Final
Remedial Investigation
Maury Island Open Space Property
Maury Island, Washington

King County Water and Land
Resources Division
King Street Station
201 South Jackson Street,
M.S. KSC-NR-600
Seattle, Washington 98104-3855

June 2, 2014

King County

CDM Smith

A Report Prepared For:

King County Water and Land Resources Division
King Street Center
201 South Jackson Street, M.S. KSC-NR-600
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Table of Contents

Executive Summary ES-1

Section 1 Introduction 1-1

1.1 General 1-1
1.2 Background Information 1-1
1.3 Purpose and Scope of Work 1-2
1.4 Report Layout 1-4

Section 2 Cleanup Unit Location and Description 2-1

2.1 Location and Vicinity Conditions 2-1
2.2 Cleanup Unit Description 2-1
2.2.1 Current Conditions 2-1
2.2.2 Cleanup Unit's History 2-2
2.2.2.1 North of SW 260th Street 2-2
2.2.2.2 South of SW 260th Street 2-3
2.2.3 Decision Units 2-3
2.3 Future Land Use 2-5

Section 3 Physical Setting 3-1

3.1 Geology 3-1
3.2 Soils 3-2
3.3 Groundwater 3-3
3.4 Springs 3-4
3.5 Surface Water 3-4

Section 4 Historical Property Chemical Data 4-1

4.1 Soil 4-1
4.1.1 Historical Soil Studies Summaries 4-1
4.2 Groundwater/Springs 4-4
4.2.1 Evaluation 4-4
4.2.2 Conclusions 4-5

Section 5 Contamination Assessment Methods 5-1

5.1 Objectives 5-1
5.2 Soil and Forest Duff 5-1
5.2.1 Sampling Methods 5-2
5.2.1.1 Sample Collection Methods 5-3
5.2.1.2 Analysis by XRF 5-4
5.2.1.3 Laboratory Analysis 5-4
5.2.1.4 Sampling Nomenclature 5-4
5.2.2 Laboratory/Quality Assurance Testing 5-5
5.2.2.1 2010 Field Investigation 5-5
5.2.2.2 2013 Field Investigation 5-5

5.2.3 Bluff Sampling ... 5-5
5.3 Vegetation ... 5-6
5.4 Springs ... 5-7

Section 6 Data Validation ... 6-1

6.1 Data Usability ... 6-1
6.1.1 Laboratory Data Validation ... 6-1
6.1.2 XRF Data Validation ... 6-2
6.1.3 Comparison of XRF vs. Laboratory Data ... 6-2
6.2 Subsurface Soil Confirmation Sampling ... 6-3

Section 7 Contaminant Assessment Findings ... 7-1

7.1 Observations ... 7-1
7.1.1 Soils ... 7-1
7.1.2 Skeet Range Inspection ... 7-1
7.2 Small Scale Variability Study ... 7-2
7.3 Soil Metals Data Summary ... 7-3
7.3.1 Property-Wide Metals Concentrations ... 7-3
7.3.2 Trails ... 7-4
7.3.3 Roads ... 7-4
7.3.4 Soils at Base of Bluffs ... 7-5
7.4 Soil PAH Data Summary ... 7-5
7.5 Plant Tissue Data Summary ... 7-5
7.6 Spring Data Summary ... 7-5

Section 8 Natural Environment Assessment Findings ... 8-1

8.1 Beach Assessment ... 8-1
8.2 Nearshore Subtidal Assessment ... 8-2
8.3 Wetland Survey ... 8-3
8.4 Terrestrial Ecological Assessment ... 8-4
8.4.1 2000 FEIS ... 8-4
8.4.2 Current Biological Survey ... 8-4

Section 9 Discussion of Cleanup Levels ... 9-1

9.1 Human Health ... 9-1
9.1.1 Soil ... 9-2
9.1.2 Water ... 9-2
9.1.3 Cleanup Level Exceedences ... 9-2
9.2 Terrestrial Ecological ... 9-3
9.2.1 Metals ... 9-3
9.2.2 PAH ... 9-4
9.2.3 Chemicals of Ecological Concern ... 9-5

Section 10 Data Evaluation and Discussion of Findings ... 10-1

10.1 Arsenic in Soil and Forest Duff ... 10-1
10.1.1 Property-Wide Data Evaluation ... 10-1

10.1.1.1 Forest Duff 10-1
10.1.1.2 Surface Soil 10-2
10.1.1.3 9-inch Soil 10-2
10.1.1.4 18- and 24-inch Soil 10-3
10.1.2 Trails 10-3
10.1.3 Roads 10-3
10.1.4 Summary 10-4
10.2 Lead in Soil and Forest Duff 10-4
10.2.1 Property-Wide Data Evaluation 10-4
10.2.1.1 Forest Duff 10-4
10.2.1.2 Surface Soil 10-5
10.2.1.3 9-inch 10-5
10.2.2 Soils, 18- and 24-inch 10-6
10.2.3 Trails 10-6
10.2.4 Roads 10-6
10.3 Summary 10-6
10.4 Cadmium 10-7
10.5 Metals in Soils at Base of Bluff 10-7
10.6 PAH in Soil 10-8
10.7 Plant Tissue 10-8
10.8 Spring Water 10-9

Section 11 Conceptual Site Exposure Model 11-1

11.1 Human Health Exposure 11-1
11.2 Ecological Exposure 11-2

Section 12 Conclusions 12-1

12.1 Metals in Forest Duff and Soil 12-1
12.1.1 Arsenic and Lead 12-1
12.1.1.1 Property-Wide Forest Areas 12-2
12.1.1.2 Property-Wide, Other Upland Areas 12-2
12.1.1.3 Bluffs 12-2
12.1.1.4 Trails 12-3
12.1.1.5 Roads 12-3
12.1.2 Cadmium 12-3
12.2 PAH in Forest Duff and Soil 12-3
12.3 Plant Tissue 12-3
12.4 Groundwater/Spring Water 12-4
12.5 Natural Environment Assessment Findings 12-4
12.6 Cleanup Levels 12-4

Section 13 References 12-1

Tables

Tables Embedded in Report Body

Table 5-1	Plant Tissue Samples by Unit	5-6
Table 7-1	Summary of Observations for Shot in the Former Skeet Range	7-2
Table 7-2	Comparison of Arsenic and Lead Concentrations within Each Small Scale Variability Study Grid	7-3
Table 8-1	Summary of Subtidal Debris	8-3
Table 9-1	Ecological Screening of Metals Detected in Soil and Forest Duff	9-4
Table 9-2	Ecological Screening of PAHs Detected in Soil and Forest Duff in Unit 5	9-4
Table 11-1	Terrestrial Ecological Conceptual Exposure Model	11-2

Tables in Table Section after Report Body

Table 1	Property-Wide Arsenic, Lead, and Cadmium Soil Concentrations
Table 2	Hydrogeologic and Arsenic Data for Wells Located on and Near the Maury Island Open Space Property
Table 3	Metals in Representative Plant Tissues
Table 4	Small Scale Variability Test Results
Table 5	Trails and Road – Arsenic and Lead Concentrations
Table 6	Bluff of Bluff at Beach – Arsenic and Lead Soil Concentrations
Table 7	PAH in Soil – Unit 5
Table 8	Metals in Representative Plant Tissues
Table 9	Spring Water – Arsenic, Lead, and Cadmium Concentrations
Table 10	Plant Species Observed – 6/20 and 6/21/2013
Table 11	Terrestrial Wildlife Observed in 2013 by King County Parks and WCC Staff
Table 12	Summary Statistics for Arsenic in Forest Duff and Soil
Table 13	Summary Statistics for Lead in Forest Duff and Soil
Table 14	Summary Statistics for Cadmium in Forest Duff and Soil

Tables in Appendix H

Table H1	XRF Duplicate Sampling Results
Table H2	XRF Replicate Sampling Results

Figures

Figure 1 – Vicinity Map
Figure 2 - Cleanup Unit and Vicinity Features
Figure 3 – Historical Features
Figure 4 – Decision Units and Pre-RI Surficial Soil Sample and Monitoring Well Locations
Figure 5 – Conceptual Park Plan
Figure 6 – Surficial Geology Map of Maury Island and Locations of Key Springs and Wells.
Figure 7 – Geologic Cross Sections
Figure 8 – Soils Map
Figure 9 - Groundwater Potentiometric Surface Map
Figure 10 – Spring and Bluff Sample Location Map
Figure 11 – Property-Wide Soil Sample Locations
Figure 12 – Subsurface Soil Sample Location Map
Figure 13 –Sample Locations on Trails and Roads
Figure 14 – Small Scale Variability Study Grid Location Map
Figure 15 – Small Scale Variability Study Grid #1
Figure 16 - Small Scale Variability Study Grid #2
Figure 17 - Small Scale Variability Study Grid #3
Figure 18 – Property-Wide Arsenic Concentrations in Forest Duff, Units South of SW 260th St.
Figure 19 – Property-Wide Arsenic in Forest Duff, Unit 5
Figure 20 – Property-Wide Arsenic Concentrations in Surface Soil, Units South of SW 260th St.
Figure 21 – Property-Wide Arsenic Concentrations in Subsurface Soil, Units South of SW 260th St.
Figure 22 – Property-Wide Arsenic Concentrations in Soil, Unit 5
Figure 23 – Property-Wide Arsenic Concentrations in Soil, Unit 3e
Figure 24 – Property-Wide Lead Concentrations in Forest Duff, Units South of SW 260th St.
Figure 25 – Property-Wide Lead Concentrations in Soil, Unit 5
Figure 26 – Property-Wide Lead Concentrations in Surface Soil, Units South of SW 260th St.
Figure 27 – Property-Wide Lead Concentrations in Subsurface Soil, Units South of SW 260th St.
Figure 28 – Property-Wide Lead Concentrations in Soil, Unit 5
Figure 29 – Property-Wide Lead Concentrations in Soil, Unit 3e
Figure 30 – Property-Wide Cadmium Concentrations in Forest Duff and Soil
Figure 31 – Arsenic and Lead Concentrations on Trails and Roads
Figure 32 – cPAH in Forest Duff and Soil
Figure 33 – Beach and Subtidal Features Associated with Early 1900s North Pit
Figure 34 – Estimated Area of Impact by Former Skeet Shooting
Figure 35 - Comparison of Metals Concentrations in Representative Plant Tissues
Figure 36 – Increased Metals Concentrations in Plant Tissues Compared to Control Samples
Figure 37 – Conceptual Site Exposure Model

Appendices

Appendix A – Site Photographs
Appendix B – Cleanup Unit History
Appendix C – Logs of Existing Observation Wells
Appendix D – Wetland Delineation
Appendix E – Historical Groundwater Data
Appendix F – 2010 Laboratory Analytical and Data Validation Reports
Appendix G – 2013 Laboratory Analytical and Data Validation Reports
Appendix H – XRF QA Data and Statistical Technical Memorandums
Appendix I – Subtidal Survey Report

Acronyms

µg/kg	micrograms per kilogram
µg/L	micrograms per liter
AES	Associated Earth Sciences
BaP	benzo(a)pyrene
bgs	below ground surface
CDM	Camp Dresser & McKee Inc. (now CDM Smith Inc.)
COC	contaminants of concern
COPC	contaminants of potential concern
cPAH	carcinogenic polycyclic aromatic hydrocarbons
DCAP	Draft Cleanup Action Plan
DDES	Department of Development and Environmental Services
EPA	Environmental Protection Agency
ESA	Environmental Site Assessment
ESL	ecological screening levels
FEIS	final environmental impact statement
FS	Feasibility Study
ft	feet
GPS	global positioning system
HQ	hazard quotient
MCL	maximum contaminant level
mg/kg	milligrams per kilogram
MSL	mean sea level
MTCA	Model Toxics Control Act
NEBA	Net Environmental Benefit Analysis
NTR	National Toxics Rule
PAH	polycyclic aromatic hydrocarbons
PQL	practical quantitation limit
QA/QC	quality assurance/quality control
RI	Remedial Investigation
RSD	relative standard deviation
SSLs	soil screening levels

TEE	terrestrial ecological evaluation
TEQ	toxic equivalency
TSP	Tacoma Smelter Plume
UCL	upper confidence level
XRF	X-Ray Fluorescence

Executive Summary

This report presents the results of a Remedial Investigation (RI) of the Maury Island Open Space property (referred to as the Cleanup Unit), which is located on the southeast side of Maury Island in unincorporated King County, Washington. CDM Smith Inc. (CDM Smith) completed the RI on behalf of King County (the County). King County recently purchased the property from Northwest Aggregates (NWA). NWA is owned by Glacier NW and Glacier NW is doing business as CalPortland.

Project Description

The Cleanup Unit is approximately 266-acres in size and is located on the southeast side of Maury Island situated on a sea bluff above Puget Sound. CalPortland operated a sand and gravel mine within the central portion of the Cleanup Unit, which is now sparsely vegetated with Scot's broom and Pacific madrone. The remainder of the Cleanup Unit consists of over-100 year old forests, younger forests, blackberry patches, and sea bluffs covered in blackberries, poison oak and Pacific madrone. The public have created a series of footpaths through the forests and utilize these, as well as former dirt roads, as casual walking trails.

The Cleanup Unit lies within the Tacoma Smelter area-wide contaminant plume where surface soils contain arsenic and lead concentrations that are many times greater than natural background concentrations. The Tacoma Copper Smelter operated for more than 90 years, closing in 1986. The objective of the RI is to characterize the nature and extent of contamination at the Cleanup Unit caused by the Tacoma Smelter Plume (TSP). Research of the Cleanup Unit's land use history identified one additional source of contamination – an area that had previously been utilized as a private skeet shooting range. Elevated lead concentrations from shot and polycyclic aromatic hydrocarbons (PAH) from skeet shards were then also identified as potential contaminants of concern associated with skeet shooting activities.

As a part of this RI, CDM Smith researched historical land use and divided the property into various "decision units." The decision units, or more briefly referred to as "Units," divide the Cleanup Unit into recent and older mined areas (Units 2a-2c, 3e), older forest (Units 1a, 1b), more recent forests (Units 3a, 3b), a historical dairy farm (Unit 3c), sea bluffs (Units 4a-4c), and an approximately 30-acre forested property that lies north of SW 260th Street that been utilized as a private skeet shooting range (Unit 5). Ideally, metals concentrations would be relatively consistent within each decision unit based on the amount and timing of disturbance within each unit.

This RI evaluated the following:

- Metals concentrations in forest duff, surface soil and subsurface soil across the Cleanup Unit.
- PAH concentrations in forest duff and surface soil associated with the former skeet range.
- Metals concentrations in groundwater and spring water.
- The uptake of metals by various representative plants that grow in the Cleanup Unit.
- The natural environment, including an assessment of anthropogenic changes to the beach and subtidal area as a result of historical mining activities and a terrestrial ecological assessment, and wetland survey.

Conclusions

Metals in Forest Duff and Soil

Soils within recently mined areas, whether surficial or subsurface, are within normal background concentrations for arsenic (7 milligrams per kilogram [mg/kg]), cadmium (1 mg/kg), and lead (24 mg/kg). Arsenic, lead, and cadmium concentrations are consistently elevated in forest duff and surface soil throughout the remaining portions of the Cleanup Unit, which includes the upland areas and bluffs. A portion of Unit 5 (approximately 4.7 acres) contains overall greater lead concentrations than in any of the other Cleanup Units as a result of the historical presence of a skeet range. For example, on a property-wide basis, arsenic concentrations in forest duff and surface soils (combined) within upland forest areas range up 477 mg/kg, with a combined mean concentration of 101 mg/kg (Units 1a, 1b, 3a, 3b, 5). Lead concentrations in surface soils within upland forest areas range up to 2,600 mg/kg and the mean concentration is 333 mg/kg. However, these values are skewed high by the presence of the former skeet range in Unit 5. Without using data for Unit 5, the greatest lead concentration in the forested areas is 930 mg/kg and the mean is 196 mg/kg. The greatest mean cadmium concentrations also occur in forest duff and the forest area surface soils, both averaging about 3.3 mg/kg.

A significant amount of variability in metals concentrations occurs within each of the decision units, most of which is likely as a result of the various natural physical processes. However, small versus large-scale variability studies conducted during this RI indicate that the distribution of metals observed within each decision unit are within the overall variability of each decision unit and that further studies would provide no additional benefit in assessing spatial variability.

Overall, metals concentrations decline rapidly with depth. The data suggests that when subsurface soils (i.e., 9-inches and deeper) contain elevated metals concentrations, it is because of physical transport mechanisms other than leaching, such as fill, inexact sampling practices that may have caused cross contamination from surface soils, and natural physical soil mixing processes.

Unit 3e is a recently mined area that is characterized by fill with some construction debris from an unknown source. While arsenic concentrations are elevated in this fill (138 mg/kg maximum, 36 mg/kg mean), albeit lower than in the forest areas, they are greater than mean concentrations in the unmined areas. Lead concentrations in Unit 3e fill are also elevated (403 mg/kg maximum, 61 mg/kg mean).

PAH in Forest Duff and Soil

PAH only occur in Unit 5 as a result of the skeet shards used for former trap shooting activities. Skeet shards were observed near where the clay trap throwers had been located. The TEQ cPAH Method A cleanup level of 100 micrograms per kilogram (µg/kg) is exceeded for both forest duff and soil at sample locations where skeet shards were present. PAH are not mobile and will bind to the organic matter. The area of cPAH-contaminated soils is limited to an approximately 3.9 acre area, which partially overlaps with the area of elevated lead contaminated soils, but is generally closer to the target throwers.

Plant Tissue

Plant uptake of arsenic, lead, and cadmium is greater on the Cleanup Unit, as compared to the same plants grown on uncontaminated soils. Even so, metals concentrations are typically less than 1.0 mg/kg, but concentrations between 1 and 3.5 mg/kg for arsenic and lead are not uncommon. Arsenic uptake by Douglas fir is particularly significant with the concentration averaging 47.6 mg/kg in Douglas fir needles collected from Units 1a and 1b. Uptake and shedding of fir needles could result in continued redeposition of arsenic in a recycling manner. However, what is not known is how much arsenic may be taken up and retained in the tree trunks.

Local area residents are routinely observed harvesting the blackberries within the Cleanup Unit. This study showed an increased metals uptake in blackberries; however, hyperaccumulation is not occurring and the overall uptake appears to be relatively low, considering that arsenic uptake in the control was about 10 µg/kg and in the Cleanup Unit samples, between 16 and 36 µg/kg. Metals concentrations in the berries were also less than in the plant tissue samples.

Groundwater/Spring Water

Historical groundwater monitoring data and historical and current spring data demonstrate that groundwater has not been significantly impacted by metals concentrations in surface soils. Further, research of data for water wells on Maury Island indicates that the Vashon Advance aquifer has not been impacted as a result of the TSP.

Natural Environment Assessment Findings

Results of the natural environment assessment findings indicate the following:

- Construction debris and remnant structures, particularly those associated with shoreline armoring are widely spread throughout the beach. While generally inert, these materials occupy space where natural processes would be occurring.
- Numerous residual pilings exist in the vicinity of the North Pit, most of which only protrude a foot or two from the sand. A subtidal survey identified several additional pilings.
- Wetland delineation in Unit 5 confirmed the presence of a wetland, totaling approximately 1.24 acres, which is much smaller than the area indicated on previous King County maps. The wetland was determined to be functioning well.
- The biological survey of the Cleanup Unit determined that the forested and shrubland habitats at the Cleanup Unit support a variety of wildlife and "especially valuable habitat" and found that this habitat is sustainable under current conditions and does not exhibit signs of distress.

Cleanup Levels

Metals concentrations in forest duff and surface soil throughout the Cleanup Unit, with the exception of recently mined areas and the beach, consistently exceed Model Toxics Control Act (MTCA) cleanup Levels. Any full scale cleanup action would necessarily remove all contaminated surficial material throughout the Cleanup Unit, and in doing so would destroy the existing ecological system. Based on this, remedial alternatives developed for the Cleanup Unit should incorporate remediation levels and a Net Environmental Benefit Analysis that would weigh the advantages of remediation versus the impact that cleanup will have on the habitat. An integrated cleanup action plan would utilize Method A cleanup levels for all areas proposed for major capitol infrastructure (i.e., playgrounds, picnic areas, permanent structures) and remediation levels developed from a human-health risk assessment based on the current and future site use as an open space property for all other areas of the unit.

Section 1
Introduction

1.1 General

This report presents the results of a Remedial Investigation (RI) at the King County Maury Island Open Space property, hereafter referred to as the "Cleanup Unit," which is located on the southeast side of Maury Island in unincorporated King County, Washington. CDM Smith Inc. (CDM Smith; previously Camp Dresser & McKee Inc. [CDM]) completed the RI on behalf of King County (the County). The work was completed in accordance with CDM Smith's work plans dated November 5, 2010 and May 8, 2013 (CDM, 2010a; CDM Smith 2013a), which were approved by the Washington State Department of Ecology (Ecology) in a letter dated October 25, 2010 (which requested minor revisions, resulting in the November 5, 2010 final), and an email dated May 15, 2013, respectively.

This work is being completed under Agreed Order No. DE 8439 with Ecology dated January 31, 2013, which requires King County to complete an RI, feasibility study (FS), and draft cleanup action plan (DCAP) for the Cleanup Unit.

1.2 Background Information

It is commonly known that Maury Island lies within the plume fallout area from the former Asarco Tacoma Smelter. The Tacoma Smelter was a 67-acre facility located in the Ruston/North Tacoma area. Beginning in 1890, the Tacoma Smelter was a lead smelter and refinery (EPA, 2010). Asarco purchased the smelter in 1905. In 1912, the facility was converted to a copper smelter, and refined copper from copper-bearing ores and concentrates that were shipped in from other locations (EPA, 2010). These copper ores contained high arsenic concentrations (EPA, 2010). The ore that Asarco used also contained significant concentrations of other metals besides copper and arsenic, including lead, nickel, zinc, cadmium, selenium, antimony, mercury, and silver. Asarco closed the smelter in 1985 (EPA, 2010).

Over the years of operation, metals released from the smelter's smokestack, particularly arsenic and lead, were carried by wind, ultimately settling over a 100 square-mile area (Ecology, 2001). As a result of this, surface soils within much of the Tacoma Smelter fallout area contain arsenic and lead concentrations that are many times greater than natural background concentrations. This is what is referred to as an area-wide contaminant plume.

Ecology defines any area where a hazardous substance has come to be located as the "Site," regardless of property boundaries. For this reason, the Maury Island Open Space property is referred to as the "Cleanup Unit" throughout this RI, and the "Site" refers to the Tacoma Smelter area-wide contaminant plume.

According to Ecology's prior area-wide investigations, the soils on Maury Island are among those most significantly impacted within the Tacoma Smelter Plume (TSP), with average arsenic concentrations greater than 100 milligrams per kilogram (mg/kg), and in some areas greater than 200 mg/kg (Ecology, 2004). On Maury Island, the Cleanup Unit lies within one of the areas most impacted by the TSP (Ecology, 2004).

Ecology has completed a Model Remedies Guidance for the Tacoma Smelter Plume (Ecology, 2012) also known as the Model Remedy Guidance. This document is a soil sampling guidance prepared for property owners and developers who intend to develop or redevelop properties located within the TSP. The guidance only requires testing for arsenic and lead in soil, because these metals are consistently present at the highest concentrations and are the primary contaminants of concern with respect to human health risks.

The Model Remedy Guidance does not address assessment of groundwater, terrestrial ecological concerns, or surface water. In some instances metals-impacted soils may cause secondary impacts to groundwater, surface water or sediments as a result of contaminant migration. In undeveloped areas (i.e., forest land) the higher exposure, and therefore the greater population at risk, is the terrestrial ecological environment as opposed to humans. Ecology undertook an area-wide terrestrial ecological evaluation (TEE) to evaluate soil screening levels (SSLs) for arsenic and lead that are protective of plants, soil biota, and wildlife in the TSP and Hanford Site Old Orchards areas, the results of which are published in a documented dated February 2011.

CalPortland[1] previously owned the Cleanup Unit and operated gravel mining operations on it. For 13 years CalPortland worked on permitting to expand mining operations, which was met with heavy public opposition. As a result, in 2010 King County purchased the Cleanup Unit for use as protected open space in perpetuity, effectively ending the public dispute over land use. A portion of the acquisition was funded by an appropriation of $15 million from Ecology to assist King County in the acquisition and remediation of the property, $4.1 million of which was funded out of a settlement with Asarco and the remainder out of the State Toxics Control Fund. Land reclamation and soil remediation are a condition of Ecology's grant funding for the Cleanup Unit.

In December 2010, CDM Smith completed a Phase 1 environmental site assessment (ESA) for the Cleanup Unit (CDM, 2010b). Besides the fact that the Cleanup Unit lies within one of the areas most heavily impacted by the TSP, CDM Smith determined that a portion of the Cleanup Unit had also been used as a private, recreational skeet shooting range from possibly as early as the 1930s until approximately the mid-1980s. A Phase 2 ESA confirmed that concentrations of lead in forest duff and surface soil in a portion of the Cleanup Unit that is within the former private skeet range are greater than area background concentrations (CDM Smith, 2011).

1.3 Purpose and Scope of Work

The objective of this RI is to characterize the nature and extent of contamination across the Cleanup Unit, regardless of the source. The work to complete this RI was conducted in three phases as follows:

Phase 1 - Remedial Investigation

CDM Smith conducted an RI in accordance with an Ecology approved work plan dated November 5, 2010 (CDM, 2010a). The results of that investigation were documented in a draft RI report dated February 25, 2011. The scope of work to complete the RI generally included the following:

- Compiled and evaluated data collected during previous investigations of the Cleanup Unit by others.

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[1] The Cleanup Unit was owned by Northwest Aggregates' (NWA), a wholly owned subsidiary of Glacier Northwest, Inc. Glacier Northwest is now a wholly owned subsidiary of CalPortland.

- Conducted forest duff, surface soil, and shallow subsurface soil screening analyses for arsenic and lead using an X-Ray Fluorescence (XRF) meter.
- Submitted a subset of the XRF-screened soil samples to an analytical laboratory for analysis of arsenic, lead, and cadmium.
- Conducted quality assurance/quality control (QA/QC) sampling and analysis of the XRF and laboratory analyzed samples.
- Collected representative plant tissue samples on the Cleanup Unit and submitted those samples for laboratory analysis of arsenic, lead, and cadmium.
- Collected the same types of plant tissue samples from a control area (i.e., area unimpacted by the TSP) and submitted them for analysis of arsenic, lead, and cadmium.
- Compiled the XRF and laboratory data and conducted statistical evaluations of the data.
- Conducted a site reconnaissance to identify the presence of seasonal surface water features.
- Compiled and evaluated historical groundwater data for the property, and groundwater data for similarly arsenic-impacted areas on Maury and Vashon Islands.

Phase 2 - Phase 2 ESA, Former Skeet Range

CDM Smith conducted a Phase 2 ESA of an approximately 30-acre portion of the Cleanup Unit, which contained the former private skeet range, to assess whether historical skeet shooting activities resulted in lead concentrations in forest duff and surface soils that are significantly greater than those on the rest of the Cleanup Unit. The results of the Phase 2 ESA were documented in a report dated June 27, 2011 and are incorporated within this RI. The scope of work for that investigation generally included:

- Collected soil and/or forest duff samples within the anticipated projected area of the skeet range and lead shot fallout zone.
- Submitted collected soil and forest duff samples to a laboratory for analysis of total arsenic and lead.

Phase 3 - Supplemental RI

The County received Ecology's comments on the draft RI in a letter dated March 5, 2013. CDM Smith, on behalf of King County, submitted a response to Ecology's comments in a letter dated April 3, 2013. The letter also provided a conceptual plan for follow-up supplemental investigation to complete the RI, which was verbally approved by Ecology on April 9, 2013. The draft work plan, based on the conceptual plan was submitted on May 8, 2013 and Ecology approved the work plan without changes in an email dated May 15, 2013. The scope of work to complete the supplemental RI work generally included:

- Conducted a visual assessment of the presence of shot and clay shards within the former skeet range area.

- Collected additional soil and forest duff samples from the former skeet range area and submitted them for analysis of arsenic and lead to delineate the extent of lead contamination associated with the former skeet range and to obtain additional Cleanup Unit - wide data.
- Collected soil and forest duff samples from the former skeet range area for analysis of polycyclic aromatic hydrocarbons (PAH) to assess the potential presence of these contaminants as they may have been present in the clay pigeons used at the skeet range.
- Collected soil samples along the existing trails through forested areas and submitted them for analysis of arsenic and lead to determine concentrations of these metals in soils in areas where humans have the greatest potential for exposure to metals associated with the TSP.
- Conducted confirmation subsurface soil sampling at selected locations.
- Collected soil samples from bluff faces and slough along the beach and submitted them for analysis of arsenic and lead.
- Collected blackberry samples and submitted them for analysis of arsenic, lead and cadmium. Blackberries are frequently harvested by the local residents and it was too late in the season to collect those samples during the Phase I RI.
- Collected a blackberry sample from a control area (i.e., area unimpacted by the TSP) and submitted it for analysis of arsenic, lead, and cadmium.
- Conducted an assessment of the presence of springs along the beach and collected samples from each spring where there was sufficient flow for sampling. The samples were submitted for analysis of arsenic, lead, and cadmium.
- Conducted a formal delineation of the wetland located on the Cleanup Unit.
- Conducted a survey of existing plant and animal communities, along with observations of the general health of these communities, and compared these observations to the 2000 Final Environmental Impact Statement (FEIS) that was prepared for the proposed expansion to the existing gravel mine.
- Conducted a site-specific terrestrial ecological assessment.
- Conducted an assessment of the beach at very low tide to assess physical changes to the beach area as a result of historical mining activities (i.e., presence of pilings, bulkheads, anthropogenically placed rock, debris).
- Conducted a nearshore subtidal assessment parallel to the original (north) mining pit to assess the presence of pilings and other anthropogenically placed materials in the subtidal zone as a result of historical gravel mining activities.

1.4 Report Layout

This report is broken down into 13 sections with supporting tables, figures and appendices. The following summarizes the topics presented in each of the remaining sections of this report.

Section 2 – This section describes current conditions on the Cleanup Unit, its history, and proposed future land use.

Section 3 – This section describes the physical setting of the Cleanup Unit, including its geology, soils, groundwater and surface water features.

Section 4 – This section presents historical chemical data collected by other consultants during prior investigations.

Section 5 – This section describes the investigation methods used to complete this RI.

Section 6 – This section provides a summary of the data validation.

Section 7 – This section provides a summary of the contaminant assessment findings, including field observations, and the chemical data.

Section 8 – This section presents findings of several natural environment investigations completed, including an assessment of residual mining –related debris on the beach and subtidal zone, wetland survey, and terrestrial ecological assessment.

Section 9 – This section presents a discussion of cleanup levels established under the Model Toxics Control Act (MTCA).

Section 10 – This section presents a discussion of the data findings and evaluation.

Section 11 – This section presents a discussion of the human health and ecological conceptual site exposure model.

Section 12 – This section presents the RI conclusions.

Section 13 – This section lists the references cited throughout the report.

Section 2

Cleanup Unit Location and Description

2.1 Location and Vicinity Conditions

The Cleanup Unit is located on the southeast side of Maury Island, which is located in the Puget Sound, north of Tacoma, Washington, as shown on **Figure 1**. Maury Island is just off the southeast side of Vashon Island and connected to Vashon Island at its north end by an isthmus. The two landmasses together are sometimes referred to as Vashon-Maury Island. The Cleanup Unit is situated in portions of Sections 28 and 29, Township 22 North, Range 3 East, and Willamette Meridian.

The surrounding land is characteristically forested with some rural residential properties and small residential communities. King County and privately owned vacant forest lands are situated to the north, northwest, and west of the Cleanup Unit. Small residential communities are located off the south end and northeast corner of the Cleanup Unit and two rural properties for residential and equestrian use (horse acreage) are located to the west. These adjacent land uses are depicted on **Figure 2**.

2.2 Cleanup Unit Description

2.2.1 Current Conditions

The Cleanup Unit consists of the following tax parcels and have the assigned addresses and the acreage:

- Parcel No. 2822039023, 8215 SW 260th Street (257.38 acres)
- Parcel No. 2822039024, SW 260th Street (2.91 acres)
- Parcel No. 2822039025, SW 260th Street (2.74 acres)
- Parcel No. 2822039057, SW 260th Street (3.09 acres)

The Cleanup Unit is irregularly-shaped and is bordered on the southeast by the Puget Sound. SW 260th Street bisects an approximately 30 acre portion of the property on the north from an approximately 227 acre portion of the property on the south**.**

Topographically, most of the Cleanup Unit is situated on a sea bluff above the Puget Sound. The upland northern, western, and southern portions of the Cleanup Unit are gently rolling. Slopes range from roughly 5 to 20 percent in these areas. The Cleanup Unit is steeply sloped along the sea bluffs above Puget Sound and the boundaries around mined areas, with slope gradients of up to approximately 60 percent. Total elevation change across the Cleanup Unit is approximately 363 feet (AESI, 1998). The sea bluffs tend to be prone to landslides. **Figure 2** shows the Cleanup Unit's boundaries with topographic contours projected on an aerial photograph. **Appendix A** contains photographs that show the sea bluffs and steep slopes that are within the Cleanup Unit.

CalPortland operated a sand and gravel mine within the Cleanup Unit. Mining, processing, and reclamation activities had been permitted on approximately 193 acres of the portion of the parcel that is south of SW 260th Street. Recent mining operations had been centrally located within that acreage, which is referred to as the "Southern Pit" (**Figure 3**). There currently are some associated above ground and underground conveyor structures existing on the property (**Figure 2; Appendix A,** Photo #1). A partially reconstructed dock is located at the base of the Southern Pit (**Appendix A**, Photo #2). To the northeast of the Southern Pit is another abandoned gravel pit, referred to as the "North Pit," which had operated in the early 1900s (**Figure 3**).

Much of the most recently mined areas (the Southern Pit) are sparsely vegetated, typically with Scot's broom (also known as Scotch broom), sparse grasses, and seedling Pacific madrone. The North Pit is predominantly vegetated with Scot's broom, sparse grass, and a few mature trees (Pacific madrone, maple, and Douglas fir). The majority of the upland areas previously undisturbed by mining are covered by mature and semi-mature forest, which includes Pacific madrone, Douglas fir, Red alder, Black cottonwood, Western hemlock, and maple with an understory that includes salal, various ferns, huckleberry, Oceanspray, and Oregon grape. The exceptions to this are an area in the northeast corner of the Cleanup Unit and within the former skeet range that are predominantly covered by blackberry bushes. Large stands of blackberry bushes and other scrubby vegetation, such as poison oak, Himalayan blackberries, and Scot's broom, cover the sea bluffs. Further description of the Cleanup Unit's vegetation is provided in Section 8. The portion of property north of SW 260th Street contains a wetland that is included in the National Wetlands Inventory (NWI). Photographs in **Appendix A** show some of these features.

2.2.2 Cleanup Unit's History

In December 2010 CDM Smith completed a Phase 1 ESA for the Cleanup Unit, which included research of its history (CDM, 2010b). The results of that research are summarized below. Selected historical features are indicated on **Figures 2** and **3.** A more detailed description of the Cleanup Unit's history is provided in **Appendix B**.

Maury Island and the Cleanup Unit itself was extensively logged during the 1880s-1890s. The first recorded human occupancy was in the late 1800s when the northeastern portion of the Cleanup Unit was homesteaded; however, the homesteading occupants left in 1891. Anthropogenic activities on the Cleanup Unit for the area north of SW 260th Street and the area south of SW 260th Street subsequent to the late 1800s are described separately in the following sections.

2.2.2.1 North of SW 260th Street

A driveway used to extend north into the Cleanup Unit from SW 260th Street. Currently this former driveway is blocked off by ecology blocks. The driveway used to be the entrance for a private skeet shooting range which operated possibly as early as the 1930s, and certainly by the early 1960s, until the mid-1980s. The skeet range reportedly had a high tower, low tower, and a shed. The approximate configuration of the skeet range, as determined from historical aerial photographs, is shown on **Figure 3**. Based on the configuration of the former skeet range, shooting would have generally occurred in a northeasterly direction.

The former skeet range area rests on a small plateau, which drops off to the north, east, and west. The overall property topography, shown on **Figure 2**, indicates that the property has a swale that extends in a northwest-southeast direction through the center, which drops off and becomes steeper as it extends farther towards the northwest.

2.2.2.2 South of SW 260th Street

Shortly after 1902, gravel mining began on the northeastern portion of the Cleanup Unit along the bluff, beside the former homesteaded area (North Pit; **Figure 3**). Those initial mining operations peaked in 1917 and shut down after 1923 - possibly as late as the early to mid-1930s. The owner of the gravel mine also began a dairy farm on the level upland portion of the property adjacent to the mine, approximately the same location as the homestead. The farm (also known as the Pembroke Farm) included barns, silos, a superintendent's residence, and residences for employees of the mine and farm. Residual foundations from this dairy farm still exist (**Figures 2** and **3**). The farm also shut down around 1923.

Gravel mining did not occur again on the Cleanup Unit until sometime between 1965 and 1969 when mining operations began in the central area (Southern Pit; **Figure 3**). The amount of and exact location of mining activities varied throughout the years, as indicated by the presence or lack of vegetation on the mine areas. Mining ceased in 2010 when King County purchased the property, but during the last several years before 2010, mining operations were very limited.

From the historical resources reviewed, the only structures ever indicated on the Cleanup Unit besides the residence/farm related structures were small temporary or portable structures in vicinity of the Southern Pit. There has never been evidence of above ground or underground fuel storage tanks for mine-related equipment.

None of the historical information sources reviewed suggest settling ponds were ever constructed for the Southern Pit. A 1973 Department of Development and Environmental Services (DDES) inspection record cited potential concerns regarding land clearing in the western portion of the Cleanup Unit that may impact a "drainage ravine" if mining were expanded to that area. The inspector suggested settling ponds may be sufficient to address this concern in the event of future increased activity in that area, but the Southern Pit was never extended into that area and said settling ponds were never constructed. The referenced drainage ravine appeared to be more of a topographic feature than for conveying surface water runoff to any significant degree.

Gravel washing may have occurred in the original gravel pit, suggesting settling ponds may have been utilized. However, based on anecdotal information that turbidity caused by the multiple operational gravel mines on the east side of Maury Island reached all the way to Tacoma, it is not likely that settling ponds were used.

Aerial photographs reviewed indicated the possible presence of imported fill in one portion of the Cleanup Unit. This area was explored during the RI field investigation, and as will be noted in later sections of this report, the debris noted was relatively innocuous in nature (i.e., concrete, brick, telephone pole, wood debris, stumps). The only contaminants identified were the same metals already present throughout the Cleanup Unit as a result of the TSP.

The Phase 1 and 2 ESAs completed for the Cleanup Unit did not identify recognized environmental conditions a result of past historical activities beyond those associated with the TSP and the former skeet range.

2.2.3 Decision Units

The Cleanup Unit is not homogenous and is very complex in that it varies widely in topography, historical use, and vegetation. For purposes of evaluating how these differences affect the nature of contamination across the Cleanup Unit CDM Smith divided it into five primary "decision units" and further subdivided some of these decision units into two or more "sub-decision" units. The five primary decision units consist of the following: 1) forest, 2) mines, 3) unmined historic disturbed areas, 4) bluff, and 5) former skeet range. Within the gravel mine decision unit, sub-decision units are based upon the time of active mining relative to the operation of the Tacoma Smelter. **Figure 4** shows the approximate boundaries of the various primary decision and sub-decision units across the Cleanup Unit. The primary decision units, associated sub-decision units, and the distinctions between each are described below. Throughout this report decision/sub-decision units will be referred to generally as Unit 1, Unit 2, etc., and specifically as Unit 4a, Unit 3b, etc.

Unit 1) Mature Forest

1a) Western Forest - characterized by a predominance of Pacific madrone, maple, and Douglas fir, with understory of salal, bracken fern, sword fern, Oregon grape, and huckleberries. The area was last logged during the 1880s-1890s.

1b) Northern Forest - similar to the Western Forest area but geographically separated. The area was similarly logged during the 1880s-1890s.

Unit 2) Mines

2a) Southern Pit - Most actively mined from the mid-1960s through 1980s, and a relatively small amount of mining along the north side in the late 1990s. Scot's broom and Pacific Madrone are encroaching in this area (**Appendix A**, Photo #1)

2b) Southern edge of the Southern Pit - Mined from the 1980s to 2010. This area is graded level, rather than steeply sloped like the Southern Pit area. Some Scot's broom and sparse grass are beginning to encroach at the edges of this area (**Appendix A**, Photo #3).

2c) North Pit – Mined from the early 1900s until the mid-1920s. Vegetated primarily with Scot's broom on the northern slope. A few mature maple, Douglas fir, and Pacific madrone exist on the southwest slope and the northeast slope.

Unit 3) Unmined Historic Disturbed Areas

3a) Presently forested, but with a much higher percentage of young alder than in Unit 1. There is also a substantial amount of nettles and blackberries at the edge of the forest at some locations. In the mid-1970s the unit appeared to have been partially logged/cleared. Roads through this unit have been redirected several times over the years and substantial grading occurred off the east side of the unit during the early 1980s to repair a large slide.

3b) This unit was extensively graded, apparently in association with the North Pit activities, in the 1930s. Since the 1930s grading, Unit 3b has been relatively undisturbed and has grown back into forest. The forest in this unit appears to have a higher percentage of Douglas fir than in Unit 1.

3c) Homesteaded in the late 1800s until 1891, followed by dairy farm from the early 1900s until about 1923. This unit appears to have been relatively undisturbed since the dairy farm except for the dirt road that was graded through it. Presently the area is characterized by thick stands of blackberry bushes, but also contains a few madrone, maple, aspen, and old fruit trees, as well as Scot's broom and ivy.

3d) Unit 3d is presently forested. In the first work plan it had been originally segregated out because of clearing that occurred to allow for parking and other disturbances along the side of the main road into the mine, as associated with mining activities from the 1960s through the 1970s. The data for this unit has since been merged in with data for adjacent Units 1b and 3e and is no longer used.

3e) Western Edge of the Southern Pit. This unit presently consists of dense stands of Scot's broom and blackberries that cover soil mounds and level grassy areas. Historical aerial photographs indicate that the area was stripped level then material was mined out of several relatively shallow holes that were later filled in. The source of the fill and stockpiled material was never determined. Upon exploration with a backhoe during this RI it was determined that the fill and stockpiles in this area contain stumps and construction debris, such as concrete, asphalt, brick, and power poles.

Unit 4) Bluff

4a) South bluff – Several landslides have occurred along this bluff over the decades. The area is heavily vegetated and there are no trails or roads.

4b) Middle bluff – Numerous large landslides occurred along this bluff in the 1930s through 1980s. The area is heavily vegetated, primarily with Scot's broom and blackberries.

4c) North bluff – Landslides have not been prevalent along this bluff, but a substantial amount of road grading occurred in 1960s, which in turn generated a substantial amount soils that were side-cast down the hillside. The area is heavily vegetated, primarily with Scot's broom and blackberries, and it also contains a substantial amount of poison oak. Unit 4c also includes what were once three long, narrow residential-zoned parcels at the north end.

Unit 5) Former Skeet Range

Unit 5 is not subdivided into subunits. It consists of the approximately 30 acre property located to the north of SW 260th Street. It was formerly used as a private skeet shooting range as described in Section 2.2.2.1. On the plateau where the skeet range was situated, the area was primarily covered in blackberry bushes. Much of this area was cleared of the blackberries to allow for sampling. The most of the rest of the property is forested. The wetland area contains primarily cottonwood and alder with an understory of hardhack and willows. The upland area primarily consists of second growth Douglas fir, cedar, maple and alder with an understory generally consisting of vine maple, hazelnut, salal, holly, bracken fern and nettles.

2.3 Future Land Use

King County has purchased the Cleanup Unit for use as part of its open space system. Open spaces provide valuable environmental and recreational opportunities. They offer places for the general public to exercise and experience the natural environment. Besides offering scenic beauty, open spaces provide natural habit, wildlife corridors, and maintain air and water quality. It is anticipated that the Cleanup Unit will be preserved as open space in perpetuity. The most current plan for the Maury Island Open Space property is outlined in a February 2013 draft document entitled "*Maury Island Natural Area Site Management Plan*" (King County, 2013). The property will be generally accessible to the public as a fairly informal park. The current plan will limit recreational use to low impact, passive recreation, such as: hiking, mountain biking, horseback riding, dog walking, running, and water-based activities such as canoeing, kayaking, and scuba diving. Off-road vehicles will not be allowed. King County's plan is to maintain the existing soft surface trail system. Structures that present a safety hazard, impact wildlife movement, restrict natural processes, or restrict access unnecessarily will be removed. Constructed facilities may include parking, small picnic shelters/areas, and primitive toilet facilities. **Figure 5** shows the current conceptual plan for the future park layout. There is no plan for supplying water to picnic areas or sanitary facilities, nor will there be landscaped areas that require watering. Therefore, no production wells will be installed on the property for a source of potable or irrigation water.

Section 3
Physical Setting

The Cleanup Unit is located within the Puget Sound Lowland, a north-south trending structural and topographic depression bordered on the west by the Olympic Mountains and on the east by the Cascade Mountains. The Puget Sound Lowland is underlain primarily by sediments deposited during and between repeated glacial advances and retreats in the Pleistocene Epoch.

3.1 Geology

The principal stratigraphic units at the Cleanup Unit and adjacent areas include (from youngest to oldest):

Modified Land (m):	Fill, or areas that obscure, or substantially alter the original deposits, commonly mapped in areas undergoing surficial mining.
Landslide Deposits (Qls):	Landslide areas typically along steep slopes at coarse grained/fine grained contacts, such as contacts between Advance outwash and fine grained Pre-Vashon silt and clay deposits.
Vashon Recessional Outwash (Qvr):	Stratified sand and gravel, moderately sorted to well sorted, less common silty sand and silt. Recessional outwash sediments were deposited in meltwater streams from the receding Vashon ice sheet.
Vashon Till (Qvt):	An unsorted and unstratified, but highly compact, mixture of clay, silt, sand, gravel and boulders deposited at the base of the advancing glacier and then overridden.
Vashon Advance Outwash (Qva):	Well-bedded sand and gravel. Advance outwash sediments were deposited in meltwater streams in front of, and adjacent to, the advancing Vashon ice sheet.
Olympia Beds (Qob):	Pre-Vashon (Pleistocene) deposits of sand, silt (can be organically rich), peat and tephra layers, thinly interbedded.
Pre-Fraser silt/clay deposits (Qcs):	Pre-Vashon (Pleistocene) deposits of silt and clay.

The 2002 King County surficial geology map (**Figure 6**) indicates Vashon till (Qvt) mantles the Cleanup Unit's entire upland area, with the exception of recessional outwash (Qvr) that occurs throughout much of the Unit. Advance outwash (Qva) is exposed along the bluffs. The Qva unit is exposed within the mine areas.

Various consultants who have studied the Cleanup Unit have estimated the till as being discontinuous and only partially mantling the upland area and that the till is relatively thin. According to work conducted by others, the till is generally only 3 to 6 feet thick, but at one location the till was found to be greater than 11.5 feet thick (AESI, 1998). This RI verified the presence of till within some areas across the upland and it does appear to be present on a discontinuous basis, but the subsurface investigations were too shallow to ascertain the full extent of the till unit mantling the Cleanup Unit. A thin Qvr layer can particularly obscure the presence of till and this was observed in test pits excavated at the southern tip of Unit 3c.

Figure 7 shows geologic cross sections developed through the Cleanup Unit and vicinity (PGG, 2000). The Advance outwash (Qva) layer underlying the Cleanup Unit is approximately 200 to 250 feet thick. Vashon Advance outwash deposits typically consist of brown, moist, stratified sandy gravel to gravelly sand, becoming fine to medium grained sand with scattered gravels at depth. The upper coarse layer of the advance outwash is 108 to 110 feet thick and is cross-bedded with clasts of silt blocks (AESI, 1998).

Pre-Vashon age deposits occur approximately 290 to 263 feet below existing ground surface across the upland areas (approximate elevations of 8 to 90 feet, respectively) (AESI, 1998).

3.2 Soils

Mined areas of the Cleanup Unit lack a soil horizon. On unmodified areas of the Cleanup Unit, soils are relatively young and have not had sufficient time to develop a deep profile. Instead, they exhibit a direct relationship to the underlying parent material (i.e., the geologic deposits described above). According to soil survey maps (SCS, 1973), three soil types are mapped across the Cleanup Unit. These soil types include: 1) Everett gravelly sandy loam, 5 to 15 percent slopes; 2) Everett-Alderwood gravelly sandy loams, 6 to 15 percent slopes; and, 3) Alderwood-Kitsap association, very steep. Each of these soil types are described below.

Everett Soils (EvC)

Everett soils consist generally of gravelly sandy loam that formed from glacial outwash (Qvr/Qva). These soils were mapped across a majority of the upland areas of the Cleanup Unit. The typical soil profile is described as follows:

- **O1 horizon** (1-2 inches thick) – Undecomposed roots, twigs, and moss, abundant roots.
- **O2 horizon** (¾ to 1 ½ inches thick) – Decomposed organic matter, abundant roots.
- **A1 horizon** (0-1 ½ inches thick) – Black to gray sandy loam with a massive, very friable structure.
- **B2 horizon** (10 to 18 inches thick) – Dark brown to yellowish brown gravelly sandy loam with a massive, very friable structure.
- **B3 horizon** (8 to 18 inches thick) – Brown to pale brown very gravelly sandy loam with a massive, very friable structure.
- **C horizon** (below a depth of 32 inches) – Black/dark grayish brown to brown/gray very gravelly coarse sand with a single grain, loose structure.

Everett-Alderwood Soils (EwC)

The Everett-Alderwood mapping unit is about equal parts Everett and Alderwood soils. The Alderwood soils consist of dark brown and grayish-brown gravelly sandy loam developed over a substratum of grayish-brown lodgment till (Qvt). These soils are mapped westward of the Everett soils. The typical soil profile for the Alderwood soil is as follows:

- **A1 horizon** (1-3 inches thick) – Very dark brown to dark grayish brown, gravelly sandy loam with a weak, fine granular structure. Friable
- **B2 horizon** (9 to 14 inches thick) – Dark brown to brown, gravelly sandy loam with a medium, subangular blocky structure. Slightly hard.
- **B3 horizon** (12 to 23 inches thick) – Grayish brown to gray gravelly sandy loam. Contains light olive brown mottling. Hard.
- **C horizon** (below a depth of approximately 27 inches) – Grayish brown to gray consolidated till. Contains distinctive light olive brown and yellowish brown mottling.

Alderwood and Kitsap Association (AkF)

Soils within the Alderwood and Kitsap Association contain two or more soil types. Approximately 50 percent of the mapped area is Alderwood gravelly sandy loam and 25 percent is Kitsap silt loam. The remaining percentage of material varies, but may consist of moderately coarse to coarse textured soils. These soils develop in varying parent materials, including clay, silt, sand and gravel, thus the variation. This association typically forms on steep slopes (25 to 70 percent) and is mapped along the sea bluffs.

Figure 8 shows the mapped areas for each of these soil types across the Cleanup Unit per the SCS 1973 soil survey. It somewhat contradicts surficial geology map shown in **Figure 6** in that the extent of till on the surficial geology map appears to occur over a much greater area. Aspect Consulting's 2006 Technical Information Report interpreted a greater area of Alderwood soils (i.e., soils derived from glacial till), indicating the presence of Alderwood soils across the southern half of Unit 1a, the northwest edge of Unit 1a, the northern half of Unit 1b, and in the western portion of Unit 3a. What appears to be most often the case is that there is a thin layer of recessional outwash (Everett soils) that overlies glacial till, when it is present, thus obscuring the boundaries of where the till exists. Based on observations made during this RI, till, whether present at the surface, or underlying a thin recessional outwash surface soil layer, is present discontinuously and appears to occur mainly in areas where the there is a slight topographic high, such as was observed in the south end of Unit 3c and in the western side of Unit 3a and 1b.

3.3 Groundwater

Shallow perched water may exist above the till, where present, particularly if there is an overlying Qvr layer. However, perched groundwater overlying the till layer has not been observed. CDM Smith noted iron oxide staining in soils overlying an unweathered till layer at 1.5 feet below ground surface (ft bgs) in one test pit (TP-7) located at the southern end of Unit 3c in the northeast corner of the Cleanup Unit. Associated Earth Sciences, Inc. (AESI) noted seepage at 0-2 ft bgs in a test pit at the southwest end of the Cleanup Unit, in soil that was similarly overlying till that extended from 2 to 7 ft bgs (AESI, 1998). This indicates limited perched water is present seasonally on a discontinuous basis in areas that till is present.

The first primary aquifer beneath the Cleanup Unit occurs in the Vashon advance outwash under unconfined conditions. Despite the large thickness of the Qva, the saturated interval is roughly one quarter of its average thickness (approximately 50 ft). Water table elevations for the Qva aquifer range from 85 feet above mean sea level (ft MSL) in the northwest corner of the Cleanup Unit to 20 ft MSL near the Puget Sound (ELS, 2006). There are seven observation wells (OBW-1, OBW-2 and OBW-5 through OBW-9) located on the Cleanup Unit, as shown on **Figure 4**. These wells are all screened in the Qva aquifer. OBW-1 and OBW-2 have 20 feet of screen. OBW-5 through OBW-9 have 5 feet of screen. The bottom of the wells range from elevation -10.9 feet to 40.4 feet. The approximate depth to groundwater in these wells ranged from approximately 26 ft bgs (OBW-9) to 307 ft bgs (OBW-2). Copies of these well logs are included in **Appendix C**.

Below the Qva, groundwater that exists in the undifferentiated pre-Vashon sediments is primarily under pressure, but static water levels do not appear to rise above the hydrostatic levels in the overlying Qva. This indicates that the general hydrostatic head declines with depth and the vertical gradient is primarily downward on Maury Island.

Horizontal flow has been mapped for the principal (Qva) aquifer on the Cleanup Unit and vicinity by various consultants. **Figure 6** shows a groundwater divide for the principal aquifer that is located immediately northwest of the Cleanup Unit and trends from southwest to northeast (PGG, 2000). Horizontal flow is generally perpendicular to the trend of this divide where groundwater in the Qva eventually discharges either to Quartermaster Harbor or Puget Sound. Water levels were measured in the existing seven observation wells on the Cleanup Unit for over a decade (1998-2007 and beyond). **Figure 9** presents contoured groundwater data for the winter of 1999-2000 as presented by Aspect Consulting (Aspect) in its 2008 Groundwater Monitoring Plan (Aspect, 2008). This shows a southeasterly groundwater flow direction towards the Puget Sound.

3.4 Springs

Springs occur at the contact between the Vashon advance outwash and the underlying less pervious silt and clay of the pre-Vashon unit where exposed near sea level on the east side of the property. These seepage zones are considered to be related to groundwater discharge (AESI, 1998).

During prior investigations by others, five springs were identified. These springs, shown on **Figure 10,** are identified as Springs A through E. As will be discussed further in Section 7.6, CDM Smith conducted a reconnaissance to identify and sample existing springs during this RI. During this investigation, Spring C was not found, but a previously unidentified spring, referred to now as "F," was identified and is shown on **Figure 10**. Spring C was likely located outside the Cleanup Unit property and/or was part of Spring B. Only two springs actually emanated from the base of the shoreline bluff. The other three seeps appear to emanate at locations between normal high and low tide elevations. These seeps tend to run parallel to the shoreline, for a length of as much as 200 ft as shown on **Figure 10**.

3.5 Surface Water

The primary surface water feature is the Puget Sound, which is the southeastern boundary of the Cleanup Unit, a distance of approximately 4,800 feet. The property line is the mean lower low water line of the Puget Sound.

The Cleanup Unit was traversed from one end to the other during this RI and no apparent surface water features were identified in the upland areas or mine slopes in the area that is south of SW 260th Street. This includes lakes, ponds, streams, or wetlands. A man made feature that tends to hold water is located in Unit 3c near the old barn foundation. This concrete "impoundment" is approximately 10 feet wide by 25 feet long and has curved concrete walls approximately 1 foot thick. It is so overgrown with blackberry bushes that only one end was visible. The purpose of this impoundment was never determined, but apparently had something to do with the dairy. Similarly, over 50 historical aerial photographs were reviewed by CDM Smith for the years between 1936 and 2009 and no signs of settling ponds or other surface water features were ever indicted.

On the portion of the Cleanup Unit north of SW 260th Street is a wetland (**Figure 2**). This wetland was delineated by King County as a part of this RI and a copy of the wetland delineation study is included in **Appendix D**. The wetland delineation is further summarized in Section 8.3.

Section 4
Historical Property Chemical Data

Prior to this RI, several environmental soil studies related to metals impacts as a result of the TSP were conducted on the Cleanup Unit by various consultants beginning in about 1998. The following section contains a listing of the soil environmental studies completed for the Cleanup Unit by others with a brief summary of the purpose of the study, scope of work, and findings. These pre-RI sample locations are shown on **Figure 4**.

4.1 Soil

In the following discussion we have used MTCA Method A soil and groundwater cleanup levels for unrestricted land use as a basis for comparing concentrations. These concentrations are not necessarily the standards that would be applied to the Cleanup Unit for protection of human health and the terrestrial ecological environment. Further discussion on cleanup levels is presented in Section 9.

The Method A cleanup level for arsenic is 20 milligrams per kilogram (mg/kg). For lead, cadmium, and mercury, the Method A cleanup levels are 250 mg/kg, 2 mg/kg, and 2 mg/kg, respectively. As metals are also naturally occurring, published Puget Sound area background concentrations are also relevant when considering metals concentrations in soils. These are: arsenic, 7 mg/kg; lead, 24 mg/kg; cadmium, 1 mg/kg, and; mercury, 0.07 mg/kg (San Juan, 1994).

4.1.1 Historical Soil Studies Summaries

Associated Earth Sciences, Inc., 1998, Soils, Geology, Geologic Hazards and Groundwater Report, Existing Conditions, Impacts and Mitigation, Maury Island Pit, King County, Washington. Prepared for Lone Star Northwest, Inc.

> The purpose of this study was to document existing soils, geology, geologic hazards, and hydrologic conditions. Ten soil samples were collected at six locations (EP-2, EP-3, EP-9, EP-11, OBW-1, OBW-2 locations) and analyzed for arsenic, lead and mercury as a part of the AESI study. Four samples were collected from an 8-10 inch depth and the remaining samples were collected from depths of 7 to 220 ft bgs. Arsenic concentrations in three of the shallow surface samples were comparable to background. Arsenic in one topsoil sample was present at a concentration of 85 mg/kg. Mercury and lead concentrations in all the samples were low (i.e., background), as were all metals concentrations in all of the samples collected at depth.

Landau Associates. 1999. Letter to Vashon-Maury Island Community Council Re*: Final Sampling Results. NW Aggregates Maury Island Gravel Mine.* January 19, 1999.

> The purpose of this study was to assess arsenic concentrations in surface soil samples. Ten soil samples were collected from the 0-2 inch interval (these samples were given the designation “GM”). Arsenic concentrations ranged from 28 to 379 mg/kg in nine samples, and was 9 mg/kg in the tenth sample. According to the report “surface detritus” (inferred to be forest duff) was removed before sampling. The only location mentioned as possibly having been disturbed by prior activities (e.g., grading or filling) was GM-9. Samples were sieved by

the lab prior to analysis. AGRA collected duplicate samples. Their data were similar, with arsenic concentrations ranging between 6.6 and 477 mg/kg in the ten samples.

Terra Associates, Inc. 1999. Technical Memorandum, Environmental Soil Sampling, Arsenic, Cadmium and Lead, Lone Star Maury Island Site, King County, Washington. March 23, 1999.

The purpose of this study was to obtain additional information regarding the distribution of arsenic, lead, and cadmium in soils throughout the Cleanup Unit. The study included analysis of 77 samples, 57 of which were collected from within the top 18-inches (these samples were given the designation “TA”). The samples were collected on a 600-foot grid established across the Cleanup Unit. The set of 57 samples were collected by: 1) sampling the upper 2-inches after removal of branch and leaf litter (i.e., forest duff); 2) using a shovel to advance the hole to 9-inches and collecting the next sample depth interval; and, 3) using a shovel to advance the hole to 18-inches and collecting the deepest sample. Soils at two of the sample locations were also collected at a depth of 2 ft bgs (arsenic was not detected in either sample).

Of the 19 surface soil samples, 12 exceeded the MTCA Method A arsenic cleanup level, ranging from 47 mg/kg to 220 mg/kg. Of the 19 samples collected at a depth of 9-inches, 11 exceeded the MTCA Method A arsenic cleanup level, ranging from 25 to 270 mg/kg. Of the 19 samples collected at a depth of 18-inches, three exceeded the MTCA Method A arsenic cleanup level, ranging from 43 to 64 mg/kg. In these samples, cadmium concentrations ranged to a maximum of 9.3 mg/kg and lead concentrations ranged to a maximum of 830 mg/kg. Cadmium and lead concentrations were only elevated in soil samples where arsenic concentrations were similarly elevated.

Terra Associates collected the remaining 20 samples from resource materials (i.e., proposed mine materials) from test pits, borings, and grab samples off existing vertical cuts (EP-15 through EP-28, OBW-6, OBW-7, and “G” series samples). Sample depths ranged from 8.5 to 220 ft bgs. Arsenic concentrations were all less than 7 mg/kg. Cadmium and lead concentrations were below laboratory method detection limits in these samples.

Foster Wheeler Environmental. 1999a. Attachment A to Mitigation Plan, entitled: *Focused Feasibility Study*. In: *Mitigation Report for Contaminated Soils, Northwest Aggregates, Maury Island Sand and Gravel Mining Operation.* June 1999.

The purpose of this study was to evaluate remedial alternatives, based on the proposed land use as a mining operation. This study estimated that 271,000 cubic yards of surface soils exceed the MTCA Method A arsenic cleanup level of 20 mg/kg. Of that total yardage, approximately 50,520 cubic yards of soil were estimated to exceed 200 mg/kg total arsenic. Of the remedial alternatives evaluated in the FS, excavation and containment on the Cleanup Unit in lined cells was determined to be the preferred alternative.

Foster Wheeler. 1999b. *Mitigation Report for Contaminated Soils, Northwest Aggregates, Maury Island Sand and Gravel Mining Operation*. June 1999.

This report presents a summary of prior environmental data and the FS described above, as well as confirmation soil sampling, air monitoring, groundwater monitoring, and institutional controls that would be implemented as a part of the proposed remedial alternative.

Additional soil data presented in this report included three locations ("SS" series samples) where soil samples were collected from the surface, 9-inches and 18-inches, similar to the Terra Associates study summarized above. At two additional locations, soil samples were collected from a depth of 2 ft bgs. Arsenic concentrations were 110 and 140 mg/kg in two surface soil samples and non-detected in the third sample. In the three 9-inch samples, arsenic was reported at 130 mg/kg in one sample and non-detected in two samples. Arsenic was not detected in the 18 inch or 2 ft samples. Cadmium ranged to a maximum concentration of 9.8 mg/kg and lead to a maximum of 840 mg/kg. Cadmium and lead concentrations were only significantly elevated where arsenic concentrations were similarly elevated.

Foster Wheeler. 2000a. *Soil Sampling Report for June 2000*. Prepared for Glacier Northwest, Inc. August 2000.

The purpose of this investigation was to supplement prior data and better define metals concentrations in selected areas, specifically: 1) the west road where a future grading effort was planned (the samples were given the designation "WRS"); and, 2) near the 180 degree bend in the North Slope access road (ORS-12 and ORS-13). The purpose of the road grading was to improve road drainage. Samples were collected along the east and west access roads. The samples were presumably collected within the top 0-2 or 0-6 inches. Arsenic concentrations in the 12 samples ranged between 19 and 110 mg/kg. The Method A cleanup level was exceeded in 11 of the samples. Cadmium and lead were also analyzed, and concentrations were not notably elevated in any sample.

What occurred following this sampling is unclear, but it does not appear that grading subsequently occurred.

Foster Wheeler. 2000b. (No Report Available)

Summary tables and summary figures prepared by Foster Wheeler contain information on 15 soil samples (the samples were given the designation "SF") collected along SW 260th Street by Foster Wheeler in 2000. Similar to those samples documented in the August 2000 report, we assume these were surficial soil samples collected alongside SW 260th Street in preparation of grading, ditch clearing, etc. Arsenic concentrations in these samples ranged between 16.5 and 172 mg/kg. Thirteen of the 15 samples exceeded the Method A cleanup level.

Foster Wheeler. 2001. *Soil Sampling Report for Road Restoration.* Prepared for Glacier Northwest, Inc. October 15, 2001.

The purpose of this investigation was to supplement previous analytical data and quantify metals contamination along the east access road where a road repair project was planned. Twelve samples were collected (ORS-14 through ORS- 25), presumably within the top 2 to 6 inches. Arsenic concentrations ranged between 1.78 and 156 mg/kg. Three samples exceeded the Method A cleanup level. Cadmium and lead were also analyzed and these metals were only elevated when arsenic concentrations were elevated.

Again, what occurred following this sampling is unclear. Subsequent road grading work may have modified the area where the ORS series samples were collected from, but this likely never occurred.

Aspect Consulting, LLC. 2004. *Fill Source Environmental Assessment for Maury Island for STIA Third Runway Project.* Prepared for Glacier Northwest. March 2004.

> The purpose of this investigation was to evaluate metals concentrations in mined soils for proposed use in the SeaTac Airport third runway project. In this study Aspect Consulting collected 59 soil samples from a series of test pits and borings. Sample depths ranged between 5 and 280 ft bgs. The samples were analyzed for a variety of metals, including arsenic, cadmium, and lead. Metals concentrations in all samples were low and similar to background.

The metals data generated during these investigations which were deemed usable for purposes of this RI (i.e., comparable to the same depth intervals) were compiled and are included with this RI. These historical soil data are summarized in **Table 1**, along with the soil data collected during this RI and are included in CDM Smith's statistical evaluation of the data as presented in the following sections of this report. **Figure 4** shows the historical sample locations. These sample locations are also included on subsequent figures showing the sample locations for the current investigation.

4.2 Groundwater/Springs

CDM Smith conducted an evaluation of existing groundwater data for the Cleanup Unit and the Vashon-Maury Islands to evaluate whether arsenic in surface soils could adversely affect potable water supply wells or shallow spring systems.

Table 2 lists the various drinking water and marine criteria for arsenic. These range from 0.014 micrograms per liter (µg/L) (Marine Water National Toxics Rule [NTR] Criteria) to 36 µg/L (Marine Water – chronic exposure). Two of these criteria, the Washington State groundwater standard and the marine NTR criteria are less than the laboratory method detection limit for EPA Method 200.8, which was 0.1 µg/L during the current investigation. The drinking water standards are not consistent. The MTCA Method A groundwater cleanup level for arsenic is 5 µg/L. The State and Federal drinking water primary Maximum Contaminant Level (MCL) for arsenic is 10 µg/L. The Washington State drinking water standard is 0.05 µg/L.

4.2.1 Evaluation

CDM Smith researched and reviewed geologic logs, completion intervals and water quality data for several wells and springs on the Cleanup Unit and vicinity where:

- Well completion is in the first (Qva) aquifer.
- A till cap is not present on the surface, based on existing information.
- Water quality data exists.

Table 2 highlights the information on the few wells and springs that met the criteria outlined above. Several wells did not fully meet these criteria, but are included in **Table 2** because they do provide valuable information. Two wells located off the Cleanup Unit were completed in the deeper pre-Vashon undifferentiated (Qpvu) deposits. All of the wells and sampled seeps on the Cleanup Unit represent groundwater within the Qva aquifer. The locations of these wells are shown on **Figure 6**.

Three of the seven observation wells, OBW-6, OWB-7, and OBW-9, on the Cleanup Unit were regularly monitored for metals and a variety of other inorganics between February 1999 and December 2009.

These data are included in **Appendix E**. Monitoring well OBW-7 is located at the northeast (hydraulically upgradient) corner of the Cleanup Unit, OBW-6 is located at the northwest (hydraulically upgradient) corner of the Cleanup Unit, and OBW-9 is located on the southwestern (hydraulically downgradient) side of the Cleanup Unit as shown on **Figure 9**.

Springs and wells in the vicinity of the Cleanup Unit that had water quality data and no apparent till cap include Dockton Springs West/East, Dockton Hake Springs, Piner Point Association Spring, Glacier Springs A and E, and monitoring well OBW-9. Other wells listed on **Table 2**, had a till cap, or a similar overlying low permeability unit.

Groundwater quality data on the wells that are located in the vicinity of the Cleanup Unit was obtained online from the Washington State Department of Health and are summarized in **Table 2**. Department of Health's records for Dockton's West/East and Hake springs showed historic arsenic concentrations ranging from 2 to 3 µg/L. No specific arsenic concentrations were listed for the Piner Point Association Spring (which does not have an apparent overlying till cap), located at the southern tip of Maury Island, but it does not show any exceedences for arsenic in the Washington State Department of Health water system database.

Wells apparently completed where there was a till cap or similar overlying low permeability unit (Dockton's Sandy Shores Well 1, OBW-6, OBW-7, KC-W9a and b, KC-W10a and KC-W12) show similar concentration ranges with the exception of two wells that show arsenic concentrations exceeding 7 µg/L. These wells are William White (also known as KC-W9a) and William Rueter (also known as KC-W12). Both wells are completed very deep below ground surface (370 and 473 ft respectively) and are close to, or within, the pre-Vashon undifferentiated sediments. Based on initial research of arsenic concentrations found in groundwater on Vashon Island, it is possible that the higher arsenic levels at these two deeper wells is the result of a natural geochemical process occurring within peat and organics present in the deeper interglacial sediments (Ferguson, E. and Johnson, K., 2006).

4.2.2 Conclusions

In summary, CDM Smith's review of groundwater data indicate the following:

- Arsenic concentrations in groundwater of the Qva unit within the Cleanup Unit do not exceed MTCA Method A.
- The arsenic concentrations recorded in the potable supply wells in the vicinity that are completed within the Qva do not exceed MTCA Method A.
- There is no difference in arsenic concentrations at wells/springs where a till cap covers the outwash sand compared with those that are completed in the outwash sand without the till cap at the surface.
- Deeper wells, primarily those completed in, or near, the pre-Vashon undifferentiated sediments appear to have higher arsenic concentrations. Natural geochemical process occurring within peat and organic rich zones commonly found in the deeper pre-Vashon sediments is the likely source of the elevated arsenic concentrations found at these deeper wells.

Based on this review, there is no evidence that elevated arsenic concentrations in topsoils have had or will cause any significant adverse impact to the underlying aquifer on the Cleanup Unit. Finally, additional seep sampling was conducted as a part of this RI, results of which are presented in Section 7.5. These data further substantiated the earlier seep data discussed above.

Section 5
Contamination Assessment Methods

Field investigations to assess the nature and extent of contamination throughout the Cleanup Unit were conducted in November-December 2010 and June-August 2013. The work was conducted in accordance with CDM Smith's work plans dated November 5, 2010 and May 8, 2013.

5.1 Objectives

The objectives of the field investigations described in this section were to assess:

1. Metals concentrations in soils within the various decision/sub-decision units. Prior assessment work conducted by others did not evaluate the physical differences between various areas of the Cleanup Unit and thus differentiate decision unit, let alone assess the various metals concentrations by decision unit.
2. Metals concentrations in forest duff, when present. Prior assessment work did not differentiate soil from the organic layer (i.e., forest duff) and it is assumed that any organic layer was removed prior to sampling, as indicated in some of the documents reviewed and was common practice.[2]
3. Metals concentrations in soils at depth.
4. Metals concentrations in soils along the base of the bluff where it meets the beach.
5. Metals concentrations along existing trails and roads.
6. The impact of skeet shooting activities that occurred on a portion of the Cleanup Unit.
7. Potential plant uptake of metals that may result in "biocycling," removal of metals from soils, and/or ingestion of unacceptable concentrations of metals in edible berries.
8. Metals concentrations in spring water that discharges to the Puget Sound.

5.2 Soil and Forest Duff

The scope, materials, and methods utilized during this investigation to assess contaminants of potential concern (COPC) in soil and forest duff are summarized in the following sections. The work plans should be consulted for further details.

For the soil sampling, within the decision units there were five basic areas in which soil sampling occurred. In the statistical evaluation and discussion of the data, these areas are not mixed, unless specifically stated. These areas are described as follows:

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[2] Ecology's Final Tacoma Smelter Plume Model Remedies Guidance dated 2012, recommends sampling the forest duff layer as a result of the RI work completed for the Maury Island Open Space property.

- Property - Wide – Soil samples collected from relatively undisturbed areas - off trails and roads (**Figure 11**). Subsurface sampling occurred at a limited number of locations, as shown on **Figure 12**.
- Trails – Soil samples collected directly from the soft trail system generally created by the public as a result of continued informal use over time (**Figure 13**). Subsurface sampling occurred at a limited number of locations, as shown on **Figure 12**.
- Dirt Roads – Formerly graded roads created from historical mining operations, but which have been abandoned for a number of years and currently are used only as public trails. These former dirt roads are overgrown and nearly impassible in some areas along the bluffs (**Figure 13**).
- Bluffs – Both as slough from the bluff faces that has piled on the beach against the face of the bluff and as exposed vertical bluff sidewalls located adjacent to the beach (**Figure 10**).
- Small-Scale Variability - The purpose of the small scale variability study was to evaluate whether the widespread variation in concentrations observed in any given unit was also present at a much smaller scale. Each study area was located where a relatively elevated arsenic concentration had been detected and was situated within an area that appeared relatively homogenous in nature (i.e., similar vegetation, topography) (**Figure 14**).

Forest duff was collected from the same locations as the property-wide samples in all forested units. In the case of Unit 3c the organic layer under blackberry bushes was collected. Forest duff was not collected separately from soils for the trail samples because the layer was thin (i.e., less than an inch) and the material was well degraded. Any forest duff in the trail samples was incorporated directly with the soil sample collected.

Surface soil and shallow subsurface soil sampling was conducted in all units except 4a (the southern bluff). For Units 4b and 4c, sampling was mostly limited to the existing trail (formerly a graded dirt road) that extended through these units. Off trail sampling throughout the #4 sub-units was generally impracticable due to the dense vegetation, proliferation of poison oak, and steep slopes (see Photos #4 through #6 in **Appendix A**). To have successfully completed soil sampling throughout Unit #4 would have entailed creating a series of graded roads throughout the bluff with heavy equipment in order to gain access. The clearing would in effect cause a greater potential for landslides to occur. It would also be an invitation for the general public to use these graded roads as trails, thus maintaining the longer-term increased potential for landslides. Resorting to extreme measures to collect soil samples along the bluff was considered unnecessary because:

1. The extensive amount of data collected throughout the Cleanup Unit was considered sufficient to characterize contamination and move into the feasibility study.
2. Considering the lack of trails that exist along the bluff currently and that those that do exist are nearly overgrown at this time, humans seldom use the bluff trails and therefore the risk of exposure from the bluff soils is low.

5.2.1 Sampling Methods

This RI utilized two different analytical methodologies: 1) XRF and 2) and submittal of collected samples to an analytical laboratory for analysis by standard EPA methods. The field investigation conducted in 2010 relied heavily on use of the XRF, with laboratory analysis of a subset of the samples for quality assurance purposes. In 2013, the field investigation relied entirely on submittal of collected samples for laboratory analysis. As will be described later, the XRF data were adjusted using a simple regression method to estimate laboratory (dry weight) data from XRF data so that the two sets of data could be compared directly.

At each sample location, characteristics of the sample location, such as the vegetation type, topography, presence/thickness of decomposed forest duff, and undecomposed vegetation detritus, and indications of anthropogenic disturbance in the sample area were noted on a field form. All sample locations were determined using a Global Positioning System (GPS) unit. In Unit 5, during the 2013 field investigation, prior locations with high lead concentrations were specifically returned to and inspected for the presence of lead shot by sieving the forest duff and soil through a ¼ inch and No. 6 (3.35 millimeter) brass sieve, respectively. The range area was also traversed and examined for the presence of skeet shards. Sampling was conducted in areas where skeet shards were identified.

5.2.1.1 Sample Collection Methods

Samples were collected using a hand auger and from backhoe dug test pits as described below.

Hand Collection Methods: Forest duff was collected using a hand trowel to collect the forest duff layer over an approximately 3-inch square area. Forest duff samples consisted of the entire forest duff layer, however thick, minus large, recently deposited undecomposed material (generally the top 1 to 2 inches). The duff material was placed in a clean, labeled plastic resealable plastic bag. Large rocks, sticks, leaves and other mostly undecomposed organic matter were removed and the duff was then thoroughly mixed in the plastic bag. After collecting the forest duff sample a hand bucket auger was used for soil sample collection. This ensured a consistency in the sample dimensions, both laterally and vertically.

Soil samples were collected from depths of: 0-2 inches, 9 -inches, 18-inches, and 24-inches. Sampling at depth (below 2 inches) occurred at a limited, pre-determined number of locations. In a few instances however, refusal occurred before the 18-inch depth was reached and when this occurred the samples were collected at 16- or 17-inches below ground surface. The 24-inch sample depth was only specified at locations where the arsenic concentration at the 18-inch depth exceeded 15 mg/kg. After collection of the 0-2 inch sample, the auger was used to extend the hole and collect the samples at the desired depth. A measuring tape was used to ensure the accuracy of the sample depth being collected.

Upon retrieving the soil sample from the desired interval, the soil was discharged from the bottom end of the auger into a disposable sieve with 1.5 millimeter (mm) openings and sieved into a clean, labeled, plastic bag. When the 2010 field work occurred it was November and the soils were generally too wet to sieve. These samples were therefore brought back to CDM Smith's Bellevue, Washington geotechnical laboratory, dried, and then sieved. The prepared, bagged samples were either screened directly with the XRF as described below, or placed into laboratory supplied bottles and submitted for analysis.

Test Pits: At selected locations within sub-decision Units 3c and 3e a backhoe was used to access locations overgrown with blackberries (**Appendix A**, Photo #7) and Scot's broom. Two test pits were also excavated at the southwest corner of Unit 3a to check for the presence and depth of fill. The backhoe was used to excavate test pits at each location. The test pits were logged and soil samples were collected from the excavation sidewalls and sieved into clean plastic bags as described above.

5.2.1.2 Analysis by XRF

Arsenic and lead concentrations in forest duff and soils were field screened using an Innov-X System™ XRF spectrometer in general accordance with Environmental Protection Agency (EPA) Method 6200. The XRF can also analyze for cadmium; however, as will be shown in later sections of this report, the XRF's cadmium detection limit is higher than the cadmium concentrations typically found in Cleanup Unit's surface soils and the data were therefore not useful. Some photographs of the field sampling effort using an XRF are provided in **Appendix A**, Photos #8 through #13.

XRF screening for arsenic and lead was conducted both "*in situ*" and "*ex situ.*" One method was used over another at specific locations in an effort to balance level of effort and the need for direct comparability with other site data. The methodology for each screening method is described below.

In Situ: The *in situ* methodology was only used for the small-scale variability study. *In situ* XRF screening simply involved operating the machine in direct contact with the ground surface. The ground surface (forest duff or soil) was leveled just enough to have a flat surface free of rocks and large pieces of undecomposed organic debris, and the XRF window was pressed directly onto the flat ground surface for the reading. When XRF analyses were being conducted *in situ,* arsenic and lead were first screened in the forest duff. The duff layer was then removed and the surface soil then screened *in situ.*

The small-scale variability study was conducted at three forest locations within Units 1a, 1b, and 3b as shown on **Figure 14.** At each location a 150 ft by 150 ft square was laid out around a given sample point and then divided into 50 ft grids. There were 16 total sample points at locations in Units 1b and 3b and 10 sample points in Unit 1a.

Ex Situ: *Ex situ* screening was conducted on the prepared, bagged samples described above in Section 5.2.2.1. The XRF reading was then taken directly through the bag.

5.2.1.3 Laboratory Analysis

Samples to be submitted for laboratory analysis were collected from the prepared bagged samples. Samples submitted for laboratory analysis in 2010 were further prepared as described in Section 5.2.2.1. Samples submitted for laboratory analysis in 2013 were placed in laboratory-supplied sample containers. Sample containers were labeled and submitted under chain-of-custody protocol to the analytical laboratory.

OnSite Environmental, Inc. in Redmond, Washington analyzed soil and forest duff samples collected in 2010 by EPA Method 6020 (ICP-MS). King County Environmental Laboratory analyzed soil and forest duff samples collected during the 2013 field investigation. Metals were analyzed by EPA Method 6010C (ICP). In addition, several soil samples from Unit 5 were analyzed for PAH by EPA Method 8270.

5.2.1.4 Sampling Nomenclature

Individual sample identifications (ID) generally consist of the Unit number, designation of the material type ("s" for soil, "fd" for forest duff), a sequential location number, and, in the case of soils, the depth (i.e., 3a-fd-23; 1a-s-88-09). Additional nomenclature used included "TP" for test pits and "P" for piles (Unit 3e). The small scale variability samples were designated by the Unit number, material type, the grid number (g1, g2, or g3), and then a sequential number (i.e., 1a-fd-g3-08).

While the full sample ID's are provided on the summary tables, throughout this report each sample is referred to only by its location number shown on corresponding figures (i.e., #32) for ease of reference. Additional information regarding the sample location, type, and depth is discussed as necessary for the individual sample location.

5.2.2 Laboratory/Quality Assurance Testing

5.2.2.1 2010 Field Investigation

For the field investigation effort using the XRF, a minimum of 10 percent each of the bagged forest duff and soil samples that were sieved and screened were submitted to OnSite Environmental Inc. (OnSite) in Redmond, Washington for analysis of arsenic, cadmium, and lead by EPA Method 6020. In addition, two blind duplicate forest duff and two duplicate soil samples were submitted to the laboratory for analysis. The laboratory reports are included in **Appendix F**.

In total, 29 soil samples and 11 forest duff samples that were also analyzed for metals using the XRF were submitted for laboratory analysis. These samples were prepared by placing a portion of the mixed forest duff or sieved soil into an XRF sample cup and securing the top with Mylar film. The prepared sample was then screened with the XRF and submitted to the laboratory for analysis. Laboratory data were compared to the XRF data obtained from the soil in the prepared sample cups.

5.2.2.2 2013 Field Investigation

During the 2013 field investigation, six duplicate samples were collected and submitted for analysis of arsenic and lead (1 in 20). Originally, it was intended that these samples were to be collected from the same bag of sieved material (i.e., the sieved material would have been split into two sample bottles). Instead, the samples were collected from co-located borings. Therefore, a greater difference in metals concentrations would be expected for these samples. Two duplicate samples were submitted for analysis of PAH. One of these duplicates was a split from the same sample collected at one location.

Quality assurance testing conducted in 2013 also included resampling at 9 locations to verify metals concentrations at depth. Nine of the original samples collected from the 9-inch depth were found to contain greater-than-expected arsenic concentrations. Seven of the nine samples were collected by Terra Associates in 1999 and one of the nine by Foster Wheeler in 1999, so the accuracy of the collection methods could therefore not be confirmed. The consistency of the greater-than-expected arsenic concentrations in the deeper samples was thought to indicate cross contamination from the surface layer.

5.2.3 Bluff Sampling

On June 24, 2013, the base of the bluff was traversed at low tide to identify areas with exposed bluff soils. Much of the intersection of the bluff and the beach contains dense vegetation where there is no substantive exposure of the bluff. However, there are intermittent exposures of the bluff soils at various locations. Exposed bluff soils include vertical exposed sidewalls and piles of soil that have sloughed off the bluff face and as landslides. One soil sample was collected at approximately 500 ft intervals along the 4,800 foot-long shoreline. In total, six bluff and four slough samples were sampled; the sample locations are shown on **Figure 10**.

The sample collection methodology varied by whether it is being collected from a vertical exposed sidewall or from slough. Samples collected from vertical exposed sidewalls were collected at a height of 2 feet above the ground surface (a height suitable for young children to be able to reach and dig in). If the bluff face was not at least 2 feet high, the sample was collected off the bluff face at the intersection of the ground surface, the 0-2 inch interval. Slough samples were collected from the surface of the soil pile, over the 0-2 inch interval.

Samples were submitted to the King County Environmental Laboratory under chain-of-custody protocol and analyzed for arsenic and lead by EPA Method EPA Method 6010C (ICP).

5.3 Vegetation

Plant uptake of arsenic, lead, and cadmium was evaluated by collecting composite tissue samples of some of the primary tree and shrub species on the Cleanup Unit.

The following plant species were selected for sampling:

Trees – Douglas fir, Pacific madrone, and Alder
Shrubs – Salal, Blackberry, and Bracken Fern
Berries – Himalayan blackberries (both berries and leaves)

With the exception of the berry samples, the plant tissue samples were collected in November 2010. The berry samples were collected in August 2013.

The sample collection varied by decision unit; the predominant species within decision units were sampled and obviously some of the species sampled did not exist in certain decision units. Sampling also focused on decision units that were likely to have moderate to high arsenic and lead concentrations (i.e., no plant tissue sampling was conducted in Units 2a or 2b).

Table 5-1 below summarizes the Units where the various plant tissue samples were collected.

Table 5-1 Plant Tissue Samples by Unit

Vegetation Type	Unit
Pacific Madrone	1a(north), 1a(south), 1b, 2c
Alder	1a, 1b, 3a, 3d (now 1b)
Douglas Fir	1a(north), 1a(south), 1b, 2c
Bracken Fern	1a(north) 1a(south), 1b, 3a
Blackberry (leaves)	1a, 3a, 3c, 3e
Blackberry (berries)	1a, 3c, 3e, 5
Salal	1a (north), 1a(south), 1b

One control sample of each of the plant tissue types was also collected from an area within the Puget Sound unimpacted by the Tacoma Smelter Plume. These samples were collected from the central area of Whidbey Island. All of the plant samples, except for the blackberry samples, were collected from the Kettles Trail and Kettles Park area. The blackberry sample (both leaves and berries) were collected at the south edge of the town of Coupeville. The central area of Whidbey Island is considered to be very similar to the Cleanup Unit due to its similar marine climate, vegetation, soil type, and elevation (approximately 220 ft MSL). The Kettles Park area where the samples were collected is part of the Penn Cove upland (Polenz, et. al., 2005). The upland rises to a maximum elevation of 280 feet and has no stream network. Soils in this area formed in proglacial meltwater referred to as Partridge Gravel, which consists of sand, gravel and sand-gravel mixtures with minor interlayers of silt and silty sand (Polenz, et.al. 2005). According to geologic maps, the Partridge Gravel likely extends to sea level or deeper within the area where the samples were collected (Polenz et. al., 2005).

The plant tissue samples were typically collected over a fairly large area within the sampled decision unit, except when there were few plants located within the decision unit. For example, in Unit 2c the madrone samples were collected off of three small adjacent trees and the Douglas fir sample off one large tree as there were few trees situated in the mined out bowl that comprises the North Pit. In Unit 1b, the alder sample was collected from one mature tree centrally located in the decision unit, as there were so few alder trees remaining in this decision unit (the alder trees are replaced by Douglas fir and other species as the forest matures).

Blackberry leaves were collected by cutting off entire 5-leaf whorls at the main stem. Alder, madrone, and salal were collected as individual leaves. Approximately the first 6 to 12 inches of bracken fern fronds and Douglas fir needles, from the tips, were collected as samples. The Douglas fir tissue samples were typically off a mix of young and mature trees and contained a mix of the current year and previous year's growth. The only plant tissue sample that was not collected directly from the plant was the alder sample collected from Unit 3d (now 1b), where the trees were too tall to reach therefore recently deposited leaves were selected for collection.

Ripe blackberries were selected for sampling. Since blackberries typically grow in previously disturbed areas, it was difficult to find blackberry plants for berry sampling in Units 1a and 1b. In addition, those few plants that were found within the forest were shaded such that their ripening occurred much later than those in decision units 3c and 5. On August 12 the berries in Unit 3c were nearly past their prime, the berries in Unit 5 were just coming on and the few blackberry plants found in Unit 1a were still green with the exception of one small cluster of plants found on the eastern side, in the vicinity of soil sample #7, but on the eastern side of the trail.

Analysis of plant tissue samples collected in 2010 was subcontracted to Kuo Testing Labs Inc. in Othello, Washington. Plant tissue samples were rinsed, dried, and acid digested, and then analyzed by ICP. The blackberry samples collected in 2013 were submitted to King County Environmental Laboratory for analysis. King County laboratory's methodology differentiated slightly in that the samples were rinsed, allowed to dry, freeze dried, crushed to a powder, acid digested and then analyzed by ICP- MS. The 2010 laboratory report is included in **Appendix F** and the 2013 laboratory report is included in **Appendix G**.

5.4 Springs

On June 24, 2013 the beach was traversed to identify the location of springs. Spring sampling occurred the following day on June 25. Very low tides occurred at the Port Vashon Vashon Island station on these days, -3.7 ft MLLW at 12:08 pm on June 24, and -3.24 ft MLLW at 12:56 pm on June 25 (NOAA). Five spring samples were collected.

Water samples from the springs were collected by digging a small hole approximately 6 inches deep in an area of the seep that was deemed to be representative of the seep. The small hole was then allowed to fill with water and a water sample was collected into a dedicated Stericup® equipped with a 0.45 micrometer filter. Water collected into the Stericup was then pulled through the filter unit with the use of a hand vacuum pump and the filtered sample was transferred to the appropriate laboratory-supplied sample container. Samples were submitted to the King County Environmental Laboratory under chain-of-custody protocol and analyzed for arsenic, lead and cadmium by EPA Method 6020a (ICP-MS).

Section 6

Data Validation

This section provides an evaluation of the usability of the data collected, presentation of calculated adjustment factors for the XRF data, and results of the confirmation sampling.

6.1 Data Usability

CDM Smith conducted various levels of data review to evaluate the validity and use of the XRF and laboratory data. These reviews and the results are described in the following sections.

6.1.1 Laboratory Data Validation

CDM Smith conducted a data validation review of the analytical laboratory results to evaluate completeness and data quality. CDM Smith's data validation reports are provided in **Appendices F** and **G** with the laboratory reports. Based on our review, all of the data are considered quantitative, with the exception that some of the samples analyzed for PAH were qualified as estimated due to analysis out of holding time or the relative percent difference (RPD) in a sample duplicate exceeding the laboratory's control limit. Further discussion regarding specific findings of the data validation is presented below.

Duplicate Testing: The data validation reports present the results of the analytical duplicate testing. Between the 2010 and 2013 field investigations, eight duplicate soil samples were collected for metals analyses and two duplicate forest duff samples were collected for metals analyses. The analytical results and the RPD between the duplicate samples are listed in the data validation reports. On a dry weight basis arsenic RPD for soil samples ranged between 4 and 26%, cadmium between 2 and 10% (two duplicate samples), and lead between 8 and 42%. The RPDs for forest duff in the two duplicate samples analyzed were: arsenic 18 and 22%; cadmium 12 and 15%; and lead 28 and 40%. Using ≤20% as a standard goal for the RPD, both forest duff samples exceeded the 20% goal for lead and one of the samples exceeded for arsenic. One soil sample exceeded the 20% goal for arsenic and another for lead. Variation is inherent for soil and forest duff samples, particularly for forest duff samples where adequate homogenization is difficult. As was also noted previously, six of the duplicate soil samples were collected from adjacent borings. Even so, the RPD for either arsenic or lead were ≤20% in each of five samples.

Two duplicate soil samples (5-S-180-D6; 5-S-186-D7) were submitted for analysis of PAH. The RPD for PAHs ranged from 0 to 16%, all less than 20% RPD goal. However, the laboratory also analyzed sample 5-S-187-0 in duplicate and acenaphthene, fluorene, and phenanthrene exceeded the laboratory's control limit of 20%, which further demonstrates the inherent variation of soil samples.

The data were not qualified on the basis of field duplicate results.

Method Reporting Limits: The practical quantitation limits (PQL) and method detection limits (MDL) varied between OnSite and the King County laboratory. For example, OnSite' s PQL for arsenic and lead were both about 0.5 mg/kg and King County's lab's PQL was about 5 mg/kg (the actual values vary by moisture content). King County's MDLs for arsenic and lead were both about 1 mg/kg. King County reported all results greater than the MDL and these are the data that are reported in the summary tables and evaluated in this RI. Technically, the data reported at less than the MDL are considered estimated; however, these data were not flagged as estimated in the summary tables.

Holding Times: The laboratory met the standard EPA holding times with the exception of the total solids for one set of samples having been analyzed one day out of holding time. However, after reviewing the initial set of PAH data, CDM Smith requested that the remaining samples collected from Unit 5 in 2013 be analyzed for PAH. These samples were extracted 7 days out of holding time. Considering that PAH are nonvolatile and are extremely slow to degrade (as demonstrated in the analytical results), analysis out of holding time is not considered to have adversely impacted the data and the data were not qualified based on this.

6.1.2 XRF Data Validation

During field work involving XRF analyses, part of the XRF data validation involved analyzing 17 samples in duplicate and 11 samples in replicates of 8. Arsenic, lead and cadmium results of this testing are summarized on **Tables H-1** and **H-2** in **Appendix H**.

The arsenic RPD ranged from 0% to 17% in 16 of the duplicate samples and was 25% in the 17th sample. Using 20% as a standard goal for the RPD, the one sample in which the duplicate RPD was greater than 20% had a concentration of arsenic near the detection limit (14 to 18 ppm). The lead RPD also ranged from 0% to 17% in 16 of the duplicate samples and was 31% in the 17th sample. This particular sample had the greatest lead concentration of any of the duplicate samples (356 and 488 mg/kg). The RPD for cadmium could not be calculated in most instances due to number of non-detections and in the five instances where it could be calculated; one sample had an RPD of 18% and the remaining four between 40% and 150%.

Similarly, the relative standard deviation (RSD) for arsenic in the replicate samples ranged between 2% and 27%. The two highest RSD values (17% and 27%) were for samples that contained low arsenic concentrations (5-8 ppm and 2-4 ppm, respectively). The RSD values for lead in the replicate samples ranged between 1% and 34%. The RSD samples that exceeded 20% also contained low concentrations of lead (less than 9 mg/kg). The RSD values in the remaining samples were $\leq$ 8. Cadmium concentrations were similar to instrument detection limits, and RSD values for cadmium either ranged between 47% and 115% or could not be calculated due to the lack of detections.

In all, the XRF showed excellent consistency in its duplicate and replicate analyses for arsenic and lead. All but one of the duplicates and replicates that had larger than desired variability were samples that contained arsenic or lead concentrations near the instrument's detection limit where a small variation can translate to a higher percent difference. The only other instance of a larger than desired variation was in the duplicate sample that had the highest lead concentration and such variability can be expected due to the relatively inhomogeneous nature of forest duff/soil samples

While the XRF can provide valid data for cadmium, the XRF's detection limits for this metal are too low to be reliable for this site and are not presented or discussed further.

6.1.3 Comparison of XRF vs. Laboratory Data

CDM Smith conducted an evaluation of the comparability of the XRF data to the laboratory data. Results of this evaluation are presented in a technical memorandum presented in **Appendix H.** This analysis concluded that arsenic and lead XRF data are highly comparable with the laboratory data when compared on a wet weight basis.

In most instances, the original XRF data are based on non-dried samples (as indicated previously, several overly wet samples were partially dried to allow for sample sieving prior to XRF analysis). Depending upon the soil/forest duff moisture content, the difference between arsenic and lead concentrations in dried versus undried samples can be significant. For this reason, CDM Smith developed a means of adjusting the field XRF data, as presented in a technical memorandum provided in **Appendix H.**

The method selected to estimate laboratory concentrations (dry weight) using XRF concentrations (wet weight), was to use the regression results obtained by comparing the laboratory (dry weight) and XRF (wet weight) data. Using the simple regression method resulted in the following formulas for estimating laboratory (dry weight) data from XRF data:

Arsenic

$$\text{LAB-DW} = 10^{[0.9732\ \text{Log10(XRF-WW)} + 0.1925]}$$

Lead

$$\text{LAB-DW} = 10^{[1.0546\ \text{Log10(XRF-WW)} + 0.\ 0291]}$$

The direct results of applying these adjustment factors are presented in **Table 3**, which shows the laboratory derived concentrations on a dry weight basis, the XRF concentrations, and then the adjusted XRF concentrations. Throughout this report, unless as otherwise noted, the arsenic and lead XRF data presented are adjusted to make them comparable to dry weight concentrations.

6.2 Subsurface Soil Confirmation Sampling

As indicated in Section 5.2.2.2, nine locations (TA-19, TA-13, TA-17, TA-09, TA-05, TA-03, TA-06, #11, and SS-2) were resampled to confirm the metals data at the 9-inch depth. Eight of the nine resampled locations were by other consultants in 1999. The consistency of arsenic concentrations being greater-than-anticipated in the deeper samples were thought to indicate cross contamination from the surface soil. The data collected from this resampling effort were statistically evaluated and the results of this evaluation are presented in a technical memorandum presented in **Appendix H.** Results of this assessment concluded the following:

1. Arsenic in the 9-inch depth samples is statistically lower in the confirmation samples than in the original samples, confirming a possible cross contamination problem in the original samples.

2. Lead in the surface samples is statistically lower in the confirmation samples than in the original samples.

Based on these results, the original sample results for both arsenic and lead are considered suspect and were replaced by the confirmation sample results. All of the 1999 cadmium data for the 0-2 inch interval, however, were retained as the confirmation samples were not analyzed for cadmium. The 1999 cadmium data for the 9-inch sample interval were removed from the data set. The 1999 18-inch data set was reviewed and three of the nine data sets (TA-05, TA-06, 3a-s-11-18) were removed from the data set as these data still appeared to be compromised.

Section 7

Contaminant Assessment Findings

This section presents a summary of physical observations, evaluation of small versus large scale variability of the data, and presentation of the compiled metals and PAH data for the Cleanup Unit.

7.1 Observations

7.1.1 Soils

Forested areas typically contained between 2 and 8 inches of duff, generally the top 1 to 2 inches of which was undecomposed twigs and leaf litter. Unit 3c also contained a 3 to 7 inch organic layer formed from the thick patches of blackberries that cover this unit.

Topsoils in the upland areas generally consisted of brown silty sand with 5 to 10 percent gravel. In the mined areas and bluffs topsoils generally consisted of sandy gravel or gravelly sand containing about 5 to 10 percent silt.

Possible till soils were observed in Units 1b, 3a, 3b, and 3c. Refusal at depths of 16 to 17 inches occurred at sample locations #11 (Unit 3a), #30 (Unit 3b), and #98 (Unit 1b). Glacial till was evident in Unit 3a at sample locations #11, #12, #22 and test pits TP8 (**Appendix A**, Photo 14) and TP9 (**Appendix A**, Photo 15) at depths of 12 to 24 inches. In Unit 3c glacial till was observed in the southernmost test pits (TP6 and TP7) at depths of 18 to 24 inches. At sample location #44, located near the Cleanup Unit entrance in the northwest corner, yellow brown sandy silt soil indicative of weathered till was encountered at 9 inches. Iron oxide staining at 18 inches indicated possible seasonally perched water. These findings seemingly to indicate the presence of till in much of the northern half of the upland area.

Under the dense blackberry brambles and Scot's broom, Unit 3e was found to contain tree stump piles (3-6 ft tall), soil stockpiles, and fill with construction debris. Construction debris mainly consisted of asphalt, concrete and brick. TP13, located in the southern end of Unit 3e uncovered large concrete slab pieces, an electrical or telephone pole, various wires, and metal pipe (**Appendix A,** Photos 16 and 17). Two soil piles were test-pitted and found to contain heterogeneous mixtures of silty sand, gravelly silty sand, silt, and clumps of till. In TP14, at a depth of 17 inches there appeared to be a 1-inch layer dark ash or burned wood.

7.1.2 Skeet Range Inspection

As outlined in the work plan, the skeet range was inspected for the presence of shards and an area of shards were identified just to the north and east of the eastern trap station. This was the area where samples #184 through #188 were collected, specifically for PAH analysis.

Several of the prior sample locations were revisited in 2013 to inspect for the possible presence of shot in forest duff and soil. Shot was confirmed at most of the locations, although sometimes it was difficult to ascertain shot from small gravel due to the discoloration that occurs with weathering. **Table 7-1** below summarizes the findings of this inspection. These observations substantiate the premise that the relatively higher lead concentrations in a portion of Unit 5 are the result of historical skeet shooting activities.

Table 7-1 Summary of Observations for Shot in Former Skeet Range

Map Location	Sample ID	Media	Lead Concentration (mg/kg)	Observations
#507	5-FD-7 5-s-7-0	Forest Duff 0-2	1,800 350	shot is present abundant shot
#508	5-FD-8 5-s-8-0	Forest Duff 0-2	1,800 750	abundant shot abundant shot
#511	5-FD-11 5-s-11-0	Forest Duff 0-2	1,800 220	shot is present abundant shot
#513	5-FD-13 5-s-13-0	Forest Duff 0-2	3,200 350	shot is present abundant shot
#515	5-FD-15 5-s-15-0	Forest Duff 0-2	1,900 590	shot is present abundant shot
#523	5-FD-23 5-s-23-0	Forest Duff 0-2	2,600 1,500	1 possible piece of shot Possible shot, but difficult to differentiate from small gravel
#535	5-FD-35 5-s-35-0	Forest Duff 0-2	2,300 150	shot is present abundant shot
#182	5-FD-182-0 5-s-182-0	Forest Duff 0-2	459 2,520	no shot apparent no shot apparent
#183	5-FD-183-0 5-s-183-0	Forest Duff 0-2	48 56	Possible shot, but difficult to differentiate from small gravel

7.2 Small Scale Variability Study

This section presents the results and conclusions of the small scale variability study separate from the other forest duff and surface soil data as its purpose was to demonstrate the variability of the metals data within a relatively small area, regardless of the relative homogeneity of the vegetation and soil, historical use (or lack thereof), and TSP fallout. The data however, were not used in the statistical analyses or other data compilations presented later in this report.

Table 4 presents the data for the small scale variability studies that were conducted in Units 1a, 1b, and 3b. **Figure 14** shows the locations where these studies occurred and **Figures 15** through **17** show the arsenic and lead concentrations in forest duff and soil at each point within each sampling grid. The maximum and minimum concentrations and mean and median concentrations for arsenic and lead in each of the grids are summarized in **Table 7-2** below.

Table 7-2 Comparison of Arsenic and Lead Concentrations within Each Small Scale Variability Study Grid

		Grid #1 Unit 3b		Grid #2 Unit 1b		Grid #3 Unit 1a	
		Arsenic	Lead	Arsenic	Lead	Arsenic	Lead
		mg/kg					
Forest Duff	Low	1.6	4.6	13	51	8.9	50
	High	56	199	63	423	101	667
	Mean	16	51	30	177	45	275
	Median	11	45	27	114	43	252
Soil	Low	74	79	69	37	26	50
	High	269	259	312	532	223	773
	Mean	152	170	174	212	172	382
	Median	143	170	171	142	206	327

CDM Smith conducted a statistical comparison of the small-scale grid data and property-wide data in Units 1a, 1b and 3b. The methods and results of this statistical evaluation are provided in a technical memorandum included in **Appendix H** and summarized below.

Results provided in this evaluation indicate no significant difference in variability between the small-scale grid and property-wide off trail datasets. The result of no significant difference means that the spatial variability in both arsenic and lead at the Cleanup Unit is essentially the same at either scale (small-scale and property-wide), hence supporting a conclusion that no additional property-wide sampling is required in order to evaluate and/or map arsenic and lead concentrations for risk assessment purposes.

7.3 Soil Metals Data Summary

The following sections present the metals data under the remaining four groupings described in Section 5: 1) property-wide, 2) trails, 3) roads, and 4) bluffs.

7.3.1 Property-Wide Metals Concentrations

Property-wide metals data are summarized on **Table 1.** As noted in Section 5.2, these are samples that were collected in relatively undisturbed areas – specifically off of trails and roads.

Table 1, which separates data by unit, shows the arsenic concentrations are quite variable within each unit except Units 2a and 2b where all arsenic concentrations were low in all samples due to the mining that occurred in these units. The greatest arsenic concentration in forest duff was 310 mg/kg in sample #507 collected in Unit 5. The greatest arsenic concentration in a surface soil sample was 477 mg/kg in surface soil sample GM-8 collected by Landau in 1999 from the southern end of Unit 1a. The greatest arsenic concentration in a 9-inch sample (excluding Unit 3e, which contains fill) was 119 mg/kg in sample #153, collected from Unit 1a. The greatest arsenic concentration in an 18-inch depth sample (again, excluding Unit 3e), was sample TA-01 in Unit 1b, which contained 43 mg/kg. The greatest arsenic concentration in non-fill soils at the 24-inch depth was 22 mg/kg in sample #46 collected from Unit 2c. In Unit 3e, the greatest arsenic concentration was 138 mg/kg, which was in an 18-inch sample. A 36-inch sample collected at Unit 3e contained as much as 34 mg/kg arsenic. Arsenic concentrations in soils and forest duff at individual locations by depth are illustrated on **Figures 18** through **23.**

Similarly, lead concentrations were variable within each unit except Units 2a and 2b, which had overall low lead concentrations. For Units 1 through 4, the greatest lead concentration in a forest duff sample was 817 mg/kg in sample #81 in Unit 1a. However, lead concentrations in forest duff in Unit 5 ranged up to 3,200 mg/kg and 2,600 mg/kg in samples #513 and #523, respectively. For surface soil in Units 1 through 4, the greatest lead concentration was 930 mg/kg in sample #95 located on the southwestern side of Unit 1b. However, lead concentrations in surface soil in Unit 5 ranged up to 2,520 mg/kg in sample #182. The greatest lead concentrations at the 9- and 18-inch depths were 112 and 12 mg/kg, respectively in sample #47 collected from Unit 2c. In the Unit 3e in what are expected to be fill soils, lead concentrations ranged between 34 and 402 mg/kg at the 18-inch depth and 24 to 54 mg/kg at the 24-36-inch depths. Lead concentrations in soils and forest duff at individual locations by depth are illustrated on **Figures 24** through **29.**

The greatest cadmium concentration in a forest duff sample was 5.4 mg/kg in sample #74 located on the eastern side of Unit 1a at the north end. The greatest cadmium concentration in a surface soil sample was 11 mg/kg in sample #79 collected from the north central area of Unit 1b. The greatest cadmium concentration at the 9-inch depth was 2.2 mg/kg in sample #22. The greatest cadmium concentration in an 18-inch sample was 1.5 mg/kg in TA-13 located in the central area of Unit 1a. Cadmium concentrations in soils and forest duff at individual locations by depth are illustrated on **Figure 30.**

7.3.2 Trails

As shown on the site figures, there are numerous footpaths that extend through Units 1a, 1b, 3b, and 5, which were created over time from the repeated use, as opposed to formal clearing. Because of the repeated foot traffic along these trails, the forest duff layer is very thin, broken into fine particles, and has basically become part of the soil. Therefore, any surface duff layer was collected as part of the 0-2 inch soil layer.

The soil data for samples collected directly on trails are summarized on **Table 5**. The sample locations and arsenic and lead data are illustrated on **Figure 31.** The greatest arsenic concentration in a surface soil sample was 394 mg/kg in sample #161 collected from Unit 1b. In the 9-inch sample set, the greatest arsenic concentration was 26 mg/kg in sample #151 collected from Unit 1a.

The greatest lead concentration in a surface soil sample was 1,590 mg/kg, in sample #173 collected from Unit 5. Outside of Unit 5, the greatest lead concentration in the surface soil sample set was 776 mg/kg in sample #151 collected from Unit 1a. In the 9-inch sample set, the greatest lead concentration was 17 mg/kg in sample #173 collected from Unit 5.

7.3.3 Roads

The graded dirt road that extends through Unit 3a, 3b, 3c and winds on down the bluff through Units 4c, 2c and 4b is now used as a footpath. It has become overgrown and very narrow as it winds down the bluff and is generally impassible after it extends into Units 4c and 4b from Unit 2c. Soil data for samples collected along this road-trail are summarized on **Table 5**. The sample locations and arsenic and lead data are illustrated on **Figure 31.**

While the overall concentrations of arsenic and lead were low, there were a few locations where concentrations were elevated. The greatest arsenic concentration occurred in on-road sample #22, collected from the central area of Unit 3a, which was 67 mg/kg. The lead concentration (130 mg/kg) was also greatest at this location.

7.3.4 Soils at Base of Bluffs

A total of six samples were collected from the bluff face at the edge of the beach and four samples were collected from slough accumulations along the base of the bluff. The bluff/slough soil sample data are summarized in **Table 6** and the sample locations are shown on **Figure 10.** Photographs of each bluff/slough sample location are provided in **Appendix A**, Photos #18 through #27 and notes indicating the conditions at each sample location are also provided in **Table 6.**

Arsenic concentrations ranged from 1.8 to 27 mg/kg, with the greatest concentration occurring in sample Bluff #4. Lead concentrations ranged from 1.5 to 31 mg/kg, again with the greatest concentration occurring in sample Bluff #4.

7.4 Soil PAH Data Summary

A total of 11 forest duff samples and 17 soil samples (including 2 duplicates) were analyzed for PAH, all of which were collected from Unit 5. The data are summarized in **Table 7** and sample locations are shown on **Figure 32**. The number of PAHs detected and concentrations varied widely. The greatest overall concentrations of PAH occurred in forest duff sample #187 where the concentration of benzo(a)pyrene (BaP) was 82,600 micrograms per kilogram (µg/kg) and the benzo(b,j,k)fluoranthene concentration was 138,000 µg/kg. The concentrations of all PAHs in the surface soil sample collected from this same location were all lower, typically by one to two orders of magnitude.

Table 7 also presents the carcinogenic PAH (cPAH) concentrations based on the toxic equivalency method (TEQ) where the toxicity of individual cPAH are adjusted to an equivalent basis with BaP (CalEPA, 1994). The TEQ values are plotted on **Figure 32**.

7.5 Plant Tissue Data Summary

Results of the plant tissue sampling are summarized in **Table 8.** The first set of sample data listed for each plant type is the control sample collected from Whidbey Island. The remaining samples are listed by the unit from which they were collected. The data are presented on a dry weight basis.

In the control samples, arsenic concentrations ranged between 0.0096 and 0.306 mg/kg. Arsenic concentrations in the various plant tissue samples collected across the Cleanup Unit ranged between 0.016 and 52.8 mg/kg.

In the control samples, lead concentrations ranged between less than the analytical detection limit (<0.0043/<0.045 mg/kg) and 0.522 mg/kg. Lead concentrations in the various plant tissue samples collected across the Cleanup Unit ranged between 0.010 and 2.66 mg/kg.

In the control samples, cadmium concentrations ranged between 0.012 and 0.219 mg/kg. Cadmium concentrations in the various plant tissue samples collected across the Cleanup Unit ranged between 0.036 and 0.833 mg/kg.

7.6 Spring Data Summary

Six "springs" were identified during the RI. These included the previously identified Springs A, B, D, and E, and two new springs, F and G, as shown on **Figure 10**. All but Spring G were sampled. There was not sufficient water to reasonably collect a valid sample from Spring G. Historically mapped Spring C was not identified. Spring C was indicated to be located adjacent to Spring B and it is possible that it is one and the same as Spring B. None of these "springs" are so much as springs as they are seeps. Each of these springs is described below. Photographs from the spring sampling are included in **Appendix A**, Photos 28 through 32**.**

Spring A: The spring appeared to emanate from the base of the shoreline bluff in an area covered by vegetation and a driftwood logs. The water sample was collected from as close as possible to the area where the water from underneath the vegetation and driftwood logs. The water at this sample location was visibly flowing over a sand and gravel substrate.

Spring B: The spring was an area approximately 125 feet from the bluff, and which extended for a distance of approximately 200 feet parallel to the bluff where groundwater appeared to "daylight" from the sand at a location somewhere between the normal high and low tide seawater levels. Although this location did not emanate from the bluff base, the water observed along this seep was interpreted as a freshwater seep where the groundwater table intersects the marine sea level. The water sample collected at the location identified as Spring B was collected from just below a small depression in the sand where a constant flow of water emanated across a sand substrate. Most of the areas along this length of the spring exhibited insufficient flow for sampling with the exception of the sand depression where the sample collection location was chosen.

Spring D: This spring appeared to emanate from an area where several partially buried logs are present in the beach. The partially buried logs are oriented perpendicular to the shoreline. The spring was interpreted to be groundwater that daylights at a location that is between the normal high and low tide water levels. Water at the sample location was flowing across a sand and gravel substrate.

Spring E: This spring appeared to emanate from the shoreline bluff base in an area covered by dense vegetation. The water sample was collected from an area as close to the vegetation as possible where water was observed to be flowing across a sand and gravel substrate.

Spring F: This spring extended parallel to the bluff for approximately 500 feet along in what appears to be groundwater day lighting along the normal high tide level. The sampled location was chosen at an area near the northeast end of this spring where water was observed to be flowing across a sand and gravel substrate.

Spring G: Spring G, similar to Spring F extended parallel to the bluff at approximately the normal high tide level, but for a much shorter distance and was not as prolific.

Results of the spring sampling are summarized in **Table 9**. Dissolved arsenic concentrations ranged from 1.24 µg/L to 4.03 µg/L and total arsenic concentrations ranged from 1.54 to 4.59 µg/L. Dissolved lead concentrations were all less than <0.1 µg/L and total lead was detected in two samples, Spring E and B at concentrations of 0.22 and 0.26 µg/L, respectively. Dissolved cadmium was detected only in Spring D at 0.06 µg/L and total cadmium was detected in Spring D and B at 0.062 and 0.065 µg/L, respectively.

Section 8

Natural Environment Assessment Findings

This section presents the results of the assessment of the natural ecological environment, particularly with respect to the potential impacts by the TSP and/or historical mining activities. Surveys of the beach, nearshore subtidal area adjacent to the North Pit, wetland, and of current terrestrial ecological conditions were conducted.

8.1 Beach Assessment

On June 24, 2013, staff from King County Water and Land Resources Division surveyed the beach to assess potential beach changes associated with the mining activities. CDM Smith personnel also conducted a beach survey on this date to log the locations of historical pilings and other features on the beach associated with historical mining activities. The survey was conducted around the low tide, which was approximately -3.7 at 12:08 pm on this date (NOAA). During the survey, debris, pilings, and potential beach changes associated with the mining activities were photographed and logged with GPS coordinates. The existing dock that extends off the beach from the most recent mine area is an obvious feature that is already shown on site figures.

Construction debris and remnant structures were found to be widely spread throughout the beach. This material ranged from rock placed for historic shoreline armoring to old electrical cables. Concrete blocks and chunks of rusty metal were also quite common. While generally inert, these materials occupy space where natural processes would be occurring. The largest concentration of construction remnant structures occur downslope of the North Pit. **Figure 33** shows the features identified in this area, as discussed further below. The area of detail shown on **Figure 33** is outlined in **Figure 10.**

The most significant ecological impacts are caused by structures remaining on the beach that are associated with shoreline armoring. One of the more prominent structures is a concrete pier, which is a remnant of the North Pit. This pier inhibits the free movement of beach material along the beach as well as onto the beach from upland areas (**Figure 33, Appendix A**; Photo #33). To the west of this structure is a 200-foot-long rock bulkhead that is now in the mid-intertidal area, but was originally at the toe of the slope in the early 1900s when the North Pit was in operation (**Figure 33, Appendix A,** Photo #34). The landward toe has eroded back up to 50 feet at the western end of the structure. While the structure is not limiting the erosion of the bluff to the beach, it is still impacting how wave energy interacts with the shoreline and displaces intertidal habitats.

Another approximately 80-foot-long bulkhead is located 160 feet east of the existing dock (**Appendix A**, Photo #35). This bulkhead is composed of concrete slabs and appears to have been added in recent times to limit erosion of the shoreline. It is currently limiting erosion of the bank. Approximately 20 feet offshore of this bulkhead is an older 200-foot-long bulkhead that likely was constructed between the 1930s and 1970s (**Appendix A**, Photo #36). The shoreline has eroded behind this bulkhead since 1977 as indicated by aerial photographs. Like the first bulkhead mentioned above, the structure is not limiting the erosion of the bluff to the beach, but it is still impacting how wave energy interacts with the shoreline and displaces intertidal habitats.

There are several other areas along the shoreline that are armored with rock, concrete or other debris. This shoreline armoring prevents driftwood accumulation, native plant establishment and sediment transport along the beach. In some locations the shoreline has eroded behind the armoring, resulting in chunks of debris scattered on the beach.

Numerous residual pilings exist on the beach in the vicinity of the North Pit as shown on **Figure 33** and in **Appendix A,** Photo #37. Most of these pilings protrude only a foot or two from the sand.

One area of the upper beach, to the east of the concrete pier at the North Pit, consists of almost exclusively of cobbles (**Figure 10, Appendix A**, Photo #38). Most other areas of the upper beach contain a mixture of fine sand and gravel with a small proportion of cobble sized substrate. The cobble area has a different aspect than other portions of the beach and may be subjected to different wave energy. However, based on the presence of barnacles through the cobble area, the cobble beach material is not being mobilized by the existing wave energy. Offshore of the larger material is a substantial fine sand to mud intertidal terrace (**Figure 10, Appendix A,** Photo #39). Aerial photographs reviewed indicate this terrace appears to have increased in size (~150 feet further offshore) since 1936. While the exact cause of the cobble beach and adjacent intertidal terrace of fine sand and mud was not determined, it is likely related to the mining that occurred in the North Pit, and possibly that of the Southern Pit.

When compared to a nearby reference beach updrift to the south west of the mining site, the primary difference noted is the absence of human placed debris and shoreline armoring. If this material was removed, the Maury Island Open Space property's beach would likely regain the characteristics of the reference beach. King County does intend to remove debris, shoreline armoring, the old pilings, and the existing dock as a part of the park improvement.

8.2 Nearshore Subtidal Assessment

In March 2000, EVS Environment Consultants (EVS, 2000) completed a nearshore subtidal assessment to characterize sediment conditions, benthic habitats, and likely use of fisheries resources of the nearshore area near the existing dock which was being proposed for replacement. The baseline characterization identified a number of seabed features, including several eelgrass beds, sunken barges, patches of coarse-grained sediment, and a patch of debris. Characterization analyses of sediment samples identified no detectable concentrations of pesticides or polychlorinated biphenyls, trace concentrations of arsenic, cadmium, and silver, and low concentrations of PAH. As the assessment focused on conditions associated with the Southern Pit, Ecology requested an additional survey to evaluate subtidal conditions adjacent to the North Pit.

On July 16, 2013, Ballard Diving performed an underwater survey to assess the potential presence of additional pilings and other potential deleterious debris associated with the North Pit. A 1,000-foot-long area, centered on the old concrete pier, was surveyed to a depth of 40 feet of seawater, or a distance of 200 feet from the mean lower low tide mark. The approximate survey area is shown on **Figure 10.** Ballard Diving's report, which details the survey methodology and findings is provided in **Appendix I.**

Several additional pilings were identified during the survey, as summarized on **Table 8-1** below and shown on **Figure 33.**

Table 8-1 Summary of Subtidal Debris

Target Shown on Figure 33	Description
A	2 pilings, 5' apart
B	2 pilings, 18" apart
C	1 piling
D	1 piling
E	Row of 5 pilings parallel to shore, 2 horizontal walers, 9 pilings parallel to shore
F	7 pilings
G	1 piling
H	3 pilings
I	2 pilings
J	1 piling lying horizontal on bottom

8.3 Wetland Survey

On May 22, 2013, a senior ecotoxicologist from King County Parks conducted a rating and delineation for the previously identified wetland located on the north side of SW 260th Street. The wetland study was completed using methodology from the Corps of Engineers Wetlands Delineation Manual, Technical Report Y-87-1 and the 2010 USACE Regional Supplement to the Corps of Engineers, Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (version 2.0) and Western Washington Rating System (Washington Department of Ecology, 2004, version 2) (Hruby, 2004). Field observations, hydraulic study, and aerial photos from King County's GIS website (iMaP) were used to identify and rate the wetland. Wetland boundaries were determined on the basis of an examination of vegetation, soils, and hydrology. Areas meeting the criteria set forth in the Corps manual were determined to be wetland. Soil, vegetation, and hydrologic data were collected at four locations. The delineated wetland boundaries and data plot locations were flagged and surveyed using GPS. A copy of the report prepared by King County for this survey is included in **Appendix D** and the survey findings are summarized below. The surveyed wetland area is shown on **Figure 2.**

The wetland was determined to be a forested/shrub-scrub depressional wetland, approximately 49,657 square feet in size. It appears that it was partially formed by a 3-5 foot high constructed berm along the northeastern section of the present wetland boundary. It was considered possible that the berm had been constructed specifically to create a small open water pond for the skeet range. Ponded water occurs over less than 10 percent of the wetland. The wettest areas of the wetland are adjacent to this berm.

The wetland vegetation is dominated by hardhack (spirea) and willow in its understory, with black cottonwoods and red alders providing the forested canopy. A pocket of birch trees is in the southwest corner. The edge of the wetland supports emergent vegetation, with a band of slough sedge. Additional species observed in the wetland include salmonberry, soft rush, skunk cabbage, smartweed, and mannagrass.

The wetland was rated a Category II based on the Washington State Wetland Rating system for Western Washington (Hruby, 2004). The total score was 53, with its highest value being habitat (21), followed by water quality (20), and then hydrology (12). The wetland was determined to be functioning well. Any adverse impact associated with elevated concentrations of metals was not apparent.

8.4 Terrestrial Ecological Assessment

8.4.1 2000 FEIS

The presence of wildlife and habitat at the Cleanup Unit was documented in the 2000 FEIS that was prepared to evaluate Glacier Northwest's application to expand mining operations to ultimately encompass approximately 193 acres of the Cleanup Unit (King County, 2000). The FEIS encompassed the area south of SW 260th Street (approximately 227 acres). It did not account for the area north of SW 260th Street and the three bluff parcels – totaling approximately 38 acres). However, the size of the property encompassed by the FEIS was reported to be 235 acres – about an 8 acre difference. The acreages below reflect what is reported in the FEIS.

According to 2000 FEIS, about 69 percent of the property (161) acres contains Pacific madrone and mixed madrone/Douglas fir forest. Douglas fir trees range in size from about 6 to 20 inches in diameter and average about 80 feet tall. The madrone trees range from about 2 to 22 inches in diameter an about 35 to 40 feet tall.

About 31 percent of the Cleanup Unit (74 acres) is not forested, including areas where mining and other clearing has taken place, and contained mixed grasses, invasive shrubs (such as Scot's broom and blackberries), and open ground. Previously cleared areas were being recolonized by Pacific madrone and red alder.

A variety of mammals were documented in the 2000 FEIS as utilizing the Cleanup Unit, including black-tailed deer, raccoon, bats, Douglas squirrel, and possibly black bear. Deer mice, voles, moles, and shrews were assumed to be relatively abundant. Twenty-one species of birds were observed during spring bird surveys conducted during the 2000 FEIS (King County 2000).

8.4.2 Current Biological Survey

On June 19 and June 20, 2013, a field survey was conducted by a King County biologist to verify existing conditions with regard to habitat types and quality and to identify potential exposure receptors. During the June 2013 survey, the biologist walked approximately 5 miles of trails throughout the Cleanup Unit during both early morning and afternoon hours. Observations of habitat were noted, including significant alterations of vegetation or habitat since the 2000 FEIS and any visible signs of distress in vegetation or animal life. Observations of wildlife observed (seen and/or heard) and plant species were recorded and representative photographs were taken of habitat in the various decision units across the Cleanup Unit.

The distribution of plant communities was similar to what is discussed in the EIS. Sixty percent of the area is covered by a mixed Pacific madrone and Douglas fir forest, with one patch of Douglas fir forest (about 35 acres). Photographs of mature forest habitat located within Unit 1a (Photos #40 and #41), 1b (Photos #42 and #43), and 5 (Photo #44) are included in **Appendix A**. Approximately 30% of the Cleanup Unit is previously mined area consisting of invasive shrubs and vines (Scot's broom and Himalayan blackberry) with madrone saplings in various stages of succession. Bluffs densely vegetated with invasive shrubs and madrone total approximately 10% of the area (**Appendix A**, Photos #4 through #6). Compared to conditions in 2000, an increase of invasive vegetation (Scot's broom and Himalayan blackberry) was noted within previously mined and cleared areas, likely due to lack of disturbance from mowing and mining activities.

Wildlife observed during the 2013 survey included four species of amphibians, three reptile species, 33 species of birds, and five species of mammals. Plant and animal species observed during the biological survey in June, 2013 are listed in **Tables 10** and **11**. As documented in the 2000 FEIS, two special-status species, bald eagle and peregrine falcon (both now federally delisted) are likely to be occasional or rare on site. Other priority species and species of concern, including pileated woodpecker, great blue heron, red-tailed hawk, and band-tailed pigeons are all likely to occur. Black-tailed deer are common on site. Observations or signs of flycatchers, woodpeckers, sapsuckers, owls, and chickadees were reported in the EIS and this field visit confirmed them.

No signs of distress in the vegetation or animal life were observed.

Section 9
Discussion of Cleanup Levels

One of the first steps in evaluating potential human health and ecological risk is the development of contaminants of concern (COC), whether human health or ecological-based. This is developed through the establishment of cleanup levels and comparison of the concentrations of COPC to human health-based cleanup levels and ecological screening levels (ESLs). Cleanup levels/ESLs are concentrations of hazardous substances in soil, water, air, or sediment that are determined to be protective of human health and the environment under specified exposure conditions.

In addition, to cleanup levels/ESLs there are "remediation levels." Remediation levels are concentrations of a hazardous substances above which a particular cleanup action component will be required as part of a cleanup action at a site. Remediation levels, by definition, exceed cleanup levels. Cleanup levels must be established for every site. Remediation levels, however, may not be necessary at a site.

The following sections describe human health-based cleanup levels and terrestrial ecological-based ESLs applicable for the Cleanup Unit in various media.

9.1 Human Health

MTCA provides three approaches for determining human health-based cleanup levels: Methods A, B, and C as described below.

- Method A provides a simplified approach for routine cleanup actions using tabulated cleanup levels. Method A cleanup levels are at least as stringent as applicable state and federal laws—typically these values are the same. Method A is appropriate for routine sites as defined in WAC 173-340-130, or sites that involve relatively few hazardous substances. Method A soil cleanup levels are available for both unrestricted land use and industrial sites. Remedial actions conducted using industrial cleanup levels are less stringent than those based on unrestricted land use, but have longer term implications, such as the placement of institutional controls.

- Method B allows for development of cleanup levels for specific compounds based on evaluation of applicable state and federal laws, groundwater and surface-water protection, and risk-based concentrations calculated using the risk equations specified in the regulations (WAC 173-340-750). These cleanup levels may be more or less stringent than the Method A unrestricted land use cleanup levels.

- Method C cleanup levels represent concentrations that are protective of human health and the environment for specific-site uses (i.e., industrial sites). Method C cleanup levels are established similarly to Method B; however, because site-specific conditions are such that the potential for exposure is lower, Method C cleanup levels are higher than Method B. Just as for Method A industrial soil cleanup levels, institutional controls are required for remedial actions conducted using Method C cleanup levels.

The Cleanup Unit does not meet the definition of an industrial site and therefore Method C and industrial Method A cleanup levels are not applicable. The following sections present an evaluation of the applicability of Method A and B cleanup levels.

9.1.1 Soil

Method A cleanup levels are appropriate for soils because of the very few hazardous substances present and that there are Method A cleanup levels for each contaminant of concern (i.e., arsenic, lead, cadmium, cPAH). In addition, there is insufficient toxicity information to develop Method B cleanup levels for lead or for cadmium in soil, as evidenced by the lack of soil cleanup levels available in Ecology's Cleanup Levels and Risk Calculations (CLARC) database. Method B cleanup levels for arsenic in soil are much greater than Method A cleanup levels, which are based on state and federal law. Thus, by default, Method A cleanup levels are applicable.

The human health-based MTCA Method A soil cleanup levels for unrestricted land use are: 20 mg/kg for arsenic, 250 mg/kg for lead and 2 mg/kg for cadmium. For cPAH, the MTCA Method A cleanup level is 0.1 mg/kg, based on the TEQ for BaP.

Given the nature and widespread extent of metals contamination at the Cleanup Unit (and across the Site itself) remediation levels, as allowed under WAC 173-340-355 of MTCA, become applicable. Remediation levels are used to identify the concentrations of hazardous substances at which different cleanup action components will be used. For the Cleanup Unit, logic would dictate that remediation levels would be developed from a human-health risk assessment based on the current and future site use as an open space property.

9.1.2 Water

In Section 4.2 various drinking water and marine criteria were presented for arsenic, in addition to Method A, including the NTR criteria, state groundwater and drinking water standards. The standards are not at all consistent – some are below laboratory method detection limits and some are greater than Method A. Under MTCA, the cleanup standards are based on the most stringent of all regulatory standards, or background, whichever is greater. Since the MTCA Method A standard for arsenic is based on background for Washington State, the groundwater cleanup standard defaults to Method A.

The human health-based MTCA Method A groundwater cleanup levels are: 5 μg/L for arsenic, 15 μg/L for lead, and 5 μg/L for cadmium.

9.1.3 Cleanup Level Exceedences

As was shown in Section 7, forest duff and surface soil exceed soil cleanup levels for arsenic, lead and cadmium extensively throughout the cleanup unit. The initially proposed gravel mine expansion would have removed all of this material throughout a large portion of the Cleanup Unit, but such actions are incongruent with use as a public natural open space. PAH concentrations exceed soil cleanup levels on a more limited basis, in a portion of Unit 5 only. For groundwater and spring water, Method A cleanup levels for metals have not been exceeded, as will be discussed further in Section 10.

Based on the metals Cleanup Level exceedences that occur extensively throughout the Cleanup Unit remedial actions at the Cleanup Unit will inevitably incorporate the use of remediation levels (which will be developed for the Cleanup Unit separate from the RI). For this reason the data evaluation and discussion in Section 10 is presented on the basis of statistical evaluation of the data (i.e., arithmetic means) to provide a comprehensive understanding of the overall metals concentrations by Unit.

9.2 Terrestrial Ecological

MTCA requires that existing or potential threats to terrestrial plants or animals exposed to hazardous substances also be evaluated by determining whether the site is: 1) excluded from the terrestrial ecological evaluation (TEE), 2) qualified for a simplified TEE, or 3) must undergo a site-specific TEE in accordance with WAC 173-340-7490. The Cleanup Unit does not qualify for an exclusion from a TEE per WAC 173-340-7491, nor does it qualify for a simplified TEE per WAC 173-340-7492. Under WAC 173-340-7493 sites located in an area where management or land use plans will maintain or restore native or semi-native vegetation (e.g., greenbelts and protected wetlands) require a site-specific TEE. The scope of a site-specific TEE requires consultation with the Washington State Department of Ecology (Ecology). The goal of the TEE process is the protection of terrestrial ecological receptors (plants and animals) from exposure to contaminated soil with the potential to cause significant adverse effects.

Conservative ESLs for soil and forest duff were developed from MTCA and other sources. Potentially toxic chemicals for which maximum detected concentrations exceed ESLs are identified as chemicals of ecological concern that may result in ecological risk. The ESLs developed for the Cleanup Unit and an evaluation of ESL exceedences is provided in the following sections.

9.2.1 Metals

ESLs for metals in soil were obtained from the following sources:

1. Table 749-3, MTCA, Chapter 173-340-WAC
2. "Ecological Soil Screening Levels for Arsenic and Lead in the Tacoma Smelter Plume Footprint and Hanford Site Old Orchards" (Ecology 2011). This source recommends the lowest ESLs for arsenic and lead within the TSP footprint based on a comparison of soil screening level values from the MTCA and EPA (2005a and 2005b).

Table 9-1 presents the lowest ESLs for metals in soil and forest duff per the MTCA site-specific TEE process. The ESLs were then compared to the 95% upper confidence level (UCL) calculated for arsenic, lead, and cadmium in soils and forest duff in the unmined decision units 1a, 1b, 2c, 3a, 3b, 3c, 4b, 4c, and 5 combined.[3] **Table 9-1** also provides the resulting screening level hazard quotients (HQs). Due to the ubiquitous nature of the metals, HQs were determined to be the 95% UCL concentration of a contaminant divided by the selected chemical-specific ESL:

Hazard Quotient (HQ) = 95% UCL concentration/ screening level concentration

Chemicals detected at concentrations resulting in screening level HQs greater than 1.0 are identified as chemicals of ecological concern.

[3] See Section 10 for details regarding development of the statistical analysis of the data.

Table 9-1 Ecological Screening of Metals Detected in Soil and Forest Duff

Analyte	95% UCL[a] (mg/kg)	Lowest ESL[b] (mg/kg)	HQ	Eco COC?
Arsenic [c] -- soils	113	10	11.3	**YES**
Arsenic [c] -- forest duff	102	10	10.2	**YES**
Lead – soils	248	11	22.5	**YES**
Lead -- forest duff	612	11	55.6	**YES**
Cadmium – soils	2.37	4	0.59	No
Cadmium – forest duff	2.45	4	0.61	No

Notes:

a)The 95% UCL of concentrations detected in Units 1a, 1b, 2c, 3a, 3b, 3c, 4b, 4c, and 5 combined.

b) Lowest of Ecological Screening Level based on Table 749-3 and Ecology 2011.

c) Total arsenic used based on Ecology, 2011.

9.2.2 PAH

ESLs for PAHs in soil were obtained from the following:

1. Table 749-3, MTCA, Chapter 173-340-WAC
2. EPA Region 5 ESL, RCRA Program (EPA, 2003), for those PAH congeners with no ESL provided in Table 749-3. This source is preferred over other EPA regional sources because the database for soil contaminants is much more extensive than other EPA sources.

Table 9-2 provides the selected ESLs for the PAHs detected in the former skeet range (Unit 5) at the Cleanup Unit. The ESLs were then compared to the maximum detected concentrations for the individual PAH detected soils and forest duff in decision unit 5. **Table 9-2** also provides the resulting screening level HQs. Because PAH are present on a more limited basis than metals, HQs were determined to be the maximum concentration of a contaminant divided by the selected chemical-specific ESL:

Hazard Quotient (HQ) = maximum concentration/ screening level concentration

Chemicals detected at concentrations resulting in screening level HQs greater than 1.0 are identified as chemicals of ecological concern.

Table 9-2 Ecological Screening of PAHs Detected in Soil and Forest Duff in Unit 5

Analyte	Maximum Detection[a] (mg/kg)	Lowest ESL[b] (mg/kg)	HQ	Eco COC?
1-Methylnaphthalene[c]	269	3.24	83.0	**YES**
2-Methylnaphthalene	271	3.24	83.6	**YES**
Acenaphthene	1,990	20	99.5	**YES**
Anthracene	3.71	1,480	0.003	No
Benzo(a)anthracene	62.7	5.21	12.0	**YES**
Benzo(a)pyrene	82.6	12	6.88	**YES**
Benzo(b,j,k)fluoranthene [d]	138	59.8	2.31	**YES**
Benzo(g,h,i)perylene	37.4	119	0.31	No
Chrysene	75.7	4.73	16.0	**YES**
Dibenz(a,h)anthracene	10.9	18.4	0.59	No
Fluoranthene	104	122	0.85	No
Fluorene	743	30	24.8	**YES**
Indeno(1,2,3-cd)pyrene	48.3	109	0.44	No
Naphthalene	286	0.0994	2,877	**YES**
Phenanthrene	22.5	45.7	0.49	No
Pyrene	105	78.5	1.34	**YES**

Notes:

[a] Maximum detection was used regardless of where detected (soils and forest duff treated the same).

[b] Lowest of Ecological Screening Level based on EPA, 2003.

[c] ESL based on ESL for 2-methylnaphthalene.

[d] ESL based on ESL for benzo(b)fluoranthene.

9.2.3 Chemicals of Ecological Concern

Based on this screening, arsenic and lead remain chemicals of ecological concern across the Cleanup Unit, but cadmium does not. Multiple PAH are chemicals of ecological concern within a portion of Unit 5. These chemicals of ecological concern present a potentially significant ecological risk for various toxicological effects in terrestrial plants and wildlife (EPA, 2011). In addition, arsenic, and lead can accumulate in plants, soil invertebrates, and to some degree in upper trophic level biota. PAHs would not be expected to accumulate in upper trophic level animals because PAHs are often metabolized to degradation products. Most studied vertebrates have the enzymes necessary for metabolic activation (Eisler, 1987).

Section 10

Data Evaluation and Discussion of Findings

The metals data for the upland soils and forest duff were compiled into a database. In this database, the duplicate (lab and adjusted XRF) and replicate (adjusted XRF) data were averaged and the averages were used in the data analysis. The database was used to conduct a statistical evaluation of the various metals within individual units, combined units, media (forest duff versus soil), and at various soil depth intervals. In the calculation of the mean values the method reporting limit was used when the analyte was not detected. This is a more conservative approach than using one half the method reporting limit, but arsenic and lead concentrations were seldom below the detection limit. The statistical analyses conducted and results are discussed in the following sections. The discussions of the metals in soils along the bluff base, PAHs, and metals in spring water are presented on a more specific basis without the need for statistical analysis.

10.1 Arsenic in Soil and Forest Duff

Table 12 provides various statistical summary analyses of the arsenic data by unit. For these analyses Units 2a and 2b are combined, as are Units 2c, 4b, and 4c. The data for Units 2a and 2b were combined as they were statistically very similar, and considering that both units are recently mined areas it was reasonable to combine the two units. Units 2c, 4b and 4c are along the bluff, and while Unit 2c was mined out, that activity ended at least by the mid-1930s – 55 years before Asarco closed down, so the data from Unit 2c would be most comparable to the bluff data. The data for all soil depths for Unit 3e was combined as the material sampled in this unit was primarily fill. Statistical analyses for the trails and roads were conducted separately and separate from the property-wide data.

10.1.1 Property-Wide Data Evaluation

10.1.1.1 Forest Duff

Of the 93 forest duff/organic layer samples analyzed, all but 15 samples exceed the Method A cleanup level for arsenic (20 mg/kg). The mean forest duff concentrations by unit range between 40 mg/kg (Unit 3a) and 123 mg/kg (Unit 5). The mean arsenic concentrations in forest duff in Units 1a and 1b are about two times greater than for Units 3a and 3b. The mean arsenic concentration in Unit 5 is about 3 times greater than in Units 3a and 3b. Interestingly, the organic layer in Unit 3c, an area which is not forested, but is nearly entirely covered in blackberry bushes, has the second greatest mean arsenic concentration at 97 mg/kg. As a whole, all forested areas combined (Units 1a, 1b, 3a, 3b, and 5) have a mean forest duff arsenic concentration of 88 mg/kg.

Two primary factors in the variation of arsenic concentrations in forest duff appear to be: 1) length of time the area has been relatively undisturbed, and 2) depth in the duff layer. Obviously, the greatest overall arsenic concentrations can be expected in units where the ground surface has been relatively undisturbed throughout the period of the Asarco plume fallout (i.e., Units 1a, 1b, 5), as opposed to those where major soil disturbance occurred sometime during the Asarco period (i.e., Unit 3a).

With respect to the depth in the duff layer, note that for Unit 1a the mean *ex situ* forest duff arsenic concentration is 84 mg/kg (20 samples), and the mean arsenic concentration for the small scale variability study for this unit (samples collected *in situ*) is about half that at 45 mg/kg (10 samples). In Unit 1b the mean arsenic concentration in the forest duff is 73 mg/kg (10 samples), and the mean for the small scale variability study was again about half of that at 30 mg/kg (16 samples). We surmise that arsenic concentrations increase with depth in the duff layer and that greater arsenic concentrations result when the entire forest duff layer is collected.

10.1.1.2 Surface Soil

Units 2a/2b are the only two units where surface soil arsenic concentrations never exceeded the Method A cleanup level for arsenic. The mean arsenic concentration in the surface soil samples in Units 2a/2b is 5.9 mg/kg. For the remaining units, out of 184 surface soil samples collected, 154 samples exceed the Method A cleanup level.

The greatest mean arsenic concentration (164 mg/kg) occurred in Unit 1a, and the next greatest mean arsenic concentration occurred in Unit 3b (123 mg/kg). Unit 1b also has a mean arsenic concentration over 100 mg/kg. Units 3a, 3c, and 5 all have comparable mean arsenic concentrations less than 100 mg/kg, ranging between 63 and 87 mg/kg. As a whole, all forested areas combined (Units 1a, 1b, 3a, 3b, and 5) have a mean surface soil arsenic concentration of 108 mg/kg.

The surface soil data for Unit 3e were not calculated separately because the material sampled in this area is primarily fill and stockpiled soil. In this instance the data for all depths were combined, which resulted in a mean arsenic concentration of 36 mg/kg. The greatest arsenic concentration in Unit 3e is 138 mg/kg.

With the exception of about half of Unit 2c, most of the bluff areas, besides the trails, are essentially inaccessible. Surface soil data for the bluff areas were variable and, due to the difficulties in accessing this area uniformly, we expect the data are biased low. We note that all of the historical ORS samples collected from Unit 4c have very low arsenic concentrations and appear to have been situated in areas likely impacted by erosion or castoff from road grading. The mean surface soil arsenic concentration of 37 mg/kg for Units 2c/4b/4c is only moderately high compared to the other surface soil arsenic concentrations. In reality, one would expect that arsenic concentrations along the bluff would be nearly the same as those observed in the upland areas, with the exception of areas where fairly recent landslides, grading to repair such slides, more minor erosional processes, and grading to construct and repair the roads have occurred.

10.1.1.3 9-inch Soil

Overall, arsenic concentrations decline significantly between the surface and 9-inch depth intervals. Excluding Units 2a/2c (which has no cleanup level exceedences) and 3e (which contains fill), 38 of the 58 samples collected at this depth do not exceed the Method A cleanup level and arsenic concentrations in 20 of the samples are comparable to or less than the Puget Sound area background (7 mg/kg; San Juan 1994).

In Unit 1a the mean arsenic concentration declined from 164 mg/kg at the 0-2 inch depth to 34 mg/kg at the 9-inch depth, in Unit 1b, from 105 to 26 mg/kg, and in Unit 3a from 63 mg/kg to 22 mg/kg. There was insufficient data to conduct a statistical analysis of arsenic in the 9-inch samples collected from Unit 5, but arsenic concentrations in all three samples were less than 20 mg/kg.

The only location where arsenic at the 9-inch depth did not decline overall was in Unit 2c/4b/4c. In Unit 2c/4b/4c, with only four 9-inch samples, two samples had arsenic concentrations of 69 and 111 mg/kg. Both of these samples were collected from steep, unstable, gravelly/cobbley slopes in Unit 2c. Given that sample #47 had a surface soil arsenic concentration of 116 mg/kg, and the 9-inch sample contained 111 mg/kg arsenic, we expect that higher concentration at depth is in part due to erosion – colluvium that has buried the original surface soil.

10.1.1.4 18- and 24-inch Soil

Of the 50 18-inch samples (not counting Unit 3e, because samples collected are of fill), 35 have arsenic concentrations comparable to Puget Sound area background (7 mg/kg) and 47 of the samples do not exceed the Method A cleanup level. The mean arsenic concentrations for the 18-inch depth range between 5.1 mg/kg (Unit 3c) and 14 mg/kg (Unit 2c/4b/4c).

The greatest arsenic concentration at the 18-inch depth was 43 mg/kg in TA-01, collected from Unit 1b by Terra Associates in 1999. As was demonstrated by the resampling effort conducted in 2013, it is likely that the arsenic concentration this sample is biased high (this location was not resampled). Arsenic concentrations in the two remaining samples with concentrations greater than 20 mg/kg were 22 and 28 mg/kg. The second greatest arsenic concentration was collected from Unit 2c, which as discussed above, is likely due to erosion and subsequent burial of the surface soil. The sample containing 22 mg/kg was collected from a test pit TP-9 in Unit 3a. The test pit was situated in an area subjected to historical grading. TP-9 was logged as having 2 feet of fill and the sample was collected from 3-inch dark gray layer at 18 inches.

Similarly, of the six samples collected from a depth of 24-inches, five had arsenic concentrations of 0.8 to 4.5 mg/kg, and one sample, collected from Unit 2c (#47) had an arsenic concentration of 22 mg/kg.

In summary, there is no indication that arsenic in the overlying surface soil has leached to a depth of 18-inches. The locations where arsenic concentrations are elevated at this depth can be explained by the following: 1) the presence of fill, 2) erosion and subsequent burial of the top soil on steep slopes, or 3) suspected cross contamination as a result of inexact sampling methods.

10.1.2 Trails

Out of 31 surface soil samples collected along the trails, all but one exceeded the Method A cleanup level. The mean arsenic concentrations along the trails in Units 1a, 1b/3b, and 5, ranges from 117 to 165 mg/kg and for all trails combined, it is 130 mg/kg. The mean arsenic concentration at the 9-inch depth was only 8.5 mg/kg and the maximum arsenic concentration at this depth was 26 mg/kg.

10.1.3 Roads

Along the historic graded roads, one would expect overall arsenic concentrations to be low and the mean arsenic concentration was only 17 mg/kg. While 18 of the 22 samples had arsenic concentrations less than 20 mg/kg, two of the samples had arsenic concentrations on the order of 60 mg/kg: sample #22 located in Unit 3a (67 mg/kg) and sample #28 located in Unit 3c (65 mg/kg). Arsenic concentrations in two other samples were in the low 30 mg/kg range. Without specific controls, one would expect that soils from the outlying forest areas can be dispersed onto the roads from foot traffic and animals and that this is the primary cause of the intermittent greater arsenic concentrations.

10.1.4 Summary

Arsenic concentrations in the forest duff and surface soil within each unit are highly variable, with the exception of the mined Units 2a/2b which has overall low arsenic concentrations because of the recent mining which stripped the topsoil layer off. Excepting Units 2a/2b, mean arsenic concentrations in forest duff within the individual units range from 40 to 123 mg/kg. As a whole, all forested areas combined (Units 1a, 1b, 3a, 3b, and 5) have a mean forest duff arsenic concentration of 88 mg/kg. In surface soil, mean arsenic concentrations within the individual units range from 37 to 165 mg/kg. Greater overall arsenic concentrations in forest duff do not always equate to greater overall arsenic concentrations in the surface soil. As a whole, all forested areas combined (Units 1a, 1b, 3a, 3b, and 5) have a mean surface soil arsenic concentration of 108 mg/kg.

Arsenic concentrations typically decline significantly within the first 9-inches and two thirds of the samples did not exceed the Method A cleanup level. It should be noted that the 9-inch depth is well within the active biotic zone and subject to process of bioturbation (i.e., earthworm activity, animals burrowing, and ant colonies). It is also a zone where significant soil disturbance may happen by other physical means, such as trees falling and creating stump holes that fill in with “cleaner” soil and forest duff, and being buried by colluvium if on steep slopes. Given the relatively high percentage of 9-inch samples that have relatively low arsenic concentrations, the locations where arsenic concentrations are relatively greater at depth are most likely caused by physical mixing processes as opposed to leaching. In relatively undisturbed areas arsenic concentrations are less than 20 mg/kg by the 18-inch depth interval. For the bluff areas we can expect that, with some frequency, the original soil surface has been buried due to slides and other erosional process, as well from the cast off that would have occurred during road grading. Somewhat elevated arsenic concentrations also occur at depths in areas with fill.

10.2 Lead in Soil and Forest Duff

Table 13 provides various statistical summary analyses of the lead data by unit. The Units were combined in the same manner as arsenic was. In the calculation of the mean values the method reporting limit was used when lead was not detected. This is a more conservative approach than using one half the method reporting limit. Results of these statistical analyses are discussed below.

10.2.1 Property-Wide Data Evaluation

10.2.1.1 Forest Duff

Half of the forest duff samples exceed the Method A cleanup level of 250 mg/kg (47 of 93 samples) and half of those (25 samples) were collected from Unit 5. The mean forest duff lead concentrations by unit ranged between 102 mg/kg (Unit 3b) and 898 mg/kg (Unit 5). The fact that the greatest mean lead concentration occurs within Unit 5 is consistent with the historical skeet shooting activities that occurred in this area. The next two greatest mean lead concentrations, 364 and 309 mg/kg, respectively, occurred in Units 1a and 3c. In the remaining units, mean lead concentrations ranged between 102 and 220 mg/kg.

As was observed for arsenic and with the exception of Unit 5, the length of time the area has been relatively undisturbed and depth in the duff profile appears to be the primary reasons for the varying lead concentrations. Obviously, the greatest overall lead concentrations can be expected in units where the ground surface has been relatively undisturbed throughout the period of the Asarco plume fallout (i.e., Units 1a, 1b, 5), as opposed to those where major soil disturbance occurred sometime during the Asarco period (i.e., Unit 3a). In this case, Unit 5 also has the greatest lead concentrations as a result of the historical skeet shooting activities.

The greater overall lead concentrations occurred again occurred in the *ex situ* samples as opposed to the *in situ* samples. For Unit 1a the mean forest duff lead concentration of 364 mg/kg (20 samples), and the mean arsenic concentration for the small scale variability study for this unit (samples collected *in situ*) is 274 mg/kg (10 samples). For Unit 1b the mean forest duff lead concentration is 220 mg/kg (10 samples), while the mean for its corresponding small scale variability study is 176 mg/kg (16 samples). Similar to the arsenic, we surmise that the lead concentrations increase with depth in the duff layer and as new litter is deposited over the old litter the highest lead concentrations will be found near the base of the organic layer.

The overall lead concentration in forest duff at Unit 5 is about 2.5 times higher than for any of the other units. The 95% upper confidence limit (UCL) for Units 1a and 3c is about 500 mg/kg, while it is 1,225 mg/kg for Unit 5.

10.2.1.2 Surface Soil

With the exception of Unit 5, lead concentrations in surface soil were, overall, much lower than was observed for forest duff. This demonstrates the particular affinity the lead cation has for organics. Unit 3b, as well as Units 2a/2b did not have surface soil lead concentrations that exceeded the Method A cleanup level. The mean lead concentration in the surface soil samples in Units 2a/2b is 5.9 mg/kg and for Unit 3b, it is 174 mg/kg. For the remaining units, out of 158 surface soil samples collected, 30 samples exceed the Method A cleanup level.

While lead concentrations for several samples in Units 1a, 1b, 3a, and 3c exceed Method A cleanup levels, the mean concentrations, which range from 68 mg/kg to 220 mg/kg, do not. The mean lead concentration for Unit 5, however, at 312 mg/kg, does exceed the Method A cleanup level.

Again, Unit 3e was treated differently than in the other units because the material sampled in this area as primarily fill. In this instance all the soil lead data were combined, which resulted in mean lead concentration of 61 mg/kg.

The same as for arsenic, surface soil lead data for the bluff areas are variable and, due to the difficulties in accessing this area uniformly, we expect the lead data are also biased low. Again all of the historic ORS samples collected from Unit 4c have very low lead concentrations and appear to have been situated in areas likely impacted by erosion or castoff from road grading. The mean surface soil lead concentration of 55 mg/kg is only moderately elevated. One would expect that lead concentrations along the bluff would have nearly the same concentrations as observed in the upland areas, but in many areas lead concentrations are likely low due to the multiple slides, grading to repair such slides, more minor erosional processes, and grading to construct and repair the roads.

10.2.1.3 9-inch

None of the 9-inch samples exceeded the Method A cleanup level for lead. The decline in lead concentrations between the surface and 9-inch intervals is significant – typically a 10-fold difference. In Unit 1a the mean concentration declined from 220 mg/kg to 19 mg/kg, in Unit 1b, from 195 to 26 mg/kg, in Unit 3b from 173 to 11 mg/kg (combined 9- and 18-inch intervals) and in Unit 3c from 118 mg/kg to 14 mg/kg. The mean concentrations are consistent with Puget Sound area soil background concentrations.

The same as seen for arsenic, the only locations where the dramatic decline in lead concentrations did not occur were Units 3a and 2c/4b/4c. In Unit 3a, the mean surface soil lead concentration is 68 mg/kg, while at the 9-inch depth it is 35 mg/kg. This mean is biased by three of nine 9-inch samples that range from 44 to 75 mg/kg, while the other six samples have lead concentrations that are less than 10 mg/kg.

In Unit 2c/4b/4c, the mean surface lead concentration is 55 mg/kg, while at the 9-inch depth it is 42 mg/kg. In Unit 2c/4b/4c, two of the five 9-inch samples have lead concentrations of 72 and 112 mg/kg. These are the same locations were arsenic is similarly elevated at depth, likely the result of colluvium burying the original ground surface.

10.2.2 Soils, 18- and 24-inch

A total of 52 18-inch samples were analyzed for lead and the highest concentration was 45 mg/kg (not including Unit 3e). The mean lead concentrations for the 18-inch samples ranged between 6.6 and 18 mg/kg for the various units. A total of six 24-inch samples were analyzed for lead and the highest concentration was 12 mg/kg (not counting Unit 3e).

In Unit 3e, of the 29 samples collected throughout all the depths, the greatest lead concentration was 403 mg/kg in a sample collected from TP14 at a depth of 18 inches.

10.2.3 Trails

Ten of the 31 samples collected along the trails exceeded the Method A cleanup level for lead. The cleanup level exceedences occurred in Units 1a, 1b, and 5. The mean lead concentrations on all the trails combined was 277 mg/kg, which is just slightly greater than the Method A cleanup level. Due to the former skeet range, however, the mean lead concentration on trails in Unit 5 came to 415 mg/kg.

10.2.4 Roads

The mean lead concentration on roads was 24 mg/kg, which is equivalent to the Puget Sound Area background (24 mg/kg). Four of the samples contained lead concentrations greater than 24 mg/kg. Sample #22 located in Unit 3a (130 mg/kg) and sample #28 located in Unit 3c (112 mg/kg) had slightly elevated lead concentrations and the remaining two samples had lead concentrations of 35 and 44 mg/kg.

10.3 Summary

Unit 5 contains the greatest overall lead concentrations due to the former skeet range activities. Part of this is due to the presence of lead shot. **Figure 34** shows the estimated area of impact as a result of former skeet shooting activities. This is based on the lead shot observed, as discussed in Section 7.2, and using a baseline of 1,000 mg/kg lead in soils/forest duff as no soil or forest duff sample exceeded this concentration at any other location on the Cleanup Unit (maximum observed concentration in any other unit was 930 mg/kg).

The next overall greatest lead concentrations were occur in Units 1a, 1b, and 3c, followed by Units 3a and 3b. Lead concentrations along the bluff area are variable due to the erosional processes and anthropogenic disturbances. Overall lead concentrations throughout Units 2a and 2b are comparable to background.

Typically, lead concentrations decline to background surface soil concentrations within the first 9 inches. The exceptions to this are Units 2c/4b/4c (the bluffs) and Unit 3e. For the bluff areas we can expect that in many instances the original soil surface has been buried due to slides and other erosional process, as well from the cast off that would have occurred during road grading. Thus it may be more common to find higher lead concentrations at depth along the bluff than in any other area.

Unit 3e was mined, but mined out pockets have been filled and there are also several stockpiles located across the unit. The source of this fill is not known, but overall it contains slightly elevated lead concentrations.

10.4 Cadmium

Table 14 provides various statistical summary evaluations for cadmium. In the calculation of the mean values the method reporting limit was used when arsenic was not detected. This is a more conservative approach than using one half the method reporting limit and, due to the number of nondetects, likely biases our analyses slightly high. Results of the statistical evaluations are discussed below.

Cadmium concentrations in 7 of the 10 forest duff samples analyzed exceed the Method A cleanup level of 2 mg/kg. The mean cadmium concentration for forest duff was calculated for samples collected from Units 1a, 1b, 2c, and 3a. The mean concentration is 3.3 mg/kg. The maximum cadmium concentration is 5.4 mg/kg in sample #74 from Unit 1a.

The mean cadmium concentration for surface soil in Units 1a/1b is 3.3 mg/kg, similar to that of the forest duff. However, the greatest cadmium concentration of 11 mg/kg is twice that of the greatest cadmium concentration detected in the forest duff. The 11 mg/kg sample was #79, centrally located at the north end of Unit 1a. In Units 3a/3b/3c the mean cadmium concentration is lower by half, at 1.7 mg/kg. However a cadmium concentration of as much as 9.3 mg/kg was reported in TA-06. For Units 2a, 4b, and 4c, the mean cadmium concentration in the 0-2 inch samples is only 0.27 mg/kg.

In the 9- and 18-inch samples, the mean cadmium concentrations were calculated from all units, (except 3e) and came to 0.8 mg/kg and 0.52 mg/kg, respectively. In Unit 3e, the mean cadmium concentration for all samples combined is 1.7 mg/kg.

In summary, the only areas where cadmium concentrations are consistently elevated are forest duff and surface soils in Units 1a and 1b. Cadmium will behave very similar to lead in that it will bind to the organics and is not prone to leaching.

10.5 Metals in Soils at Base of Bluff

Out of the six samples collected from the bluff face at the edge of the beach and four samples collected from slough, only one sample contained an arsenic concentration that exceeded the Method A cleanup level for arsenic. This was Bluff sample #4, which contained arsenic at 27 mg/kg. The lead concentration at 31 mg/kg is relatively low. The remaining samples contained arsenic concentrations on the order of 12 mg/kg or less and lead concentrations on the order of 8.8 mg/kg or less.

10.6 PAH in Soil

PAH are associated only with the former trap shooting activities. Skeet shards were observed within the area expected, as resulting from trap shooting activities. The shards contained PAHs as evidenced by the high PAH concentrations in samples where the shards were also present.

The TEQ cPAH concentrations were calculated for the samples analyzed and are summarized in **Table 7.** The Method A cleanup level of 100 µg/kg is exceeded for both forest duff and soil at five of the sample locations. PAH are not mobile and will bind to the organic matter. This was evident in four of the samples, where it was observed that the TEQ cPAH concentrations are one to two orders of magnitude greater in the forest duff than in the surface soil. The one exception, at sample location #188, was where the cPAH concentration was not particularly high in either the forest duff or the surface soil sample. The sample having the greatest TEQ value is #187 (112,617 µg/kg), which is three orders of magnitude greater than the Method A cleanup level of 100 µg/kg.

Figure 34 delineates the area of cPAH in soils exceeding the Method A cleanup level and estimated area of shards. As would be expected, the area partially overlaps with the area of elevated lead contamination, but is generally closer to the clay target throwers.

10.7 Plant Tissue

Figure 35 provides a comparison of metals concentrations in plant tissue samples. **Figure 36** illustrates the increased metals concentrations compared to the control samples. All of the plants showed an increased uptake in metals in the Cleanup Unit as compared to the control samples.

Arsenic: Arsenic concentrations in the Cleanup Unit plant tissue samples, except for the Douglas fir, range between 0.016 and 3.22 mg/kg, while the control samples range between 0.0096 and 0.306 mg/kg. The greatest uptake of arsenic was observed in the Douglas fir. Arsenic concentrations in the three Douglas fir samples collected from Units 1a/1b are similar and average 47.6 mg/kg. Arsenic in the Douglas fir sample collected from Unit 2c is much less, at only 2.8 mg/kg. The data are consistent with the overall greater arsenic concentrations in Unit 1a/1b versus Unit 2c. Douglas fir samples collected from Unit 1 are over 100 times greater than the control samples and over 10 times greater for the sample collected from Unit 2c. Arsenic uptake on the order of 10 to 30 times greater than the control is indicated in several other plants, including blackberry plants (Unit 3a) and bracken fern (Unit 1a). However, most plants (including the berries) indicated an arsenic uptake on the order of 2 to 9 times greater than the control.

Lead: Lead concentrations in the Cleanup Unit plant tissue samples range between 0.014 and 2.66 mg/kg, while the control samples range between <0.0043 mg/kg and 0.522 mg/kg. Lead was nondetected in the alder (<0.045 mg/kg), Pacific madrone (<0.045 mg/kg) and blackberry (<0.0043 mg/kg) control samples. Bracken fern and Pacific madrone are indicated to have the greatest overall uptake of lead. Bracken ferns in Unit 1 had an arsenic uptake on the order of 11 to 18 times greater than the control – 9 times greater for Unit 3a. Pacific madrone in Unit 1a had an uptake of over 15+ times greater than the control and 9+ times greater than the control in Units 1b and 2c. The remaining plants indicate an uptake of 0.9 to 3.7 times greater than the control.

Cadmium: Cadmium concentrations in Cleanup Unit tissue samples range between 0.044 and 0.833 mg/kg, while control samples range between 0.012 and 0.219 mg/kg. Bracken fern indicated the greatest overall uptake for cadmium – on the order of 10-11 times greater. The remaining plants indicated an uptake of 2 to 6.8 times greater than the control.

Although the plant tissue sampling indicates that there is an increased uptake of metals in soils containing elevated metals concentrations, with the exception of the Douglas fir, the metals concentrations within the plants sampled are not likely to cause a "recycling" of metals concentrations within the forest duff layer. That is, the newly deposited leaf litter should have lower overall metals concentrations than the older duff deposited during the Asarco fallout years. This appears to be the case, as was discussed in Section 10.1.1.1 where the in situ and ex situ forest duff sample data were compared.

10.8 Spring Water

Table 9 summarizes the spring water sampling conducted by CDM Smith in 2013 and by Herrera Environmental Consultants (Herrera) in 1999 (Herrera, 2000). Herrera sampled springs A and E twice (wet and dry weather) in 1999. None of the metals data exceeded their respective Method A cleanup levels. The 1999 and 2013 data are comparable.

It should be noted that chloride ions and bromide interfere with the analysis of arsenic by the ICP-MS method. Sea water is high in both of these elements. The result is that without correction, arsenic concentrations will be biased high. The laboratory was informed of the probability that these samples were at least partly saline and applied a method of analysis that prevents such interference. However, "prevention" is not necessarily "elimination" and it is entirely possible that the reported arsenic concentrations in some of these spring water samples, particularly Springs B, D, and F are still biased slightly high.

Section 11

Conceptual Site Exposure Model

This section presents an evaluation of the potential exposure pathways for human health and the ecological receptors. **Figure 37** presents a pictorial summary of the potential complete receptors, as well as incomplete pathways.

11.1 Human Health Exposure

The potential human exposure pathways at the Cleanup Unit include: direct contact with soil/sediment; ingestion of soil particles; inhalation of soil particles, ingestion of water (groundwater/spring), ingestion of vegetation, and ingestion of marine organisms exposed to COC. The primary transport pathways of COCs include: leaching of contaminants from soil to groundwater; discharge of groundwater to surface water; erosion of soil as a result of bluff failures; windblown dust; and via physical transport, such as may occur when soil adheres to pet hair and shoes.

Soil: Because the current and future use of the Cleanup Unit is open space with walking trails, the primary concern for human health is direct exposure to site contaminants. This may include: skin contact, direct ingestion by hand to mouth contact, or inhalation. The COCs have a low risk of being a skin irritant. The primary risk of exposure is through incidental ingestion as a result of hand to mouth contact, such as may occur from soil particles sticking to clothing, body parts, and pet fur. Children (and sometimes adults in instances of pica disorder) frequently ingest soil directly. Inhalation via dust may be significant if motorized off-road vehicles were to use the property. Bikes and horses may also tend to kick up to dust, but to a much lesser extent.

Groundwater: This RI has that demonstrated that groundwater has not been impacted and would never likely be impacted by site COCs. The metals and PAH have very little leaching potential and groundwater and spring water data have demonstrated that groundwater cleanup levels are not exceeded.

Vegetation: The data collected during this RI suggests that plants growing in metals-enriched soils have an uptake of metals that is greater than in areas unimpacted by the TSP. The primary concern of metals in vegetation would be from ingestion. The greatest degree of metals uptake was that of arsenic in Douglas fir – a plant type that is not likely ever to be consumed by humans to any significant degree. Local area residents are routinely observed harvesting the blackberries within the Cleanup Unit. While increased metals uptake in blackberries appears to be relatively low, the significance of this would need to be evaluated with regard to the degree of consumption.

Surface Water/Sediment: This RI has demonstrated that the Puget Sound is not being impacted by metals originating from the Cleanup Unit and therefore, the risk of exposure as a result of ingestion of marine organisms is low. This was demonstrated by the fact that spring water draining onto the beach does not exceed Method A cleanup levels and is therefore not impacting the surface water or sediments. Also, for the most part, soils along base of the bluff do not exceed Method A cleanup levels and typically are similar to Puget Sound area background concentrations. As seen in one bluff sample, minor exceedences of the Method A cleanup level for arsenic can, occur on a limited basis in the bluffs. This is to be expected, given the thin layer of impacted surface soils that will exist on the face of the bluff. However, as seen with the slough soil samples, when the relatively small mass of contaminated topsoil is mixed with the larger mass uncontaminated soils, the end effect is that overall metals concentrations are very low.

It is important to recognize that TSP fallout equally impacted the Puget Sound marine water along with the soil on the land surface. The relatively minor amount of arsenic and other metals that may have reached Puget Sound sediments as a result of erosional deposition would be several orders of magnitude less than that which occurred from direct impact by the TSP fallout.

11.2 Ecological Exposure

A terrestrial ecological conceptual exposure model was prepared for the Cleanup Unit, as summarized in **Table 11-1** below. The conceptual exposure model presents the most important terrestrial exposure pathways for representative ecological receptors exposed to Cleanup Unit-related chemicals of ecological concern. These pathways indicate how the ecological resources can co-occur or come in contact with chemicals of ecological concern, and include contaminant sources, fate and transport processes, and exposure routes. Some exposure pathways considered relatively minor (e.g., inhalation) are shown in recognition of the completeness of this pathway. Complete and significant exposure scenarios relevant to the TEE are shown in bold type.

Table 11-1 Terrestrial Ecological Conceptual Exposure Model

Primary Source	Primary Release Mechanism	Secondary Source	Secondary Release Mechanism	Exposure Medium	Exposure Route	Potential Receptor
Contaminants in Soil	Wind Erosion	Dust	Fugitive Dust Generation	Particulates in Air	Inhalation	Terrestrial Animals
	Direct Release	**Soil**	-	**Soil**	**Direct Contact / Ingestion**	**Terrestrial Plants, Soil-associated Animals**
	Biotic Uptake	**Biota**	**Uptake by Plants / Animals**	**Plants, Prey**	**Ingestion**	**Herbivorous, Omnivorous, and Carnivorous Birds and Mammals**

The primary exposure pathways for ecological receptors at the Cleanup Unit are:

1. Direct contact with and uptake of soil contaminants by terrestrial plants;
2. Direct contact with and ingestion of soil contaminants primarily by soil-associated terrestrial animals (e.g., earthworms, voles).
3. Ingestion of contaminated plants by herbivorous animals (e.g., black-tailed deer).
4. Ingestion of contaminated prey (e.g., earthworms) by omnivorous animals (e.g., American robin, deer mouse).

5. Bioaccumulation of contaminants in carnivorous animals (e.g., red-tailed hawk) via ingestion of contaminated prey (e.g., vole, deer mouse).

While arsenic, lead, and several PAHs are present at the Cleanup Unit at concentrations that exceed ESLs, the biological survey conducted in June 2013 verified that the forested and shrubland habitats at the Cleanup Unit support a variety of wildlife, including amphibians, reptiles, birds, and mammals. Ecological receptors on-site include wildlife species classified by the Washington Department of Fish and Wildlife as a “priority species” or “species of concern” under Title 77 RCW, including pileated woodpecker, great blue heron, bald eagle, and peregrine falcon. Further, the Cleanup Unit provides “especially valuable habitat” consisting of native Pacific madrone woodland and mixed Douglas-fir/madrone woodland. The June 2013 biological survey generally verified the habitat conditions and wildlife usage of the Cleanup Unit documented in the 2000 FEIS and found that this habitat is sustainable under current conditions and does not exhibit signs of distress.

Based on these findings, any remedial actions considered for the Cleanup Unit should undergo a Net Environmental Benefit Analysis (NEBA). The NEBA weighs the advantages of remediation versus the impact that cleanup might have on potentially valuable ecological receptor habitat.

Section 12
Conclusions

12.1 Metals in Forest Duff and Soil

Soils within recently mined areas, whether surficial or subsurface, are within normal background concentrations for arsenic, cadmium and lead. This RI found that the forest duff layer does contain high concentrations of metals and must be included in the assessment. Arsenic, lead, and cadmium concentrations are consistently elevated in forest duff and surface soil throughout the remaining portions of the Cleanup Unit, which includes the upland areas and bluffs. A portion of Unit 5 contains overall greater lead concentrations than in any of the other Cleanup Units as a result of the historical presence of a skeet range.

Results of this RI determined that there are differences between decision units in overall metals concentrations as a result of the TSP fallout. While some of these differences may be due to the period of time that a given area has been relatively undisturbed by anthropogenic activities compared to the period of Asarco fallout, the relative number of samples collected in a given decision unit and the small scale variability combined all factor into the observed variation.

Metal concentration variability within each decision unit is likely attributed to:

- The sample location within the duff profile (i.e., recently deposited contains lower concentrations than aged duff).
- Erosion and mass wasting on bluffs.
- Anthropogenic activities such as road grading and grading from historical mining operations.
- Bioturbation (i.e., earthworm activity, animals burrowing, ant colonies).
- Other physical natural processes (i.e., trees falling and creating stump holes that fill in with “cleaner” forest duff).
- Bioaccumulation in some plants, with possible “biocycling” occurring as the plants shed their foliage.

However, small versus large-scale variability studies conducted during this RI indicate that the distribution of metals observed within each decision unit are within the overall variability of each decision unit and that further studies would provide no additional benefit in assessing spatial variability.

12.1.1 Arsenic and Lead

Generally within the various units, excluding the recently mined areas, the following conclusions are made.

12.1.1.1 Property-Wide Forest Areas

- Arsenic concentrations in forest duff are significant, but tend to be less than in the surface soils. Arsenic concentrations in the new, more recently deposited leaf litter tend to be lower than the duff layer at the bottom of the duff profile. Lead concentrations in forest duff tend to be slightly greater than in the surface soils, likely as a because of lead's affinity for organic matter.

- On a property-wide basis, arsenic concentrations in forest duff and surface soils (combined) within upland forest areas range up 477 mg/kg, with a combined mean concentration of 101 mg/kg (Units 1a, 1b, 3a, 3b, 5). Lead concentrations in surface soils within upland forest areas range up to 2,600 mg/kg and the mean concentration is 333 mg/kg. However, these values are skewed high by the presence of a former skeet range in Unit 5. Without using data for Unit 5, the greatest lead concentration in the forested areas is 930 mg/kg and the mean is 196 mg/kg.

- An approximately 204,400 square-foot-area (4.7 acres) in Unit 5 is considered impacted by lead as a result of the former skeet range.

- Arsenic and lead concentrations rapidly decline with depth. For all of the upland forest areas combined, the mean concentration at 9-inches is 26 mg/kg, and by 18-inches the mean concentration is 8.9 mg/kg. The mean lead concentration at 9-inches is 23 mg/kg, and 9.8 mg/kg for the 18-inch interval, which are both below the Puget Sound area background concentration of 24 mg/kg.

- The sporadically elevated arsenic and lead concentrations (i.e., greater than Method A for arsenic, or background for lead) in individual subsurface soil samples can be explained by physical transport mechanisms other than leaching, such as fill, inexact sampling practices that may have caused cross contamination from surface soils, and natural physical soil mixing processes.

12.1.1.2 Property-Wide, Other Upland Areas

Unit 3c is an area thickly covered with blackberry bushes, but apparently relatively undisturbed over the past century. This unit has arsenic and lead concentrations that are not much lower than forested areas, including the organic layer. The mean arsenic and lead concentrations in the combined organic/surface soil layers were 75 mg/kg and 166 mg/kg, respectively.

Unit 3e is characterized by fill with some construction debris from an unknown source. Arsenic concentrations are elevated in this fill (138 mg/kg maximum, 36 mg/kg mean), albeit lower than in the forest areas. Lead concentrations in Unit 3e fill are also elevated (403 mg/kg maximum, 61 mg/kg mean).

12.1.1.3 Bluffs

The bluff areas appear to have a relatively low overall concentration of arsenic and lead (mean surface soil arsenic 37 mg/kg, lead 55 mg/kg). However, the data are biased low due to these bluffs being generally inaccessible for sampling. Many of the historical samples collected by others were likely collected from areas that were subjected to mass wasting, erosion, and past road building activities. These conditions will also result in generally variable metals concentrations both for surface and subsurface soils.

Metals concentrations in soils located along the base of the bluff are all generally low. As seen in one bluff sample, minor exceedences of the Method A cleanup level for arsenic can occur on a limited basis in the bluffs. This is to be expected, given the thin layer of impacted surface soils that will exist on the face of the bluff. However, as seen with the slough soil samples, when the relatively small mass of contaminated topsoil is mixed with the larger mass uncontaminated soils, the end effect is that overall metals concentrations are very low.

12.1.1.4 Trails

The mean arsenic concentration for all the soft trails combined is 130 mg/kg. The greatest arsenic concentration is 394 mg/kg. The trail arsenic concentrations are reasonably comparable to the forest duff/surface soil arsenic concentrations observed on a property-wide basis. The difference is likely a result of the limited number of trail samples compared to the much greater number of property-wide samples.

The mean lead concentrations for all soft surface trails, excluding Unit 5 which is biased high due to the former skeet range, is 225 mg/kg and the greatest lead concentration is 775 mg/kg (1,590 mg/kg in Unit 5). The trail lead concentrations are also reasonably comparable to the forest duff/surface soil concentrations on a property-wide basis.

12.1.1.5 Roads

Arsenic and lead concentrations on graded roads are, for the most part, relatively low. However, in some areas contaminated soils from other areas have apparently been transported onto the roads.

12.1.2 Cadmium

The maximum cadmium concentration is 11 mg/kg (Unit 1a). Cadmium concentrations are greatest in the forest duff layer and Unit 1a/1b surface soils where the mean concentrations for both are 3.3 mg/kg. Surface soil cadmium concentrations are less in Units 3a/3b/3c by about half (mean 1.7 mg/kg) and in Unit 3e, the mean cadmium concentration is also 1.7 mg/kg. Mean cadmium concentrations decline with depth, as is seen for arsenic and lead. The greatest observed cadmium concentration at the 9-inch depth is 2.2 mg/kg, and at the 18-inch depth it is 1.5 mg/kg.

12.2 PAH in Forest Duff and Soil

PAH only occur in Unit 5 as a result of the skeet shards used for former trap shooting activities. Skeet shards were observed near where the trap throwers had been located. The TEQ cPAH Method A cleanup level of 100 µg/kg is exceeded for both forest duff and soil at sample locations where skeet shards were present. PAH are not mobile and will bind to the organic matter. The area of cPAH-contaminated soils is limited to an approximately 169,300 square-foot-area (3.9 acres), which partially overlaps with the area of elevated lead contaminated soils, but is generally closer to the target throwers.

12.3 Plant Tissue

Plant uptake of arsenic, lead, and cadmium is greater on the Cleanup Unit, as compared to the same plants grown on uncontaminated soils. Even so, metals concentrations are typically less than 1.0 mg/kg. But concentrations between 1 and 3.5 mg/kg for arsenic and lead are not uncommon. Arsenic uptake by Douglas fir is particularly significant with the concentration averaging 47.6 mg/kg in Douglas fir needles collected from Units 1a and 1b. Uptake and shedding of fir needs could result in continued redeposition of arsenic in a recycling manner. However, what is not known is how much arsenic may be taken up and retained in the tree trunks.

Local area residents are routinely observed harvesting the blackberries within the Cleanup Unit. There is increased metals uptake in blackberries; however, hyperaccumulation is not occurring and the overall uptake appears to be relatively low, considering that arsenic uptake in the control was about 10 µg/kg and in the Cleanup Unit samples, between 16 and 36 µg/kg. Metals concentrations in the berries were also less than in the plant tissue samples.

12.4 Groundwater/Spring Water

Historical groundwater monitoring data and historical and current spring data demonstrate that groundwater has not been significantly impacted by metals concentrations in surface soils. Further, research of data for water wells on Maury Island indicates that the Vashon Advance aquifer has not been impacted as a result of the TSP.

12.5 Natural Environment Assessment Findings

Results of the natural environment assessment findings indicate the following:

- Construction debris and remnant structures, particularly those associated with shoreline armoring are widely spread throughout the beach. While generally inert, these materials occupy space where natural processes would be occurring.
- Numerous residual pilings exist in the vicinity of the North Pit, most of which only protrude a foot or two from the sand. A subtidal survey identified several additional pilings.
- Wetland delineation in Unit 5 confirmed the presence of a wetland, totaling approximately 1.24 acres, which is much smaller than the area indicated on previous King County maps. The wetland was determined to be functioning well.
- The biological survey of the Cleanup Unit determined that the forested and shrubland habitats at the Cleanup Unit support a variety of wildlife and "especially valuable habitat" and found that this habitat is sustainable under current conditions and does not exhibit signs of distress.

12.6 Cleanup Levels

As noted throughout this RI, metals concentrations consistently exceed MTCA Cleanup Levels in forest duff and surface soil throughout the Cleanup Unit, with the exception of recently mined areas and the beach. Any full scale cleanup action would necessarily remove all contaminated surficial material throughout the Cleanup Unit, and in doing so would destroy the existing ecological system. Based on this, remedial alternatives developed for the Cleanup Unit should incorporate remediation levels, and a Net Environmental Benefit Analysis that would weigh the advantages of remediation versus the impact that cleanup will have on the habitat. An integrated cleanup action plan would utilize Method A cleanup levels for all areas proposed for major capitol infrastructure (i.e., playgrounds, picnic areas, permanent structures) and remediation levels developed from a human-health risk assessment based on the current and future site use as an open space property for all other areas.

Section 13

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Tables

Table 1
Property-Wide Arsenic, Lead, and Cadmium Soil Concentrations
Maury Island Open Space Property RI
Maury Island, Washington

Decision Unit	Map Location [a]	Sample I.D.	Depth (inches)	Arsenic	Lead	Cadmium	Method	Source
				mg/kg				
1A								
	#6	1a-fd-06-0	Forest Duff	72	438	--	XRF	CDM_2010
		1a-s-06-0	0-2	280	510	4.4	Lab	CDM_2010
		1a-s-06-9	9	36	12	--	XRF	CDM_2010
		1a-s-06-18	18	19	7.1	--	XRF	CDM_2010
	#7	1a-fd-07	Forest Duff	120	730	4.4	Lab	CDM_2010
		1a-s-07-0	0-2	140	87	3.3	Lab	CDM_2010
	#8	1a-fd-08	Forest Duff	100	372	--	XRF	CDM_2010
		1a-s-08-0	0-2	199	206	--	XRF	CDM_2010
		1a-s-08-9	9	6.0	5.8	--	XRF	CDM_2010
		1a-s-08-18	18	7.5	4.6	--	XRF	CDM_2010
	#9	1a-fd-09	Forest Duff	160	420	2	Lab	CDM_2010
		1a-s-09-0	0-2	140	127	--	XRF	CDM_2010
	#10	1a-fd-10	Forest Duff	10	33	--	XRF	CDM_2010
		1a-s-10-0	0-2	320	350	8.9	Lab	CDM_2010
		1a-s-10-9	9	30	8.3	--	XRF	CDM_2010
		1a-s-10-18	18	4.5	8.3	--	XRF	CDM_2010
	#74	1a-fd-74	Forest Duff	110	510	5.4	Lab	CDM_2010
		1a-s-74-0	0-2	100	93	2.3	Lab	CDM_2010
	#75	1a-fd-75	Forest Duff	150	440	4.7	Lab	CDM_2010
		1a-s-75-0	0-2	227	342	--	XRF	CDM_2010
		1a-s-75-9	9	19	8.3	--	XRF	CDM_2010
		1a-s-75-18	18	6.0	9.5	--	XRF	CDM_2010
	#76	1a-fd-76	Forest Duff	33	230	2.5	Lab	CDM_2010
		1a-s-76-0	0-2	190	190	1.8	Lab	CDM_2010
	#77	1a-fd-77	Forest Duff	47	164	--	XRF	CDM_2010
		1a-s-77-0	0-2	150	57	3.3	Lab	CDM_2010
		1a-s-77-9	9	27	25	--	XRF	CDM_2010
		1a-s-77-18	18	8.9	12	--	XRF	CDM_2010
	#78	1a-fd-78	Forest Duff	85	452	--	XRF	CDM_2010
		1a-s-78-0	0-2	162	103	--	XRF	CDM_2010
	#79	1a-fd-79	Forest Duff	23	158	--	XRF	CDM_2010
		1a-s-79-0	0-2	270	420	11	Lab	CDM_2010
		1a-s-79-9	9	85	20	--	XRF	CDM_2010
		1a-s-79-18	18	6.0	5.8	--	XRF	CDM_2010
	#81	1a-fd-80	Forest Duff	140	817	--	XRF	CDM_2010
		1a-s-80-0	0-2	167	83	--	XRF	CDM_2010
	#82	1a-fd-82	Forest Duff	41	217	--	XRF	CDM_2010
		1a-s-82-0	0-2	198	220	--	XRF	CDM_2010
		1a-s-82-9	9	12	8.9	1.1	Lab	CDM_2010
		1a-s-82-18	18	4.5	8.3	--	XRF	CDM_2010
	#83	1a-fd-83	Forest Duff	105	492	--	XRF	CDM_2010
		1a-s-83-0	0-2	131	65	--	XRF	CDM_2010
	#84	1a-fd-84	Forest Duff	110	260	3.8	Lab	CDM_2010
		1a-s-84-0	0-2	107	54	--	XRF	CDM_2010
		1a-s-84-9	9	6.0	5.8	--	XRF	CDM_2010
		1a-s-84-18	18	7.5	3.4	--	XRF	CDM_2010
	#85	1a-fd-85	Forest Duff	25	148	--	XRF	CDM_2010
		1a-s-85-0	0-2	103	167	--	XRF	CDM_2010
		1a-s-85-9	9	6.0	8.3	--	XRF	CDM_2010
		1a-s-85-18	18	4.5	7.1	--	XRF	CDM_2010

Table 1
Property-Wide Arsenic, Lead, and Cadmium Soil Concentrations
Maury Island Open Space Property RI
Maury Island, Washington

Decision Unit	Map Location [a]	Sample I.D.	Depth (inches)	Arsenic (mg/kg)	Lead (mg/kg)	Cadmium (mg/kg)	Method	Source
1A (cont.)								
	#86	1a-fd-86	Forest Duff	170	703	--	XRF	CDM_2010
		1a-s-86-0	0-2	59	26	--	XRF	CDM_2010
	#87	1a-fd-87	Forest Duff	26	63	--	XRF	CDM_2010
		1a-s-87-0	0-2	188	292	--	XRF	CDM_2010
	#88	1a-fd-88	Forest Duff	111	381	--	XRF	CDM_2010
		1a-s-88-0	0-2	156	52	--	XRF	CDM_2010
	#89	1a-fd-89	Forest Duff	44	260	--	XRF	CDM_2010
		1a-s-89-0	0-2	52	50	--	XRF	CDM_2010
		1a-s-89-9	9	30	23	--	XRF	CDM_2010
		1a-s-89-18	18	8.9	3.4	--	XRF	CDM_2010
	EP-02	EP-2	9	85	18	--	Lab	AESI_1998
	EP-03	EP-3	9	5.8	12	--	Lab	AESI_1998
	GM-04	GM-4	0-2	82	--	--	Lab	LA_1999
	GM-05	GM-5	0-2	30	--	--	Lab	LA_1999
	GM-06	GM-6	0-2	81	--	--	Lab	LA_1999
	GM-07	GM-7	0-2	293	--	--	Lab	LA_1999
	GM-08	GM-8	0-2	477	--	--	Lab	LA_1999
	SS-5	SS-5	24	<0.8	<0.5	<0.281	Lab	TA_1999
	TA-08	TA-8	0-2	190	550	3.0	Lab	TA_1999
			9	67	41	0.94	Lab	TA_1999
			18	10	7.6	<0.281	Lab	TA_1999
	#146	1a-s-146-0	0-2	151	259	1.6[b]	Lab	CDM_2013
		1a-s-146-9	9	8.8	5.6	--	Lab	CDM_2013
		TA-9	18	9.2	7.1	0.77	Lab	TA_1999
	#147	1a-s-147-0	0-2	245	437	<0.281[b]	Lab	CDM_2013
		1a-s-147-9	9	10.9	5.9	--	Lab	CDM_2013
		TA-13	18	8.2	8.3	1.5	Lab	TA_1999
	#148	1a-s-148-0	0-2	69	107	6[b]	Lab	CDM_2013
		1a-s-148-9	9	67	32	--	Lab	CDM_2013
		TA-17	18	11	<0.5	<0.281	Lab	TA_1999
	TA-18	TA-18	0-2	11	7.1	<0.281	Lab	TA_1999
			9	8.2	<0.5	<0.281	Lab	TA_1999
			18	5.9	6.1	<0.281	Lab	TA_1999
	#153	1a-s-153-0	0-2	131	371	6[b]	Lab	CDM_2013
		1a-s-153-9	9	119	102	--	Lab	CDM_2013
		TA-19	18	3.8	<0.5	<0.281	Lab	TA_1999
	TA-20	TA-20	0-2	140	710	5.4	Lab	TA_1999
			9	11	11	<0.281	Lab	TA_1999
			18	7.6	6.6	0.59	Lab	TA_1999
1B								
	#91	1b-fb-91	Forest Duff	77	232	--	XRF	CDM_2010
		1b-s-91-0	0-2	111	224	--	XRF	CDM_2010
		1b-s-91-9	9	22	11	--	XRF	CDM_2010
		1b-s-91-18	18	4.5	9.6	--	XRF	CDM_2010
	#92	1b-fb-92	Forest Duff	59	99	--	XRF	CDM_2010
		1b-s-92-0	0-2	97	47	--	XRF	CDM_2010
	#93	1b-fb-93	Forest Duff	126	576	--	XRF	CDM_2010
		1b-s-93-0	0-2	86	19	--	XRF	CDM_2010
	#94	1b-fb-94	Forest Duff	80	210	1.8	Lab	CDM_2010
		1b-s-94-0	0-2	75	54	1.5	Lab	CDM_2010

Table 1
Property-Wide Arsenic, Lead, and Cadmium Soil Concentrations
Maury Island Open Space Property RI
Maury Island, Washington

Decision Unit	Map Location [a]	Sample I.D.	Depth (inches)	Arsenic	Lead	Cadmium	Method	Source
				mg/kg				
1B (cont.)								
	#95	1b-fd-95	Forest Duff	61	229	--	XRF	CDM_2010
		1b-s-95-0	0-2	150	930	6.7	Lab	CDM_2010
		1b-s-95-9	9	22	19	--	XRF	CDM_2010
		1b-s-95-18	18	7.5	8.3	--	XRF	CDM_2010
	#96	1b-fb-96	Forest Duff	163	304	--	XRF	CDM_2010
		1b-s-96-0	0-2	47	19	--	XRF	CDM_2010
	#97	1b-fd-97	Forest Duff	69	260	--	XRF	CDM_2010
		1b-s-97-0	0-2	48	39	--	XRF	CDM_2010
		1b-s-97-9	9	19	8.3	--	XRF	CDM_2010
		1b-s-97-18	18	7.5	8.3	--	XRF	CDM_2010
	GM-02	GM-2	0-2	379	--	--	Lab	LA_1999
	GM-03	GM3	0-2	273	--	--	Lab	LA_1999
	SF-01	SF-1	0-2	24	--	--	Lab	FW_2000
	SF-02	SF-2	0-2	39	--	--	Lab	FW_2000
	SF-03	SF-3	0-2	47	--	--	Lab	FW_2000
	SF-04	SF-4	0-2	82	--	--	Lab	FW_2000
	SF-05	SF-5	0-2	172	--	--	Lab	FW_2000
	SF-06	SF-6	0-2	61	--	--	Lab	FW_2000
	SF-07	SF-7	0-2	19	--	--	Lab	FW_2000
	SF-08	SF-8	0-2	89	--	--	Lab	FW_2000
	SS-1	SS-1	0-2	140	350	2.0	Lab	FW_1999
			9	<0.8	31	1.6	Lab	FW_1999
			18	<0.8	13	<0.281	Lab	FW_1999
	#165	1b-s-165-0	0-2	91.2	254	9.8[b]	Lab	CDM_2013
		1b-s-165-9	9	48.4	87.4	--	Lab	CDM_2013
		SS-2	18	<8	11	1.0	Lab	FW_1999
	TA-01	TA-1	0-2	330	830	1.0	Lab	TA_1999
			9	39	27	0.84	Lab	TA_1999
			18	43	23	0.89	Lab	TA_1999
	TA-02	TA-2	0-2	120	390	2.3	Lab	TA_1999
			9	25	10	1.2	Lab	TA_1999
			18	8.7	<0.5	<0.281	Lab	TA_1999
2A								
	#51	2a-51-2-0	0-2	7.5	4.6	--	XRF	CDM_2010
	#52	2a-52-s-0	0-2	12	8.3	--	XRF	CDM_2010
	#53	2a-53-s-0	0-2	7.5	8.3	--	XRF	CDM_2010
	#54	2a-54-s-0	0-2	4.5	11	--	XRF	CDM_2010
	#55	2a-55-s-0	0-2	10	11	--	XRF	CDM_2010
	#56	2a-56-s-0	0-2	4.5	8.3	--	XRF	CDM_2010
	#57	2a-57-s-0	0-2	6.0	8.3	--	XRF	CDM_2010
	#58	2a 58-s-0	0-2	6.0	3.4	--	XRF	CDM_2010
	#59	2a-59-2-0	0-2	7.5	4.6	--	XRF	CDM_2010
	#60	2a-s-60-0	0-2	6.0	13	--	XRF	CDM_2010
	#61	2a-s-61-0	0-2	7.5	17	--	XRF	CDM_2010
	#62	2a-s-62-0	0-2	4.5	5.8	--	XRF	CDM_2010
	#63	2a-s-63-0	0-2	3.1	4.6	--	XRF	CDM_2010
	#64	2a-s-64-0	0-2	4.5	8.3	--	XRF	CDM_2010
	#65	2a-s-65-0	0-2	6.0	3.4	--	XRF	CDM_2010
	#66	2a-s-66-0	0-2	11	7.7	--	XRF	CDM_2010
	#67	2a-s-67-0	0-2	8.9	8.3	--	XRF	CDM_2010

Table 1
Property-Wide Arsenic, Lead, and Cadmium Soil Concentrations
Maury Island Open Space Property RI
Maury Island, Washington

Decision Unit	Map Location [a]	Sample I.D.	Depth (inches)	Arsenic mg/kg	Lead mg/kg	Cadmium mg/kg	Method	Source
2A (cont.)								
	#68	2a-s-68-0	0-2	4.5	5.8	--	XRF	CDM_2010
	#69	2a-s-69-0	0-2	4.5	5.8	--	XRF	CDM_2010
	#70	2a-s-70-0	0-2	3.0	2.6	<0.16	Lab	CDM_2010
	#71	2a-fd-71	Forest Duff	1.6	1.1	--	XRF	CDM_2010
		2a-s-71-0	0-2	4.5	3.4	--	XRF	CDM_2010
	#72	2a-fd-72	Forest Duff	10	8.3	--	XRF	CDM_2010
		2a-s-72-0	0-2	10	5.8	--	XRF	CDM_2010
	#73	2a-s-73-0	0-2	4.3	8.8	0.2	Lab	CDM_2010
	G-2	G-2	0-2	2.2	<0.5	<0.281	Lab	TA_1999
	G-3	G-3	0-2	1.6	<0.5	<0.281	Lab	TA_1999
	G-4	G-4	0-2	1.8	<0.5	<0.281	Lab	TA_1999
	TA-10	TA-10	0-2	4.3	<0.5	<0.281	Lab	TA_1999
			9	<0.8	<0.5	<0.281	Lab	TA_1999
			18	<0.8	<0.5	<0.281	Lab	TA_1999
	TA-15	TA-15	0-2	<0.8	<0.5	<0.281	Lab	TA_1999
			9	<0.8	<0.5	<0.281	Lab	TA_1999
			18	<0.8	<0.5	<0.281	Lab	TA_1999
2B								
	#1	2b-s-01-0	0-2	4.5	4.6	--	XRF	CDM_2010
	#2	2b-s-02-0	0-2	6.0	7.1	--	XRF	CDM_2010
	#3	2b-s-03-0	0-2	6.0	8.3	--	XRF	CDM_2010
	#4	2b-s-04-0	0-2	6.0	2.2	--	XRF	CDM_2010
	#5	2b-s-05-0	0-2	6.0	5.8	--	XRF	CDM_2010
	G-1	G-1	0-2	<0.8	<0.5	<0.281	Lab	TA_1999
	WRS-10	WRS-10	0-2	19.0	<0.281	3.0	Lab	FW_2000
2C								
	#36	2c-s-36-0	0-2	6.0	7.1	--	XRF	CDM_2010
	#37	2c-s-37-0	0-2	8.9	7.1	--	XRF	CDM_2010
	#38	2c-fd-38	Forest Duff	65	390	1.2	Lab	CDM_2010
		2c-s-38-0	0-2	148	423	--	XRF	CDM_2010
		2c-s-38-9	9	69	72	--	XRF	CDM_2010
		2c-s-38-18	18	6.0	5.8	--	XRF	CDM_2010
	#46	2c-s-46-0	0-2	22	19	--	XRF	CDM_2010
		2c-s-46-9	9	12	10	--	XRF	CDM_2010
		2c-s-46-18	18	17	15	--	XRF	CDM_2010
	#47	2c-fd-47	Forest Duff	45	110	--	XRF	CDM_2010
		2c-s-47-0	0-2	116	130	--	XRF	CDM_2010
		2c-s-47-9	9	111	112	--	XRF	CDM_2010
		2c-s-47-18	18	29	12	--	XRF	CDM_2010
		2c-s-47-24	24	22	12	--	XRF	CDM_2010
	#48	2c-s-48-0	0-2	51	89	--	XRF	CDM_2010
	#49	2c-s-49-0	0-2	36	73	--	XRF	CDM_2010
	#50	2c-fd-50	Forest Duff	61	149	--	XRF	CDM_2010
		2c-s-50-0	0-2	61	163	--	XRF	CDM_2010
	ERS-11	ERS-11	0-2	19	6.0	<0.281	Lab	FW_2000
	ORS-12	ORS-12	0-2	44	18	<0.281	Lab	FW_2000
	ORS-13	ORS-13	0-2	66	43	<0.281	Lab	FW_2000
	TA-07	TA-7	0-2	17	13	<0.281	Lab	TA_1999
			9	19	18	<0.281	Lab	TA_1999
			18	13	11	<0.281	Lab	TA_1999

Table 1
Property-Wide Arsenic, Lead, and Cadmium Soil Concentrations
Maury Island Open Space Property RI
Maury Island, Washington

Decision Unit	Map Location [a]	Sample I.D.	Depth (inches)	Arsenic	Lead	Cadmium	Method	Source
				mg/kg				
3A								
	#158	3a-fd-11	Forest Duff	9	15	--	XRF	CDM_2010
		3a-s-158-0	0-2	66	87	--	Lab	CDM_2013
		3a-s-158-9	9	4.1	6.9	--	Lab	CDM_2013
	#12	3a-fd-12	Forest Duff	33	61	3.6	Lab	CDM_2010
		3a-s-12-0	0-2	33	52	--	XRF	CDM_2010
		3a-s-12-9	9	44	83	--	XRF	CDM_2010
		3a-s-12-18	18	5	12	--	XRF	CDM_2010
	#13	3a-fd-13	Forest Duff	9	13	--	XRF	CDM_2010
		3a-s-13-0	0-2	44	69	--	XRF	CDM_2010
	#14	3a-fd-14	Forest Duff	154	636	--	XRF	CDM_2010
		3a-s-14-0	0-2	144	68	--	XRF	CDM_2010
	#15	3a-fd-15	Forest Duff	10	11	--	XRF	CDM_2010
		3a-s-15-0	0-2	55	72	--	XRF	CDM_2010
	#16	3a-fd-16	Forest Duff	55	92	--	XRF	CDM_2010
		3a-s-16-0	0-2	60	34	--	XRF	CDM_2010
	#17	3a-fd-17	Forest Duff	15	19	--	XRF	CDM_2010
		3a-s-17-0	0-2	39	45	--	XRF	CDM_2010
	#18	3a-fd-18	Forest Duff	37	184	--	XRF	CDM_2010
		3a-s-18-0	0-2	72	86	--	XRF	CDM_2010
	#19	3a-fd-19	Forest Duff	85	354	--	XRF	CDM_2010
		3a-s-19-0	0-2	280	330	4.9	Lab	CDM_2010
	#20	3a-s-20-0	0-2	19	20	--	XRF	CDM_2010
	#21	3a-fd-21	Forest Duff	15	23	--	XRF	CDM_2010
		3a-s-21-0	0-2	37	44	--	XRF	CDM_2010
	#22	3a-fd-22	Forest Duff	15	31	--	XRF	CDM_2010
		3a-s-22-0	0-2	77	103	--	XRF	CDM_2010
		3a-s-22-9	9	75	110	2.2	Lab	CDM_2010
		3a-s-22-18	18	3.7	5.9	<0.3	Lab	CDM_2010
	#23	3a-fd-23	Forest Duff	58	59	--	XRF	CDM_2010
		3a-s-23-0	0-2	70	124	--	XRF	CDM_2010
	#24	3a-fd-24	Forest Duff	26	51	--	XRF	CDM_2010
		3a-s-24-0	0-2	60	42	--	XRF	CDM_2010
	M-d1	3a-s-d1	0-2	70	100	2.0	Lab	CDM_2010
	TP-08	3a-tp8-0	0-2	4.5	8.3	--	XRF	CDM_2010
		3a-tp8-9	9	8.9	7.1	--	XRF	CDM_2010
		3a-tp8-18	18	19	24	--	XRF	CDM_2010
	TP-09	3a-tp9-0	0-2	26	39	--	XRF	CDM_2010
		3a-tp9-9	9	8.7	4.3	--	XRF	CDM_2010
		3a-tp9-18	18	22	45	--	XRF	CDM_2010
	EP-09	EP-9	9	5.1	9.0	--	Lab	AESI_1998
	GM-09	GM-9	9	9.0	--	--	Lab	LA_1999
	#159	3a-s-159-0	0-2	88	109	0.92[b]	Lab	CDM_2013
		3a-s-159-9	9	32	53	--	Lab	CDM_2013
	#160	3a-s-160-0	0-2	50	42	9.3[b]	Lab	CDM_2013
		3a-s-160-9	9	3.5	5.97	--	Lab	CDM_2013
	TA-11	TA-11	0-2	1.9	<0.5	<0.281	Lab	TA_1999
			9	<0.8	<0.281	<0.5	Lab	TA_1999
			18	<0.8	<0.281	<0.5	Lab	TA_1999
	WRS-05	WRS-5	0-2	74	43	<0.281	Lab	FW_2000
	WRS-06	WRS-6	0-2	71	23	<0.281	Lab	FW_2000

Table 1
Property-Wide Arsenic, Lead, and Cadmium Soil Concentrations
Maury Island Open Space Property RI
Maury Island, Washington

Decision Unit	Map Location [a]	Sample I.D.	Depth (inches)	Arsenic	Lead	Cadmium	Method	Source
				mg/kg				
3B								
	#25	3b-fd-25	Forest Duff	45	89	--	XRF	CDM_2010
		3b-s-25-0	0-2	77	83	--	XRF	CDM_2010
	#26	3b-fd-26	Forest Duff	82	196	--	XRF	CDM_2010
		3b-s-26-0	0-2	175	215	--	XRF	CDM_2010
	#29	3b-fd-29	Forest Duff	34	69	--	XRF	CDM_2010
		3b-s-29-0	0-2	188	214	--	XRF	CDM_2010
		3b-s-29-9	9	7.5	7.1	--	XRF	CDM_2010
		3b-s-29-18	18	4.5	7.1	--	XRF	CDM_2010
	#30	3b-fb-30	Forest Duff	23	67	--	XRF	CDM_2010
		3b-s-30-0	0-2	155	189	--	XRF	CDM_2010
		3b-s-30-9	9	6.0	8.3	--	XRF	CDM_2010
		3b-s-30-17	17	19	25	--	XRF	CDM_2010
	#31	3b-fd-31	Forest Duff	29	90	--	XRF	CDM_2010
		3b-s-31-0	0-2	190	224	--	XRF	CDM_2010
	SF-09	SF-9	0-2	53	--	--	Lab	FW_2000
	SF-10	SF-10	0-2	82	--	--	Lab	FW_2000
	SF-11	SF-11	0-2	78	--	--	Lab	FW_2000
	#169	3b-s-169-0	0-2	111	111	<0.281[b]	Lab	CDM-2013
		3b-s-169-9	9	8.5	8.2	--	Lab	CDM-2013
		TA-3	18	10	8.6	0.6	Lab	TA_1999
3C								
	#27	3c-s-27-0	0-2	22	47	--	XRF	CDM_2010
	TP01	3c-tp1-0	0-2	69	92	--	XRF	CDM_2010
		3c-tp1-9	9	4.5	4.6	--	XRF	CDM_2010
		3c-tp1-18	18	7.5	3.4	--	XRF	CDM_2010
	TP02	3c-tp2-0	0-2	115	124	--	XRF	CDM_2010
		3c-tp2-9	9	15	11	--	XRF	CDM_2010
		3c-tp2-18	18	4.6	4.8	<0.19	Lab	CDM_2010
	TP03	3c-tp3-fd	Forest Duff	148	487	--	XRF	CDM_2010
		3c-tp3-0	0-2	40	68	--	XRF	CDM_2010
		3c-tp3-9	9	6.0	9.6	--	XRF	CDM_2010
		3c-tp3-18	18	4.5	7.1	--	XRF	CDM_2010
		3c-tp3-24	24	2.5	3.9	<0.16	Lab	CDM_2010
	TP04	3c-tp4-fd	Forest Duff	82	355	--	XRF	CDM_2010
		3c-tp4-0	0-2	101	90	--	XRF	CDM_2010
		3c-tp4-9	9	4.5	9.6	--	XRF	CDM_2010
		3c-tp4-18	18	6.0	8.3	--	XRF	CDM_2010
		3c-tp4-24	24	3.1	8.3	--	XRF	CDM_2010
	TP05	3c-tp5-fd	Forest Duff	104	324	--	XRF	CDM_2010
		3c-tp5-0	0-2	73	339	--	XRF	CDM_2010
		3c-tp05-9	9	10	11	--	XRF	CDM_2010
		3c-tp5-18	18	10	7.1	--	XRF	CDM_2010
		3c-tp5-24	24	4.5	5.8	--	XRF	CDM_2010
	TP06	3c-tp6-fd	Forest Duff	70	161	--	XRF	CDM_2010
		3c-tp6-0	0-2	29	28	--	XRF	CDM_2010
		3c-tp6-9	9	6.0	7.1	--	XRF	CDM_2010
		3c-tp6-18	18	4.7	5.1	--	XRF	CDM_2010
	TP07	3c-tp7-fd	Forest Duff	81	220	--	XRF	CDM_2010
		3c-tp7-0	0-2	85	106	--	XRF	CDM_2010
		3c-tp7-9	9	13	19	--	XRF	CDM_2010
		3c-tp7-18	18	3.1	4.6	--	XRF	CDM_2010

Table 1
Property-Wide Arsenic, Lead, and Cadmium Soil Concentrations
Maury Island Open Space Property RI
Maury Island, Washington

Decision Unit	Map Location [a]	Sample I.D.	Depth (inches)	Arsenic mg/kg	Lead mg/kg	Cadmium mg/kg	Method	Source
3C (cont.)								
	EP-11	EP-11	9	4.2	7.6	--	Lab	AESI_1998
	GM-01	GM-1	0-2	199	--	--	Lab	LA_1999
	ORS-14	ORS-14	0-2	16	24	0.56	Lab	FW_2001
	ORS-15	ORS-15	0-2	46	62	1.8	Lab	FW_2001
	ORS-16	ORS-16	0-2	73	102	1.7	Lab	FW_2001
	ORS-17	ORS-17	0-2	7.2	9.0	<0.281	Lab	FW_2001
	ORS-18	ORS-18	0-2	156	198	0.86	Lab	FW_2001
	ORS-19	ORS-19	0-2	6.2	6.1	<0.281	Lab	FW_2001
	SF-12	SF-12	0-2	94	--	--	Lab	FW_2000
	SF-13	SF-13	0-2	69	--	--	Lab	FW_2000
	SF-14	SF-14	0-2	17	--	--	Lab	FW_2000
	SF-15	SF-15	0-2	30.3	--	--	Lab	FW_2000
	SS-3	SS-3	0-2	<0.8	37	1.2	Lab	FW_1999
			9	<0.8	40	1.1	Lab	FW_1999
			18	<0.8	37	1.2	Lab	FW_1999
	SS-4	SS-4	24	<0.8	<0.5	<0.281	Lab	FW_1999
	TA-04	TA-4	0-2	160	450	1.5	Lab	TA_1999
			9	19	25	0.72	Lab	TA_1999
			18	4.2	<0.5	<0.281	Lab	TA_1999
3D								
	#44	3d-fd-44	Forest Duff	59	236	--	XRF	CDM_2010
		3d-s-44-0	0-2	90	370	3.6	Lab	CDM_2010
		3d-s-44-9	9	45	11	--	XRF	CDM_2010
		3d-s-44-18	18	7.5	8.3	--	XRF	CDM_2010
	#45	3d-fd-45	Forest Duff	13	9.6	--	XRF	CDM_2010
		3d-s-45-0	0-2	54	54	--	XRF	CDM_2010
	#98	3d-fd-98	Forest Duff	20	44	--	XRF	CDM_2010
		3d-s-98-0	0-2	48	63	--	XRF	CDM_2010
		3d-s-98-9	9	16	27	--	XRF	CDM_2010
		3d-s-98-16	16	19	17	--	XRF	CDM_2010
	#99	3d-s-99-0	0-2	68	159	--	XRF	CDM_2010
	#100	3d-s-100-0	0-2	32	48	1.6	Lab	CDM_2010
	WRS-03	WRS-3	0-2	106	22	<0.281	Lab	FW_2000
	WRS-07	WRS-7	0-2	110	30	<0.281	Lab	FW_2000
3E								
	#80	3e-s-80-0	0-2	14	21	0.43	Lab	CDM_2010
	#90	3e-s-90-0	0-2	23	29	--	XRF	CDM_2010
	P1	3e-p1-0	0-2	39	66	1.0	Lab	CDM_2010
		3e-p1-12	12	52	87	--	XRF	CDM_2010
		3e-p1-24	24	52	76	--	XRF	CDM_2010
		3e-p1-36	36	54	77	--	XRF	CDM_2010
		3e-p1-48	48	39	57	--	XRF	CDM_2010
	P2	3e-p2-0	0-2	22	31	--	XRF	CDM_2010
		3e-p2-12	12	33	36	--	XRF	CDM_2010
		3e-p2-24	24	17	32	--	XRF	CDM_2010
	TP10	3e-tp10-fd	Forest Duff	8.0	20	0.7	Lab	CDM_2010
		3e-tp10-0	0-2	19	25	--	XRF	CDM_2010
		3e-tp10-9	9	8.9	21	--	XRF	CDM_2010
		3e-tp10-18	18	25	35	--	XRF	CDM_2010
		3e-tp10-24	24	10	24	--	XRF	CDM_2010

Table 1
Property-Wide Arsenic, Lead, and Cadmium Soil Concentrations
Maury Island Open Space Property RI
Maury Island, Washington

Decision Unit	Map Location [a]	Sample I.D.	Depth (inches)	Arsenic (mg/kg)	Lead (mg/kg)	Cadmium (mg/kg)	Method	Source
3E (cont.)								
	TP11	3e-tp11-0	0-2	25	39	--	XRF	CDM_2010
		3e-tp11-9	9	29	44	--	XRF	CDM_2010
		3e-tp11-19	18	41	72	--	XRF	CDM_2010
		3e-tp11-24	24	22	24	--	XRF	CDM_2010
	TP12	3e-tp12-fd	Forest Duff	29	29	--	XRF	CDM_2010
		3e-tp12-0	0-2	23	37	--	XRF	CDM_2010
		3e-tp12-9	9	33	41	--	XRF	CDM_2010
		3e-tp12-18	18	39	54	--	XRF	CDM_2010
		3e-tp12-24	24	37	52	--	XRF	CDM_2010
		3e-tp12-36	36	34	54	--	XRF	CDM_2010
	TP13	3e-tp13-0	0-2	7.2	130	0.46	Lab	CDM_2010
		3e-tp13-12	12	33	70	--	XRF	CDM_2010
		3e-tp13-24	24	27	43	0.64	Lab	CDM_2010
	TP14	3e-tp14-fd	Forest Duff	26	41	--	XRF	CDM_2010
		3e-tp-14-0	0-2	37	32	--	XRF	CDM_2010
		3e-tp14-9	9	15	19	--	XRF	CDM_2010
		3e-tp14-blacklayer	17	95	380	2.5	Lab	CDM_2010
		3e-tp14-18	18	138	403	--	XRF	CDM_2010
		3e-tp14-24	24	7.5	3.4	--	XRF	CDM_2010
	TA-14	TA-14	0-2	18	70	0.91	Lab	TA_1999
			9	130	37	1.2	Lab	TA_1999
			18	<0.8	36	0.9	Lab	TA_1999
	WRS-08	WRS-8	0-2	95	25	<0.281	Lab	FW_2000
	WRS-09	WRS-9	0-2	43	3.0	<0.281	Lab	FW_2000
4B								
	TA-12	TA-12	0-2	6.1	58	<0.281	Lab	TA_1999
			9	6.2	<0.5	<0.281	Lab	TA_1999
			18	5.7	6.0	<0.281	Lab	TA_1999
4C								
	#40	4c-fd-40	Forest Duff	20	25	--	XRF	CDM_2010
		4c-s-40-0-e	0-2	10	11	0.2	Lab	CDM_2010
	GM-10	GM-10	0-2	130	--	--	Lab	LA_1999
	ORS-19	ORS-19	0-2	6.2	6.1	<0.281	Lab	FW_2001
	ORS-20	ORS-20	0-2	3.8	2.7	<0.281	Lab	FW_2001
	ORS-21	ORS-21	0-2	3.5	4.2	<0.281	Lab	FW_2001
	ORS-22	ORS-22	0-2	1.8	2.0	<0.281	Lab	FW_2001
	ORS-23	ORS-23	0-2	5.6	6.0	<0.281	Lab	FW_2001
	ORS-24	ORS-24	0-2	13	<0.281	13	Lab	FW_2001
	ORS-25	ORS-25	0-2	18	13	<0.281	Lab	FW_2001
5								
	#507	5-FD-7	Forest Duff	310	1,800	--	Lab	CDM_2011
		5-s-7-0	0-2	110	350	--	Lab	CDM_2011
	#508	5-FD-8	Forest Duff	100	1,800	--	Lab	CDM_2011
		5-s-8-0	0-2	150	750	--	Lab	CDM_2011
	#509	5-FD-9	Forest Duff	57	620	--	Lab	CDM_2011
		5-s-9-0	0-2	90	920	--	Lab	CDM_2011
	#510	5-FD-10	Forest Duff	94	1,500	--	Lab	CDM_2011
		5-s-10-0	0-2	110	240	--	Lab	CDM_2011
	#511	5-FD-11	Forest Duff	110	1,800	--	Lab	CDM_2011
		5-s-11-0	0-2	41	220	--	Lab	CDM_2011

Table 1
Property-Wide Arsenic, Lead, and Cadmium Soil Concentrations
Maury Island Open Space Property RI
Maury Island, Washington

Decision Unit	Map Location [a]	Sample I.D.	Depth (inches)	Arsenic (mg/kg)	Lead (mg/kg)	Cadmium (mg/kg)	Method	Source
5 (cont.)								
	#512	5-FD-12	Forest Duff	210	300	--	Lab	CDM_2011
		5-s-12-0	0-2	45	98	--	Lab	CDM_2011
		5-s-12-9	9	3.1	6.0	--	Lab	CDM_2011
		5-s-12-18	18	2.4	6.2	--	Lab	CDM_2011
	#513	5-FD-13	Forest Duff	66	3,200	--	Lab	CDM_2011
		5-s-13-0	0-2	93	350	--	Lab	CDM_2011
	#514	5-FD-14	Forest Duff	37	770	--	Lab	CDM_2011
		5-s-14-0	0-2	99	300	--	Lab	CDM_2011
	#515	5-FD-15	Forest Duff	170	1,900	--	Lab	CDM_2011
		5-s-15-0	0-2	96	590	--	Lab	CDM_2011
	#516	5-s-16-0	0-2	25	77	--	Lab	CDM_2011
	#517	5-s-17-0	0-2	54	120	--	Lab	CDM_2011
	#518	5-s-18-0	0-2	50	99	--	Lab	CDM_2011
	#519	5-s-19-0	0-2	57	120	--	Lab	CDM_2011
	#520	5-s-20-0	0-2	48	95	--	Lab	CDM_2011
	#521	5-s-21-0	0-2	120	420	--	Lab	CDM_2011
	#522	5-FD-22	Forest Duff	210	730	--	Lab	CDM_2011
		5-s-22-0	0-2	44	100	--	Lab	CDM_2011
	#523	5-FD-23	Forest Duff	170	2,600	--	Lab	CDM_2011
		5-s-23-0	0-2	190	1,500	--	Lab	CDM_2011
		5-s-23-9	9	19	53	--	Lab	CDM_2011
		5-s-23-18	18	1.4	4.1	--	Lab	CDM_2011
	#524	5-FD-24	Forest Duff	63	610	--	Lab	CDM_2011
		5-s-24-0	0-2	18	78	--	Lab	CDM_2011
	#525	5-FD-25	Forest Duff	170	420	--	Lab	CDM_2011
		5-s-25-0	0-2	98	150	--	Lab	CDM_2011
	#526	5-FD-26	Forest Duff	210	270	--	Lab	CDM_2011
		5-s-26-0	0-2	100	120	--	Lab	CDM_2011
	#527	5-FD-27	Forest Duff	180	840	--	Lab	CDM_2011
		5-s-27-0	0-2	37	26	--	Lab	CDM_2011
	#528	5-FD-28	Forest Duff	72	440	--	Lab	CDM_2011
		5-s-28-0	0-2	160	140	--	Lab	CDM_2011
	#529	5-FD-29	Forest Duff	89	930	--	Lab	CDM_2011
		5-s-29-0	0-2	39	230	--	Lab	CDM_2011
		5-s-29-9	9	3.3	8.6	--	Lab	CDM_2011
		5-s-29-18	18	4.4	8.7	--	Lab	CDM_2011
	#530	5-FD-30	Forest Duff	220	690	--	Lab	CDM_2011
		5-s-30-0	0-2	64	43	--	Lab	CDM_2011
	#531	5-FD-31	Forest Duff	120	800	--	Lab	CDM_2011
		5-s-31-0	0-2	70	25	--	Lab	CDM_2011
	#532	5-FD-32	Forest Duff	210	1,400	--	Lab	CDM_2011
		5-s-32-0	0-2	67	130	--	Lab	CDM_2011
	#533	5-FD-33	Forest Duff	77	210	--	Lab	CDM_2011
		5-s-33-0	0-2	12	13	--	Lab	CDM_2011
	#534	5-FD-34	Forest Duff	170	470	--	Lab	CDM_2011
		5-s-34-0	0-2	93	110	--	Lab	CDM_2011
	#535	5-FD-35	Forest Duff	190	2,300	--	Lab	CDM_2011
		5-s-35-0	0-2	68	150	--	Lab	CDM_2011
	#536	5-FD-36	Forest Duff	29	170	--	Lab	CDM_2011
		5-s-36-0	0-2	31	37	--	Lab	CDM_2011
	#537	5-FD-37	Forest Duff	150	430	--	Lab	CDM_2011
		5-s-37-0	0-2	200	320	--	Lab	CDM_2011

Table 1
Property-Wide Arsenic, Lead, and Cadmium Soil Concentrations
Maury Island Open Space Property RI
Maury Island, Washington

Decision Unit	Map Location [a]	Sample I.D.	Depth (inches)	Arsenic	Lead	Cadmium	Method	Source
				mg/kg				
5 (cont.)								
	#178	5-FD-178-0	Forest Duff	150	350	--	Lab	CDM_2013
		5-s-178-0	0-2	184	339	--	Lab	CDM_2013
	#179	5-FD-179-0	Forest Duff	34	71	--	Lab	CDM_2013
		5-s-179-0	0-2	170	246	--	Lab	CDM_2013
	#180	5-FD-180-0	Forest Duff	45.9	215	--	Lab	CDM_2013
		5-s-180-0	0-2	101	203	--	Lab	CDM_2013
	#181	5-FD-181-0	Forest Duff	56.2	282	--	Lab	CDM_2013
		5-s-181-0	0-2	114	249	--	Lab	CDM_2013
	#182	5-FD-182-0	Forest Duff	19	459	--	Lab	CDM_2013
		5-s-182-0	0-2	151	2,520	--	Lab	CDM_2013
	#183	5-FD-183-0	Forest Duff	11	48	--	Lab	CDM_2013
		5-s-183-0	0-2	18	56	--	Lab	CDM_2013

Notes:
a) Sample locations shown on Figures 7 and 8.
b) Data is from Terra Associates, 1999
mg/kg - milligrams per kilogram.
All metals concentrations that were determined by XRF are adjusted for a dry weight basis.
CDM_201X - Sampled by CDM Smith in year specified
AESI_1998 - Associated Earth Sciences. Soils, Geology, Geologic Hazards and Ground Water Report.
LA_1999 - Landau Associates. Final Sampling Results NW Aggregates Maury Island Gravel Mine.
TA_1999 - Terra Associates,]. Technical Memorandum, Environmental Soil Sampling, Arsenic, Cadmium and Lead, Lone Star Maury Island Site.
FW_2000 - Foster Wheeler. Soil Sampling Report for June 2000 and additional summary tables.

Table 2

Hydrogeologic and Arsenic Data for Wells Located on and Near the Maury Island Open Space Property

Maury Island Open Space Property RI

Maury Island, Washington

Source Name	Public Water Source	Completion Depth (ft - below ground surface)	Hydrostratigraphic Unit Completion	Overlying Confining Unit	Arsenic Range	Drinking Water MCL	MTCA Method A Standard	WA State Groundwater Standard [1]	Marine Water NTR Criteria - Organisms Only [1]	WAC 173-201A Marine Water - Chronic
					µg/L					
OBW-6	No, Monitoring only	238	Qva	Yes, Qvt	<1 to 3.06	10	5	0.05	0.014	36
OBW-7	No, Monitoring only	295	Qva	Yes, Qvt	<1 to 3.30					
OBW-9	No, Monitoring only	42	Qva	No	<1 to 5					
Glacier Spring A - North[a]	No, Monitoring only	N/A	Qva	No	2.03-2.9					
Glacier Spring E - South[a]	No, Monitoring only	N/A	Qva	No	1.24-2.1					
KC-W9a(William White)	No, Private	370	Qva	Yes, Qvt	3.87 to 7.20					
KC-W9b (William White)	No, Private	440	Qva	Yes, Qvt	0.5 to 1.1					
KC-W10 (G. B. W1)	Yes, Group A	114	Qva	Yes, Qvt	1.20 to 3.20					
Dockton Park Springs West/East	Yes, Group A	N/A	Qva	No	3					
Hake Spring	Yes, Group A	N/A	Qva	No	2					
Piner Point Association Spring	Yes, Group B	N/A	Qva	No	NE					
Dockton Sandy Shores Well 1 (KC-W11)	Yes, Group A	691	Qpvu	Yes, Qvt & Qcs	2-3					
KC-W12 (W. Rueter)	No, Private	473	Qpvu	Yes, Qcs	5.25 to 7.66					

Notes:

a) includes June 2013 seep data.
N/A - Not applicable
NE - No arsenic exceedences for the drinking water standard were noted in the WA-DOH water quality data for this syster
NA - Not Available
NTR - National Toxics Rule
WAC - Washington Administrative Code
MCL - Maximum Contaminant Level
MTCA - Model Toxics Control Act, WAC 173-340
(1) - Standard is less than laboratory method detection limit
µg/L - micrograms per liter
< - less than

Table 3
Metals in Representative Plant Tissues
Maury Island Open Space Property RI
Maury Island, Washington

Vegetation Type	Sample Unit	Sample ID	Arsenic	Lead	Cadmium
			mg/kg		
Alder	Control	A-0	0.295	<0.045	0.050
	1a	1a-A-1	2.61	1.22	0.255
	1b	1b-A-1	0.897	0.739	0.093
	3a	3a-A-1	0.507	0.412	0.044
	3d	3d-A-1	0.712	0.622	0.077
Blackberry (Plants)	Control	B-0	0.090	0.522	0.162
	1a	1a-B-1	0.822	1.44	0.702
	3a	3a-B-1	2.65	0.623	0.172
	3c	3c-B-1	0.732	0.833	0.316
	3e	3e-B-1	0.804	0.782	0.164
Bracken Fern	Control	F-0	0.306	0.146	0.073
	1a	1a-F-1	3.22	1.68	0.788
	1a	1a-F-2	1.44	2.66	0.833
	1b	1b-F-1	1.13	1.94	0.746
	3a	3a-F-1	0.952	1.32	0.714
Douglas Fir	Control	DF-0	0.243	0.348	0.089
	1a	1a-DF-1	52.8	0.741	0.604
	1a	1a-DF-2	45.9	0.909	0.515
	1b	1b-DF-1	44.0	0.796	0.449
	2c	2c-DF-1	2.80	0.765	0.199
Pacific Madrone	Control	M-0	0.200	<0.045	0.012
	1a	1a-M-1	0.824	0.713	0.069
	1a	1a-M-2	0.755	0.675	0.050
	1b	1b-M-1	0.683	0.428	0.036
	2c	2c-M-1	0.781	0.421	0.042
Salal	Control	SL-0	0.137	0.462	0.219
	1a	1a-SL-1	0.590	1.26	0.642
	1a	1a-SL-2	0.522	0.887	0.565
	1b	1b-SL-1	0.570	1.17	0.389
Blackberry (berries)	Control	BB-1	0.0096	<0.0043	0.0331
	1a	1a-BB-4	0.036	0.016	0.061
	3c	3c-BB-3	0.024	0.015	0.184
	3e	3e-BB-5	0.024	0.010	0.16
	5	5-BB-2	0.016	0.014	0.145

Note:
mg/kg - milligrams per kilogram.

Table 4
Small Scale Variability Test Results
Maury Island Open Space Property RI
Maury Island, Washington

Matrix	Grid 1 [a] Unit 3b			Grid 2 [b] Unit 1b			Grid 3 [c] Unit 1a		
	ID	Arsenic	Lead	ID	Arsenic	Lead	ID	Arsenic	Lead
	mg/kg								
Forest Duff	G1-1	4.5	12	G2-1 [e]	52	99	G3-1 [f]	44	260
Forest Duff	G1-2	19	45	G2-2	32	93	G3-2	101	667
Forest Duff	G1-3	6.0	4.6	G2-3	25	86	G3-3	41	244
Forest Duff	G1-4	29	52	G2-4	19	173	G3-4	19	50
Forest Duff	G1-5	12	44	G2-5	16	51	G3-5	8.9	51
Forest Duff	G1-6	23	55	G2-6	15	70	G3-6	63	328
Forest Duff	G1-7	16	63	G2-7	20	130	G3-7	15	77
Forest Duff	G1-8	8.9	29	G2-8	30	461	G3-8	15	96
Forest Duff	G1-9	10	54	G2-9	13	62	G3-9	70	480
Forest Duff	G1-10	7.5	32	G2-10	63	358	G3-10	69	495
Forest Duff	G1-11 [d]	26	68	G2-11	44	171	--	--	--
Forest Duff	G1-12	6.0	16	G2-12	27	90	--	--	--
Forest Duff	G1-13	1.6	12	G2-13	43	311	--	--	--
Forest Duff	G1-14	23	100	G2-14	41	423	--	--	--
Forest Duff	G1-15	8.9	24	G2-15	26	164	--	--	--
Forest Duff	G1-16	56	199	G2-16	17	87	--	--	--
Soil	G1-1	236	195	G2-1 [e]	77	51	G3-1 [f]	50	50
Soil	G1-2	118	167	G2-2	81	175	G3-2	154	113
Soil	G1-3	130	129	G2-3	257	73	G3-3	222	295
Soil	G1-4	74	89	G2-4	268	66	G3-4	131	173
Soil	G1-5	86	113	G2-5	220	314	G3-5	281	692
Soil	G1-6	253	259	G2-6	312	532	G3-6	198	610
Soil	G1-7	142	96	G2-7	220	494	G3-7	26	543
Soil	G1-8	180	143	G2-8	111	37	G3-8	223	773
Soil	G1-9	144	148	G2-9	132	54	G3-9	220	360
Soil	G1-10	78	79	G2-10	118	109	G3-10	215	208
Soil	G1-11 [d]	155	189	G2-11	164	117	--	--	--
Soil	G1-12	151	259	G2-12	232	598	--	--	--
Soil	G1-13	120	174	G2-13	251	277	--	--	--
Soil	G1-14	131	211	G2-14	69	133	--	--	--
Soil	G1-15	158	236	G2-15	101	205	--	--	--
Soil	G1-16	269	230	G2-16	178	150	--	--	--

Notes:
mg/kg - milligrams per kilogram.
All metals concentrations determined by XRF and adjusted for a dry weight basis.
Figure 14 shows grid locations on the property.
a) Sample locations shown on Figure 15.
b) Sample locations shown on Figure 16.
c) Sample locations shown on Figure 17.
d) Original starting point for Grid 1, location 3b-30.
e) Original starting point for Grid 2, location 1b-94.
f) Original starting point for Grid 3, location 1a-90.

Table 5
Trails and Road - Arsenic and Lead Soil Concentrations
Maury Island Open Space Property RI
Maury Island, Washington

Decision Unit	Map Location [a]	Sample I.D.	Depth (inches)	Arsenic	Lead	Method	Source
				mg/kg			
Existing Soft Surface Trails							
1A							
	#138	1a-S-138-0	0-2	90	195	Lab	CDM_2013
		1a-S-138-9	9	4.2	4	Lab	CDM_2013
		1a-S-138-18	18	2.5	2	Lab	CDM_2013
	#139	1a-S-139-0	0-2	36	129	Lab	CDM_2013
	#140	1a-S-140-0	0-2	144	329	Lab	CDM_2013
	#141	1a-S-141-0	0-2	218	362	Lab	CDM_2013
	#142	1a-S-142-0	0-2	113	133	Lab	CDM_2013
	#143	1a-S-143-0	0-2	29	17	Lab	CDM_2013
		1a-S-143-9	9	3.5	3	Lab	CDM_2013
		1a-S-143-18	18	3.3	1.9	Lab	CDM_2013
	#144	1a-S-144-0	0-2	10.2	11.1	Lab	CDM_2013
	#145	1a-S-145-0	0-2	102	150	Lab	CDM_2013
	#149	1a-S-149-0	0-2	43	49.4	Lab	CDM_2013
		1a-S-149-9	9	7.7	6.2	Lab	CDM_2013
		1a-S-149-18	18	2.4	2.2	Lab	CDM_2013
	#150	1a-S-150-0	0-2	218	175	Lab	CDM_2013
		1a-S-150-9	9	13	5.3	Lab	CDM_2013
		1a-S-150-18	18	6.8	4.3	Lab	CDM_2013
	#151	1a-S-151-0	0-2	256	776	Lab	CDM_2013
		1a-S-151-9	9	26	13	Lab	CDM_2013
		1a-S-151-18	18	3.9	5.4	Lab	CDM_2013
	#152	1a-S-152-0	0-2	102	87	Lab	CDM_2013
	#154	1a-S-154-0	0-2	65	244	Lab	CDM_2013
	#155	1a-S-155-0	0-2	30	27	Lab	CDM_2013
	#156	1a-S-156-0	0-2	297	527	Lab	CDM_2013
		1a-S-156-9	9	2.8	8.1	Lab	CDM_2013
		1a-S-156-18	18	2.3	4.4	Lab	CDM_2013
	#157	1a-S-157-0	0-2	102	128	Lab	CDM_2013
1B							
	#161	1b-S-161-0	0-2	394	510	Lab	CDM_2013
	#162	1b-S-162-0	0-2	205	465	Lab	CDM_2013
		1b-S-162-9	9	3.9	2.7	Lab	CDM_2013
		1b-S-162-18	18	7	4.7	Lab	CDM_2013
	#163	1b-S-163-0	0-2	119	200	Lab	CDM_2013
	#164	1b-S-164-0	0-2	105	224	Lab	CDM_2013
		1b-S-164-9	9	3.9	4.6	Lab	CDM_2013
		1b-S-164-18	18	3.2	3.8	Lab	CDM_2013

Table 5
Trails and Road - Arsenic and Lead Soil Concentrations
Maury Island Open Space Property RI
Maury Island, Washington

Decision Unit	Map Location [a]	Sample I.D.	Depth (inches)	Arsenic	Lead	Method	Source
				mg/kg			
3B							
	#166	3b-S-166-0	0-2	125	128	Lab	CDM_2013
	#167	3b-S-167-0	0-2	171	181	Lab	CDM_2013
		3b-S-167-9	9	5.8	8.3	Lab	CDM_2013
		3b-S-167-18	18	4.4	3.6	Lab	CDM_2013
	#168	3b-S-168-0	0-2	36	197	Lab	CDM_2013
5							
	#170	5-S-170-0	0-2	76	36	Lab	CDM_2013
	#171	5-S-171-0	0-2	116	96	Lab	CDM_2013
		5-S-171-9	9	8.2	11	Lab	CDM_2013
		5-S-171-18	18	4.1	2.9	Lab	CDM_2013
	#172	5-S-172-0	0-2	125	348	Lab	CDM_2013
	#173	5-S-173-0	0-2	151	1,590	Lab	CDM_2013
		5-S-173-9	9	7.7	17	Lab	CDM_2013
		5-S-173-18	18	3.5	4.9	Lab	CDM_2013
	#174	5-S-174-0	0-2	85	466	Lab	CDM_2013
	#175	5-S-175-0	0-2	182	193	Lab	CDM_2013
	#176	5-S-176-0	0-2	93	118	Lab	CDM_2013
		5-S-176-9	9	15	11	Lab	CDM_2013
		5-S-176-18	18	3.1	3.6	Lab	CDM_2013
	#177	5-S-177-0	0-2	171	474	Lab	CDM_2013
Dirt Road Now Used as a Trail							
2C							
	#35	2c-s-35-0	0-2	12	16	XRF	CDM_2010
	#36	2c-s-36-0	0-2	17	13	XRF	CDM_2010
	#37	2c-s-37-0	0-2	8.9	11	XRF	CDM_2010
	#38	2c-s-38-0	0-2	10	15	XRF	CDM_2010
3A							
	#18	3a-s-18-0	0-2	33	35	XRF	CDM_2010
	#19	3a-s-19-0	0-2	6.0	7.7	XRF	CDM_2010
	#20	3a-s-20-0	0-2	10	12	XRF	CDM_2010
	#21	3a-s-21-0	0-2	3.1	8.3	XRF	CDM_2010
	#22	3a-s-22-0	0-2	67	130	XRF	CDM_2010
	#23	3a-s-23-0	0-2	30	44	XRF	CDM_2010
	#23	3a-s-24-0	0-2	12	17	XRF	CDM_2010
3B							
	#24	3b-s-25-0	0-2	16	19	XRF	CDM_2010
3C							
	#27	3c-s-27-0	0-2	8.9	10	XRF	CDM_2010
	#28	3c-s-28-0	0-2	65	112	XRF	CDM_2010

Table 5
Trails and Road - Arsenic and Lead Soil Concentrations
Maury Island Open Space Property RI
Maury Island, Washington

Decision Unit	Map Location [a]	Sample I.D.	Depth (inches)	Arsenic	Lead	Method	Source
				mg/kg			
4B							
	#41	4b-s-41-0	0-2	6.0	7.1	XRF	CDM_2010
	#42	4b-s-42-0	0-2	12	11	XRF	CDM_2010
	#43	4b-s-43-0	0-2	8.9	13	XRF	CDM_2010
4C							
	#32	4c-s-32-0	0-2	6.0	11	XRF	CDM_2010
	#33	4c-s-33-0	0-2	8.9	5.8	XRF	CDM_2010
	#34	4c-s-34-0	0-2	8.9	11	XRF	CDM_2010
	#39	4c-s-39-0	0-2	6.0	3.4	XRF	CDM_2010
	#40	4c-s-40-0	0-2	14	15	XRF	CDM_2010

Notes
a) Sample locations shown on Figure 13
mg/kg - milligrams per kilogram.
All metals concentrations that were determined by XRF are adjusted for a dry weight basis.
CDM_201X - Sampled by CDM Smith in year specified

Table 6
Base of Bluff at Beach - Arsenic and Lead Soil Concentrations
Maury Island Open Space Property RI
Maury Island, Washington

Sample ID	Arsenic	Lead	Notes
	mg/kg		
BLUFF-1	2.3	1.6	vertical bluff face beneath a tree
BLUFF-2	5.1	5.0	exposed vertical bluff face
BLUFF-3	6.7	5.9	exposed vertical bluff face, sand is cemented
BLUFF-4	27	31	2 ft up a 6 ft vertical cut, contains softball sized cobbles
BLUFF-5	12	8.8	top two inches of a 2 ft vertical cut
BLUFF-6	1.8	1.6	
SLOUGH-1	2.3	1.8	Area with abundant driftwood
SLOUGH-2	6.7	7.8	base of slough beneath 20 ft bluff
SLOUGH-3	5.8	5.5	slough backed up against a driftwood log at base of 20 ft vertical cut
SLOUGH-4	2.2	1.5	base of slough at north end of beach

Notes:
Sample Locations Shown on Figure 10
mg/kg - milligrams per kilogram

Table 7
PAH in Soil - Unit 5
Maury Island Open Space Property RI
Maury Island, Washington

		Sample Location, Media, Sample ID, and Units							
		#172	#173	#174	#177	#178		#179	
		Soil, 0-2"	Soil, 0-2"	Soil, 0-2"	Soil, 0-2"	Forest Duff	Soil, 0-2"	Forest Duff	Soil, 0-2"
		5-S-172-0[a]	5-S-173-0[a]	5-S-174-0[a]	5-S-177-0[a]	5-FD-178-0[a]	5-S-178-0[a]	5-FD-179-0[a]	5-S-179-0[a]
	PEF	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
1-Methylnaphthalene		<7.3	<7.3	<8.9	<6.4	<8.4	<7.2	<12	<7.2
2-Methylnaphthalene		<7.3	<7.3	<8.9	<6.4	<8.4	<7.2	<12	<7.2
Acenaphthene		<7.3	<7.3	<8.9	<6.4	<8.4	<7.2	<12	<7.2
Acenaphthylene		<7.3	<7.3	<8.9	<6.4	<8.4	<7.2	<12	<7.2
Anthracene		<7.3	<7.3	<8.9	<6.4	<8.4	<7.2	<12	<7.2
Benzo(a)anthracene*	0.1	<7.3	<7.3	<8.9	<6.4	<8.4	7.4	<12	<7.2
Benzo(a)pyrene*	1	<7.3	<7.3	<8.9	<6.4	<8.4	<7.2	<12	<7.2
Benzo(b,j,k)fluoranthene*	0.1	26.2	59.1	69.5	12	<8.4	36.4	<12	70.4
Benzo(g,h,i)perylene		<7.3	<7.3	<8.9	<6.4	<8.4	<7.2	<12	<7.2
Chrysene*	0.01	<7.3	<7.3	<8.9	<6.4	<8.4	16.8	<12	<7.2
Dibenzo(a,h)anthracene*	0.4	<7.3	<7.3	<8.9	<6.4	<8.4	<7.2	<12	<7.2
Fluoranthene		17.7	27.7	36.7	<6.4	22	19.2	19	24.6
Fluorene		<7.3	<7.3	<8.9	<6.4	<8.4	<7.2	<12	<7.2
Indeno(1,2,3-cd)Pyrene*	0.1	<7.3	<7.3	<8.9	<6.4	<8.4	<7.2	<12	<7.2
Naphthalene		<7.3	<7.3	<8.9	<6.4	<8.4	<7.2	<12	<7.2
Phenanthrene		<7.3	10	15	<6.4	13	7.5	<12	8.4
Pyrene		11	16.5	18.5	<6.4	20	15	<12	16.2
TEQ cPAH		**2.62**	**5.91**	**6.95**	**1.20**	**N/A**	**4.55**	**N/A**	**7.04**

Table 7
PAH in Soil - Unit 5
Maury Island Open Space Property RI
Maury Island, Washington

		#179		#180			#181	
		Forest Duff	Soil, 0-2"	Forest Duff	Soil, 0-2"	Soil, 0-2"	Forest Duff	Soil, 0-2"
		5-FD-179-0[a]	5-S-179-0[a]	5-FD-180-0[a]	5-S-180-0[a]	5-S-180-D6[a,b]	5-FD-181-0[a]	5-S-181-0[a]
	PEF	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
1-Methylnaphthalene		<12	<7.2	<11	<6.8	<6.7	<9.8	<6.6
2-Methylnaphthalene		<12	<7.2	<11	<6.8	<6.7	<9.8	<6.6
Acenaphthene		<12	<7.2	<11	<6.8	<6.7	<9.8	<6.6
Acenaphthylene		<12	<7.2	<11	<6.8	<6.7	<9.8	<6.6
Anthracene		<12	<7.2	<11	<6.8	<6.7	<9.8	<6.6
Benzo(a)anthracene*	0.1	<12	<7.2	<11	<6.8	<6.7	<9.8	<6.6
Benzo(a)pyrene*	1	<12	<7.2	<11	<6.8	<6.7	<9.8	<6.6
Benzo(b,j,k)fluoranthene*	0.1	<12	70.4	<11	17.9	17.8	39.1	17.5
Benzo(g,h,i)perylene		<12	<7.2	<11	<6.8	<6.7	<9.8	<6.6
Chrysene*	0.01	<12	<7.2	<11	<6.8	<6.7	33.6	7.9
Dibenzo(a,h)anthracene*	0.4	<12	<7.2	<11	<6.8	<6.7	<9.8	<6.6
Fluoranthene		19	24.6	16	<6.8	<6.7	19	8.5
Fluorene		<12	<7.2	<11	<6.8	<6.7	<9.8	<6.6
Indeno(1,2,3-cd)Pyrene*	0.1	<12	<7.2	<11	<6.8	<6.7	<9.8	<6.6
Naphthalene		<12	<7.2	<11	<6.8	<6.7	<9.8	<6.6
Phenanthrene		<12	8.4	<11	<6.8	<6.7	<9.8	<6.6
Pyrene		<12	16.2	11	<6.8	<6.7	13	7.1
TEQ cPAH		**N/A**	**7.04**	**N/A**	**1.79**	**1.78**	**3.91**	**1.83**

Table 7
PAH in Soil - Unit 5
Maury Island Open Space Property RI
Maury Island, Washington

		Sample Location, Media, Sample ID, and Units					
		#182		#183		#184	
	PEF	Forest Duff 5-FD-182-0[a] µg/kg	Soil, 0-2" 5-S-182-0[a] µg/kg	Forest Duff 5-FD-183-0[a] µg/kg	Soil, 0-2" 5-S-183-0[a] µg/kg	Forest Duff 5-FD-184-0 µg/kg	Soil, 0-2" 5-S-184-0 µg/kg
1-Methylnaphthalene		<18	<12	<12	<7.7	<7.6	<6.7
2-Methylnaphthalene		<18	<12	<12	<7.7	9.6 J	<6.7
Acenaphthene		<18	<12	<12	<7.7	64.9	6.8 J
Acenaphthylene		<18	<12	<12	<7.7	<7.6	<6.7
Anthracene		<18	<12	<12	<7.7	125	12 J
Benzo(a)anthracene*	0.1	<18	<12	<12	<7.7	1,410	160
Benzo(a)pyrene*	1	<18	<12	<12	<7.7	2,210	252
Benzo(b,j,k)fluoranthene*	0.1	<18	127	<12	12	4,050	488
Benzo(g,h,i)perylene		<18	<12	<12	<7.7	1,270	137
Chrysene*	0.01	<18	<12	<12	<7.7	1,820	209
Dibenzo(a,h)anthracene*	0.4	<18	<12	<12	<7.7	328	33.2
Fluoranthene		<18	28.7	<12	<7.7	2,000	232
Fluorene		<18	<12	<12	<7.7	80.9	7.5 J
Indeno(1,2,3-cd)Pyrene*	0.1	<18	<12	<12	<7.7	1,520	166
Naphthalene		<18	<12	<12	<7.7	26.6	<6.7
Phenanthrene		<18	<12	<12	<7.7	694	74.7
Pyrene		<18	24.5	<12	<7.7	2,180	240
TEQ cPAH		**N/A**	**12.70**	**N/A**	**1.20**	**3,057**	**349**

Table 7
PAH in Soil - Unit 5
Maury Island Open Space Property RI
Maury Island, Washington

		Sample Location, Media, Sample ID, and Units						
		#185		#186			#187	
		Forest Duff	Soil, 0-2"	Forest Duff	Soil, 0-2"	Soil, 0-2"	Forest Duff	Soil, 0-2"
		5-FD-185-0	5-S-185-0	5-FD-186-0	5-S-186-0	5-S-186-D7[b]	5-FD-187-0	5-S-187-0
	PEF	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
1-Methylnaphthalene		15 J	<6.7	100 J	<7.6	<7.6	269	<7.4
2-Methylnaphthalene		23.9	8.1 J	170 J	9 J	9 J	271	10 J
Acenaphthene		116	62.1	639	44.1	41.9	1,990	126 J
Acenaphthylene		<7.8	<6.7	<90	<7.6	<7.6	<93	<7.4
Anthracene		845	192	954	70.5	66.9	3,710	64.3
Benzo(a)anthracene*	0.1	3,240	1,390	18,500	1,810	1,970	62,700	889
Benzo(a)pyrene*	1	3,120	2,300	24,100	2,920	3,240	82,600	2,020
Benzo(b,j,k)fluoranthene*	0.1	5,940	4,240	41,800	5,500	6,430	138,000	3,200
Benzo(g,h,i)perylene		1,360	374	10,500	801	836	37,400	358
Chrysene*	0.01	3,590	1,630	22,100	2,190	2,380	75,700	1,220
Dibenzo(a,h)anthracene*	0.4	478	153	3,010	248	260	10,900	129
Fluoranthene		6,990	2,210	26,900	2,250	2,440	104,000	1,180
Fluorene		194	46.9	439	27.8	27.1	743	28.7 J
Indeno(1,2,3-cd)Pyrene*	0.1	1,760	546	14,000	1,120	1,190	48,300	510
Naphthalene		57.9	15	253	13 J	12 J	286	9.7 J
Phenanthrene		3,720	865	5,120	384	371	22,500	334 J
Pyrene		5,540	2,150	27,700	2,490	2,710	105,000	1,430
TEQ cPAH		**4,441**	**2,995**	**32,955**	**3,884**	**4,327**	**112,617**	**2,544**

Table 7
PAH in Soil - Unit 5
Maury Island Open Space Property RI
Maury Island, Washington

		Sample Location, Media, Sample ID, and Units	
		#188	
		Forest Duff	**Soil, 0-2"**
		5-FD-188-0	**5-S-188-0**
	PEF	µg/kg	µg/kg
1-Methylnaphthalene		<6.6	<6.3
2-Methylnaphthalene		<6.6	<6.3
Acenaphthene		<6.6	11 J
Acenaphthylene		<6.6	<6.3
Anthracene		<6.6	16.7
Benzo(a)anthracene*	0.1	52.7	138
Benzo(a)pyrene*	1	97.8	223
Benzo(b,j,k)fluoranthene*	0.1	165	353
Benzo(g,h,i)perylene		29.3	99
Chrysene*	0.01	78.3	179
Dibenzo(a,h)anthracene*	0.4	6.7 J	29.5
Fluoranthene		77.8	211
Fluorene		<6.6	<6.3
Indeno(1,2,3-cd)Pyrene*	0.1	39.9	130
Naphthalene		<6.6	<6.3
Phenanthrene		21.5	82.5
Pyrene		88.1	233
TEQ cPAH		**127**	**299**

Notes:
* Carcinogenic PAHs
Shaded value exceeds the Model Toxics Control Act Method A Cleanup Level of 100 µg/kg.
Sample Locations shown on Figure 30.

a) sample extracted out of holding time
b) duplicate sample
J - estimated concentration
PAHs - polycyclic aromatic hydrocarbons
PEF - potency equivency factor
TEQ - toxic equivalency

cPAH - carcinogenic PAHs
N/A - not applicable - no cPAH detected
µg/kg - micrograms per kilogram
< - analyte not detected at or greater than listed concentration

Table 8
Metals in Representative Plant Tissues
Maury Island Open Space Property RI
Maury Island, Washington

Vegetation Type	Sample Unit	Sample ID	Arsenic	Lead	Cadmium
			mg/kg		
Alder	Control	A-0	0.295	<0.045	0.050
	1a	1a-A-1	2.61	1.22	0.255
	1b	1b-A-1	0.897	0.739	0.093
	3a	3a-A-1	0.507	0.412	0.044
	3d	3d-A-1	0.712	0.622	0.077
Blackberry (Plants)	Control	B-0	0.090	0.522	0.162
	1a	1a-B-1	0.822	1.44	0.702
	3a	3a-B-1	2.65	0.623	0.172
	3c	3c-B-1	0.732	0.833	0.316
	3e	3e-B-1	0.804	0.782	0.164
Bracken Fern	Control	F-0	0.306	0.146	0.073
	1a	1a-F-1	3.22	1.68	0.788
	1a	1a-F-2	1.44	2.66	0.833
	1b	1b-F-1	1.13	1.94	0.746
	3a	3a-F-1	0.952	1.32	0.714
Douglas Fir	Control	DF-0	0.243	0.348	0.089
	1a	1a-DF-1	52.8	0.741	0.604
	1a	1a-DF-2	45.9	0.909	0.515
	1b	1b-DF-1	44.0	0.796	0.449
	2c	2c-DF-1	2.80	0.765	0.199
Pacific Madrone	Control	M-0	0.200	<0.045	0.012
	1a	1a-M-1	0.824	0.713	0.069
	1a	1a-M-2	0.755	0.675	0.050
	1b	1b-M-1	0.683	0.428	0.036
	2c	2c-M-1	0.781	0.421	0.042
Salal	Control	SL-0	0.137	0.462	0.219
	1a	1a-SL-1	0.590	1.26	0.642
	1a	1a-SL-2	0.522	0.887	0.565
	1b	1b-SL-1	0.570	1.17	0.389
Blackberry (berries)	Control	BB-1	0.0096	<0.0043	0.0331
	1a	1a-BB-4	0.036	0.016	0.061
	3c	3c-BB-3	0.024	0.015	0.184
	3e	3e-BB-5	0.024	0.010	0.16
	5	5-BB-2	0.016	0.014	0.145

Note:
mg/kg - milligrams per kilogram.

Table 9
Spring Water - Arsenic, Lead, and Cadmium Concentrations
Maury Island Open Space Property RI
Maury Island, Washington

Sample ID	Date Sampled	Arsenic		Lead		Cadmium	
		Dissolved	Total	Dissolved	Total	Dissolved	Total
		µg/L					
Spring-A[a]	10/14/1999	<3.0	**2.9**	<1.0	<1.0	<0.5	<0.5
	11/28/1999	<3.0	**2.9**	<1.0	<1.0	<0.5	<0.5
	6/25/2013	**2.03**	**2.21**	<0.1	<0.1	<0.05	<0.05
Spring-B	6/25/2013	**4.03**	**4.59**	<0.1	**0.26**	<0.1	**0.065**
Spring-D	6/25/2013	**3.02**	**3.06**	<0.1	<0.1	**0.06**	**0.062**
Spring-E[a]	10/14/1999	<3.0	**2.1**	<1.0	<1.0	<0.5	<0.5
	11/28/1999	<3.0	**2.0**	<1.0	<1.0	<0.5	<0.5
	6/25/2013	**1.24**	**1.54**	<0.1	**0.22**	<0.05	<0.05
Spring-F	6/25/2013	**2.01**	**2.21**	<0.1	<0.1	<0.05	<0.05
MTCA Method A[b]		5	5	15	15	5	5

Bolded values show detected concentrations.
a) 1999 Data from Herrera Environmental Consultants. Evaluation of Spring Water Quality. February 2000.
b) Washington Administrative Code Chapter 173-340, Model Toxics Control Act Cleanup Regulation, Method A suggested groundwater cleanup level.
µg/L - micrograms per liter

Table 10
Vegetation Observed 6/20 and 6/21/2013
Maury Island Open Space Property RI
Maury Island, Washington

Trees	
Madrone	*Arbutus menziesii*
Douglas fir	*Pseudotsuga menziesii*
Red alder	*Alnus rubra*
Big leaf maple	*Acer macrophyllum*
Western hemlock	*Tsuga heterophylla*
Scouler's willow	*Salix scouleriana*
Black cottonwood	*Populus balsamifera*
Bitter cherry	*Prunus emarginata*
Oregon ash	*Fraxinus latifolia*
Water birch	*Betula occidentalis*
Pacific willow	*Salix lucida* ssp. *lasiandra*
Shrubs	
Himalayan blackberry	*Rubus armeniacus*
Trailing blackberry	*Rubus ursinus*
Scot's broom	*Cystisus scoparius*
Hazelnut	*Corylus cornuta*
Evergreen huckleberry	*Vaccinium ovatum*
Indian plum	*Oemleria cerasiformis*
Salal	*Gaultheria shallon*
Oregon grape	*Berberis nervosa*
Red elderberry	*Sambucus racemosa*
Oceanspray	*Holodiscus discolor*
Holly	*Ilex aquifolium*
Poison oak	*Toxicodendron diversilobum*
Nootka rose	*Rosa nutkana*
Snowberry	*Symphoricarpos albus*
Thimbleberry	*Rubus parviflorus*
Herbs/Ferns/Grasses	
Sword fern	*Polystichum munitum*
Lady fern	*Athyrium filix-femina*
Bracken fern	*Pteridium aquilinum*
Stinging nettle	*Urtica dioica*
Fireweed	*Epilobium angustifolium*
Candy flower	*Claytonia sibirica*
Honeysuckle	*Lonicera ciliosa*
Twinflower	*Linnaea borealis*
Orchard grass	*Dactylis glomerata*
Velvet grass	*Holcus lanatus*
Bent grass	*Agrostis sp.*
Fescue grass	*Festuca sp.*
Bedstraw	*Galium aparine*
Dandelion	*Taraxacum officinale*

Table 10
Vegetation Observed 6/20 and 6/21/2013
Maury Island Open Space Property RI
Maury Island, Washington

Foxglove	*Digitalis pupurea*
Pearly everlasting	*Anaphalis margaritacea*
Tansy	*Tanacetum vulgare*
Tansy ragwort	*Senecio jacobea*
Yarrow	*Achillea millefolium*
Vetch	*Vicia sativa*
Horsetail	*Equisetum arvense*
Creeping buttercup	*Ranunculus repens*
Plaintain	*Plantago lanceolata*
Dock	*Rumex sp.*
St. John's wort	*Hypericum perforatum*
Pink clover	*Trifolium pratense*
White clover	*Trifolium repens*
Canadian thistle	*Cirsium arvense*
Bull thistle	*Cirsium vulgare*

Table 11

Terrestrial Wildlife Observed in 2013 by King County Parks and WCC staff

Maury Island Open Space Property RI

Maury Island, Washington

Reptiles/Amphibians	
Alligator Lizard	
Western Fence Lizard	
Common Garter Snake	
Pacific Tree Frog	
Ensatina Salamander	
Northwestern Salamander	
Rough Skinned Newt	
Birds	
Great Blue Heron	Chestnut backed Chickadee
Bald Eagle	Killdeer
Red Tail Hawk	Pileated Woodpecker
Osprey	Downey Woodpecker
Kestrel	Sapsucker
Crow	Steller's Jay
Raven	Barn owl
Robin	Great horned owl
Towhee	Rufous-sided Hummingbird
Pigeon	Anna's Hummingbird
Sparrow/House Finch	Yellow warbler
Song Sparrow	Waxwing
White Crowned Sparrow	Flycatcher species
Gold Finch	Cow bird
Barn swallow	Bushtit
Violet green swallow	Dark eyed junco
Black-capped Chickadee	
Mammals	
Eastern Grey Squirrel	
Townsend Chipmunk	
Deer Mouse	
Black-tailed Deer	
Douglas Squirrel	

Table 12
Summary Statistics for Arsenic in Forest Duff and Soil
Maury Island Open Space Property RI
Maury Island, Washington

	Unit(s) and Media (Forest Duff or Soil at Specified Depth)											
	1a				1b				2a/2b	Unit 2c/4b/4c		
	Forest Duff	0-2"	9"	18"	Forest Duff	0-2"	9"	18"	0-2"	0-2"	9"	18"
Count (n)	20	32	19	16	10	30	9	9	35	21	5	5
Count (nd)	0	0	0	0	0	0	1	2	2	0	0	0
Min	10	11	5.8	4.5	13	19	<0.8	<0.8	<0.8	1.8	6.2	5.7
Max	170	477	119	19	163	379	48	43	19	148	111	29
Mean	84	164	34	8	73	105	26	11	5.9	37	43	14
Median	93	151	19	8	65	88	22	7	6.0	18	19	13
Standard Dev	50	95	34	4	45	85	15	13	3.6	44	45	10
UCL95	112	203	53	10	111	142	40	23	7.4	61	114	29

	Unit and Media (Forest Duff or Soil at Specified Depth)														
	3a				3b			3c					3e	5	
	Forest Duff	0-2"	9"	18"	Forest Duff	0-2"	9&18"	Forest Duff	0-2"	9"	18"	24"	All Depths	Forest Duff	0-2"
Count (n)	13	22	9	5	5	9	6	5	20	10	9	4	40	31	37
Count (nd)	0	0	1	1	0	0	0	0	1	1	1	1	1	0	0
Min	9	1.9	<0.8	<0.8	23	53	4.5	70	<0.8	<0.8	<0.8	<0.8	<0.8	11	12
Max	154	280	75	22	82	190	19	148	199	19	10	4.5	138	310	200
Mean	40	63	22	9.9	43	123	9.2	97	70	8.3	5.1	2.7	36	123	87
Median	26	57	8.7	4.5	34	111	8.0	82	69	6.0	4.6	2.8	29	110	90
Standard Dev	41	58	27	9.6	24	54	5.1	31	55	5.7	2.7	1.5	30	75	52
UCL95	69	92	47	25	80	173	16	146	100	13	7.6	5.9	47	155	107

	Location/Unit and Media (Forest Duff or Soil at Specified Depth)						
	Trails					Roads	Units 1a,1b,3a, 3b, 5
	All Trail	1a	1b/3b	5	9" (all)		Property-Wide
	0-2"	0-2"	0-2"	0-2"	9"	0-2"	Forest Duff and 0-2"
Count (n)	31	16	7	8	12	22	209
Count (nd)	0	0	0	0	0	0	0
Min	10	10	36	76	2.8	3.1	1.9
Max	394	297	394	182	26	67	477
Mean	130	117	165	125	8.5	17	101
Median	114	102	122	121	6.7	10	82
Standard Dev	85	88	114	40	6.7	17	76
UCL95	166	171	293	165	13	26	113

Notes:
Concentrations are in milligrams per kilogram.
Count (n) - number of samples
County (nd) - number of samples nondetect for arsenic
UCL95 - Upper 95% confidence limit

Table 13
Summary Statistics for Lead in Forest Duff and Soil
Maury Island Open Space Property RI
Maury Island, Washington

	Unit9s) and Media (Forest Duff or Soil at Specified Depth)										
	1a				1b				2a/2b	Unit 2c/4b/4c	
	Forest Duff	0-2"	9"	18"	Forest Duff	0-2"	9"	18"	0-2"	0-2"	9"
Count (n)	20	27	19	16	10	20	9	9	35	20	5
Count (nd)	0	0	1	1	0	0	0	1	6	0	1
Min	33	7.1	<0.5	<0.5	9.6	1.0	8.3	<0.5	<0.5	2.0	<0.5
Max	817	710	102	12	576	930	87.4	23	17	423	112
Mean	364	220	19	6.6	220	195	26	11	5.8	55	42
Median	377	167	11	7.1	230	54	19	9.6	5.8	13	18
Standard Dev	218	185	23	2.7	158	268	25	6.3	3.9	98	48
UCL95	483	305	31	8.3	354	341	48	17	7.4	108	117

	Unit and Media (Forest Duff or Soil at Specified Depth)												
	3a				3b			3c					3e
	Forest Duff	0-2"	9"	18"	Forest Duff	0-2"	9&18"	Forest Duff	0-2"	9"	18"	24"	All Depths
Count (n)	13	21	9	5	5	6	6	5	15	10	9	4	40
Count (nd)	0	1	1	1	0	0	0	0	0	0	1	1	0
Min	11	<0.5	<0.5	<0.5	67	83	7.1	161	9.0	4.6	<0.5	<0.5	3.0
Max	636	330	110	45	196	224	25	487	450	40	37	8	403
Mean	119	68	35	18	102	173	11	309	118	14	9	5	61
Median	51	45	7.1	12	89	201	8.3	323	90	10	5	5	38
Standard Dev	182	68	45	18	54	60	7.1	127	123	11	11	3	81
UCL95	249	104	77	45	186	251	20	507	198	24	19	12	90

	Location/Unit and Media (Forest Duff or Soil at Specified Depth)									
	Unit 5		Trails 0-2"				Trails 9"	On Road	Units 1a,1b,3a, 3b, 5 Property-Wide	Units 1a,1b,3a, 3b Property-Wide
	Forest Duff	0-2"	All Trail	1a	1b and 3b	5			Forest Duff and 0-2"	Forest Duff and 0-2"
Count (n)	31	37	31	16	7	8	12	22	190	122
Count (nd)	0	0	0	0	0	0	0	0	1	1
Min	48	13	11	11	135	36	2.7	3.4	0.5	0.5
Max	2,600	2,520	1,590	776	510	1,590	17	130	2,600	930
Mean	898	312	277	208	275	415	7.8	24	333	196
Median	620	150	193	142	215	271	7.1	13	186	103
Standard Dev	762	472	304	206	148	503	4.3	33	475	202
UCL95	1,221	493	405	336	442	921	11	41	411	237

Notes:
Concentrations in milligrams per kilogram.
Count (n) - number of samples
County (nd) - number of samples nondetect for lead
UCL95 - Upper 95% confidence limit

Table 14
Summary Statistics for Cadmium in Forest Duff and Soil
Maury Island Open Space Property RI
Maury Island, Washington

	Units and Media (Forest Duff or Soil at Specified Depth)						
	Unit 1a, 1b, 2c, 3a	**Unit 1a, 1b**	**Unit 3a,3b,3c**	**Unit 3e**	**Unit 2a, 4b,4c**	**All (1a, 1b, 2a, 2c, 3a, 3c, 3e, 4b)**	**All (1a, 1b, 2a, 2c, 3a, 3b, 3c, 3e, 4b)**
	Forest Duff	0-2"	0-2"	(all)	0-2"	9"	18"
Count (n)	9	26	14	29	13	16	22
Count (nd)	0	7	5	16	12	7	14
Min	1.2	<0.281	<0.281	<0.281	<0.2	<0.281	<0.19
Max	5.4	11	9.3	7.9	0.28	2.2	1.5
Mean	3.3	3.3	1.7	1.7	0.27	0.80	0.52
Median	3.6	2.3	0.89	0.93	0.28	0.78	0.28
Standard Dev	1.4	3.1	2.5	1.7	0.02	0.58	0.37
UCL95	4.6	4.8	3.4	2.4	0.29	1.2	0.71

Notes:
Concentrations in milligrams per kilogram.
Count (n) - number of samples
County (nd) - number of samples nondetect for cadmium
UCL95 - Upper 95% confidence limit

Figures

Source: GOOGLE EARTH PRO, 2010

N

0 3000

Scale in Feet

Washington

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MAURY ISLAND OPEN SPACE PROPERTY RI
MAURY ISLAND, WASHINGTON

Figure No. 1
Vicinity Map

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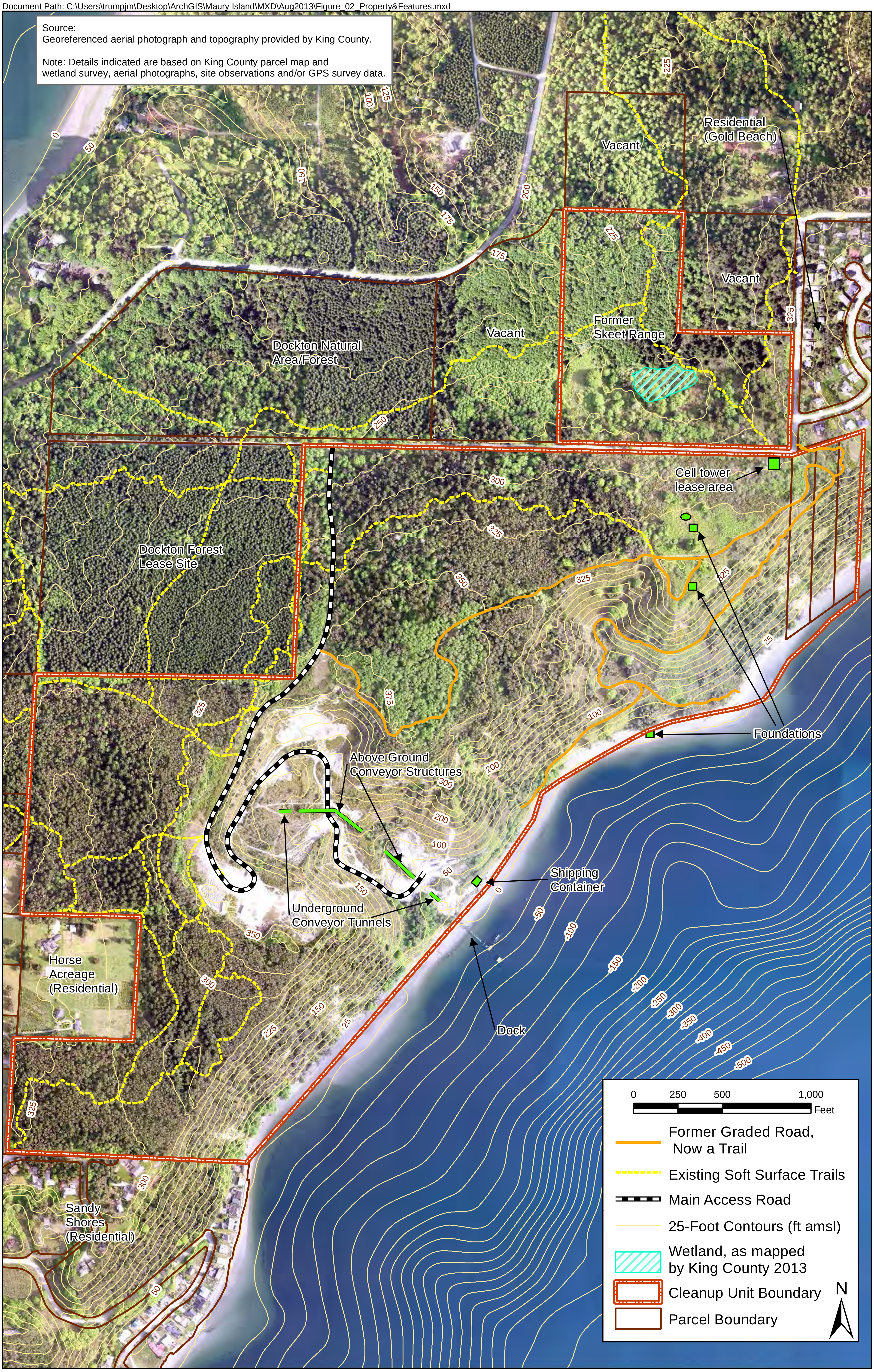

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Maury Island Open Space Property RI
Maury Island, Washington

Figure 2
Cleanup Unit and Vicinity Features

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Maury Island Open Space Property RI
Maury Island, Washington

Figure 3
Historical Features

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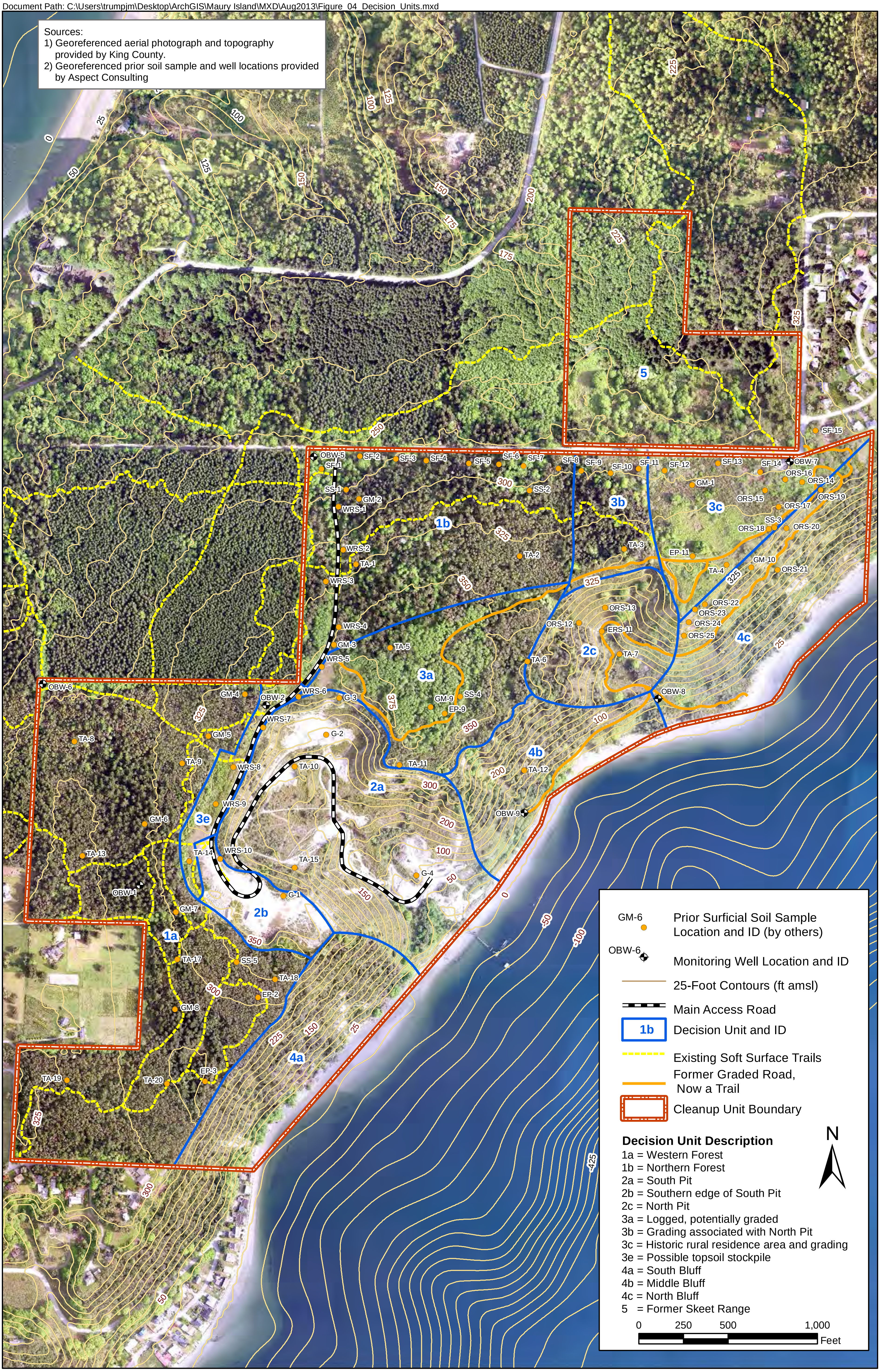

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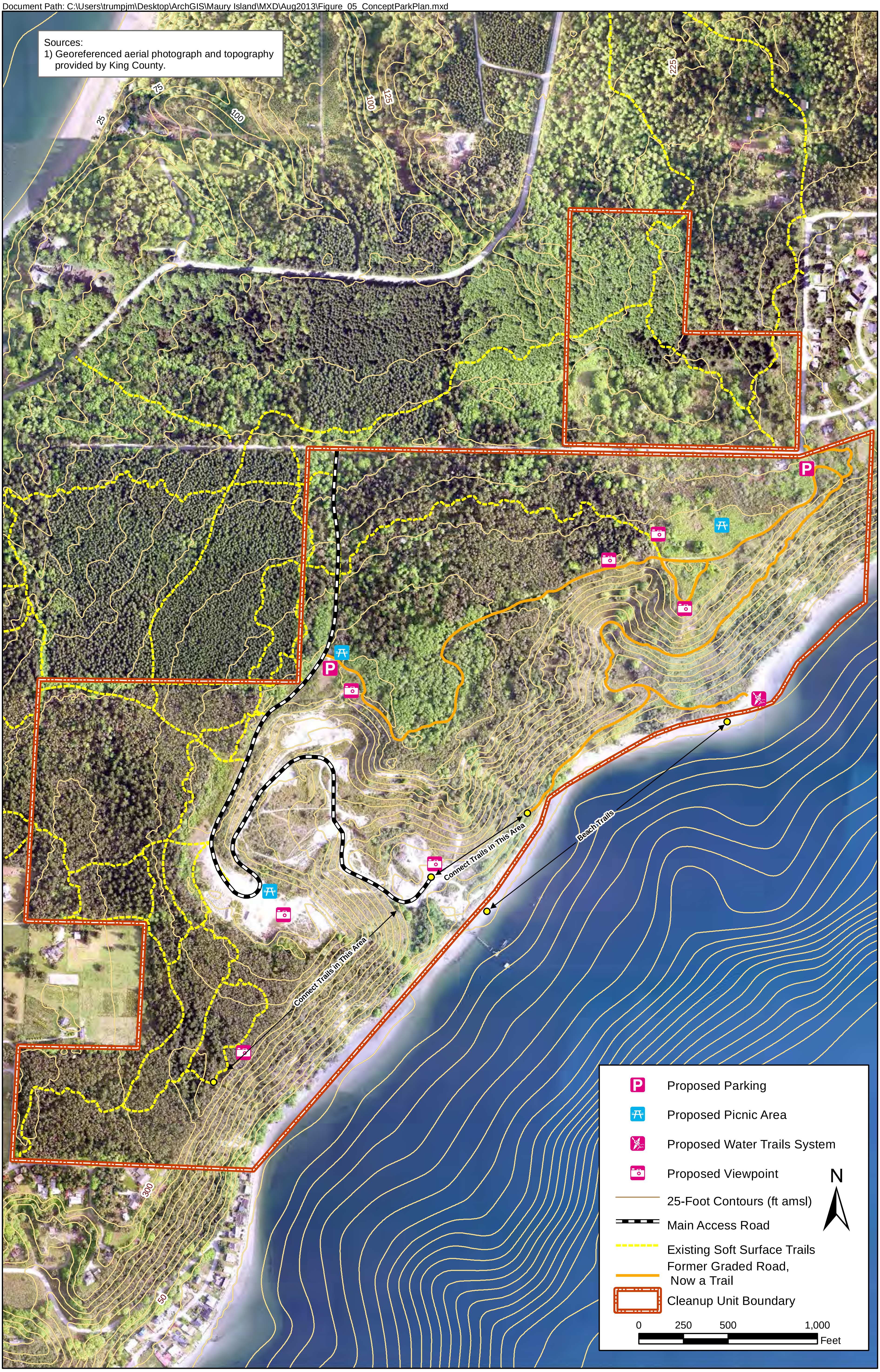
Maury Island Open Space Property RI
Maury Island, Washington

Figure 4
Decision Units and
Pre-RI Surficial Soil Sample and
Monitoring Well Locations

Document Path: C:\Users\trumpjm\Desktop\ArchGIS\Maury Island\MXD\Aug2013\Figure_05_ConceptParkPlan.mxd



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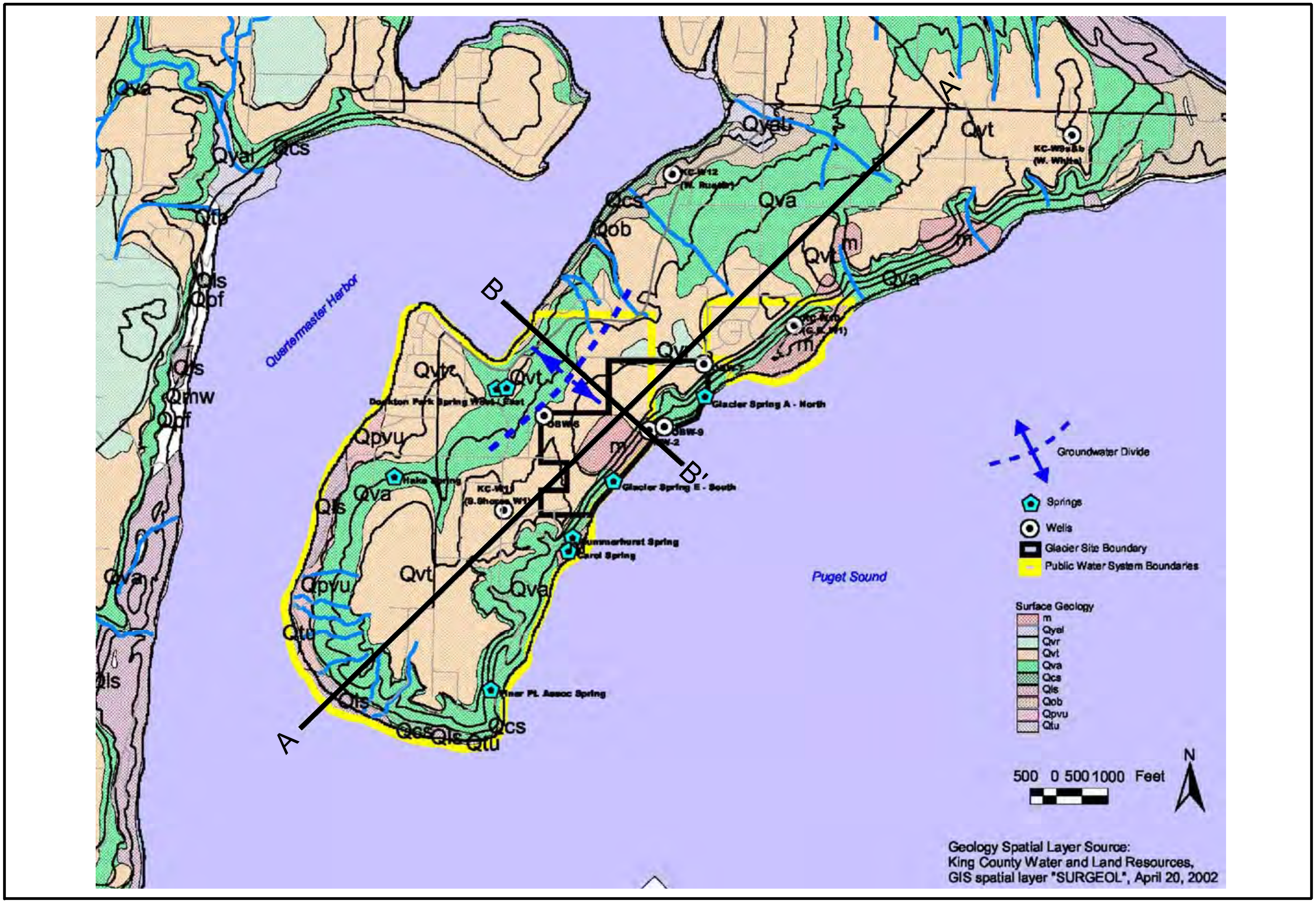
Maury Island Open Space Property RI
Maury Island, Washington

Figure 5
Conceptual Park Plan



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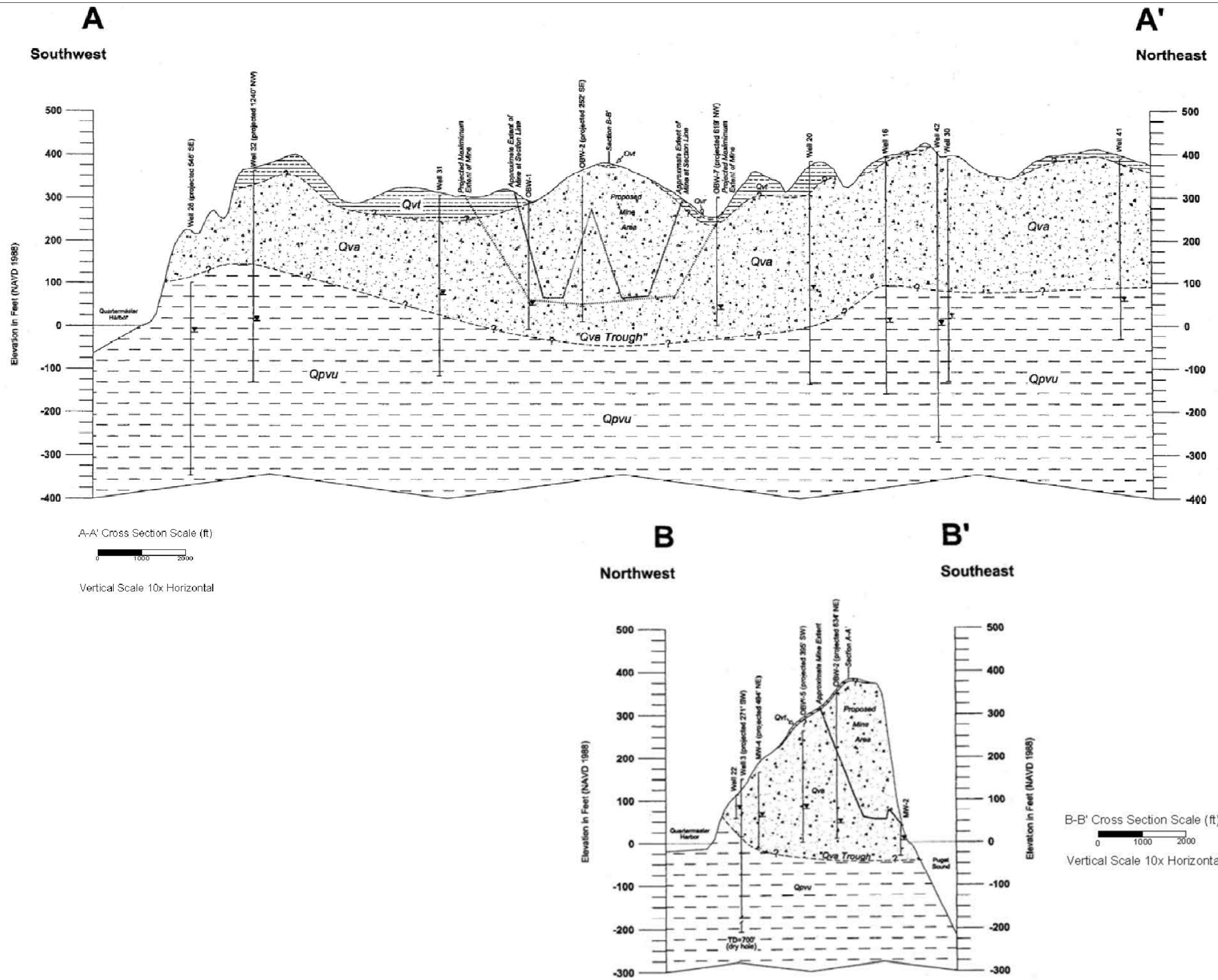
MAURY ISLAND OPEN SPACE PROPERTY RI
MAURY ISLAND, WASHINGTON

Figure No. 6

Surficial Geology Map of Maury Island and Locations of Key Springs and Wells



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MAURY ISLAND OPEN SPACE PROPERTY RI
MAURY ISLAND, WASHINGTON

Figure No. 7
Geologic Cross Sections

SOURCE: GOOGLE EARTH PRO, DATED JULY 5, 2012

REFERENCE: SOIL CONSERVATION SERVICE (SCS)
SOIL SURVEY, KING COUNTY
WASHINGTON 1973.

1" = 500'
250 0 500

N

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MAURY ISLAND, WASHINGTON

Figure No. 8
Soils Map

LEGEND:

GROUNDWATER ELEVATION CONTOUR (JANUARY 2000) (HIGHEST WATER LEVEL POINT RECORDED IN SEVEN YEARS OF WATER LEVEL MONITORING)

CLEANUP UNIT BOUNDARY LINE

GROUNDWATER FLOW DIRECTION

OBW-1 LOCATION OF MONITORING WELLS

N

1" = 500'

250 0 500

REFERENCE: ASPECT CONSULTING, PROJECT #050106, FIGURE No. 5, DATED: JANUARY 2006. AND GOOGLE EARTH PRO, DATED JULY, 5, 2012

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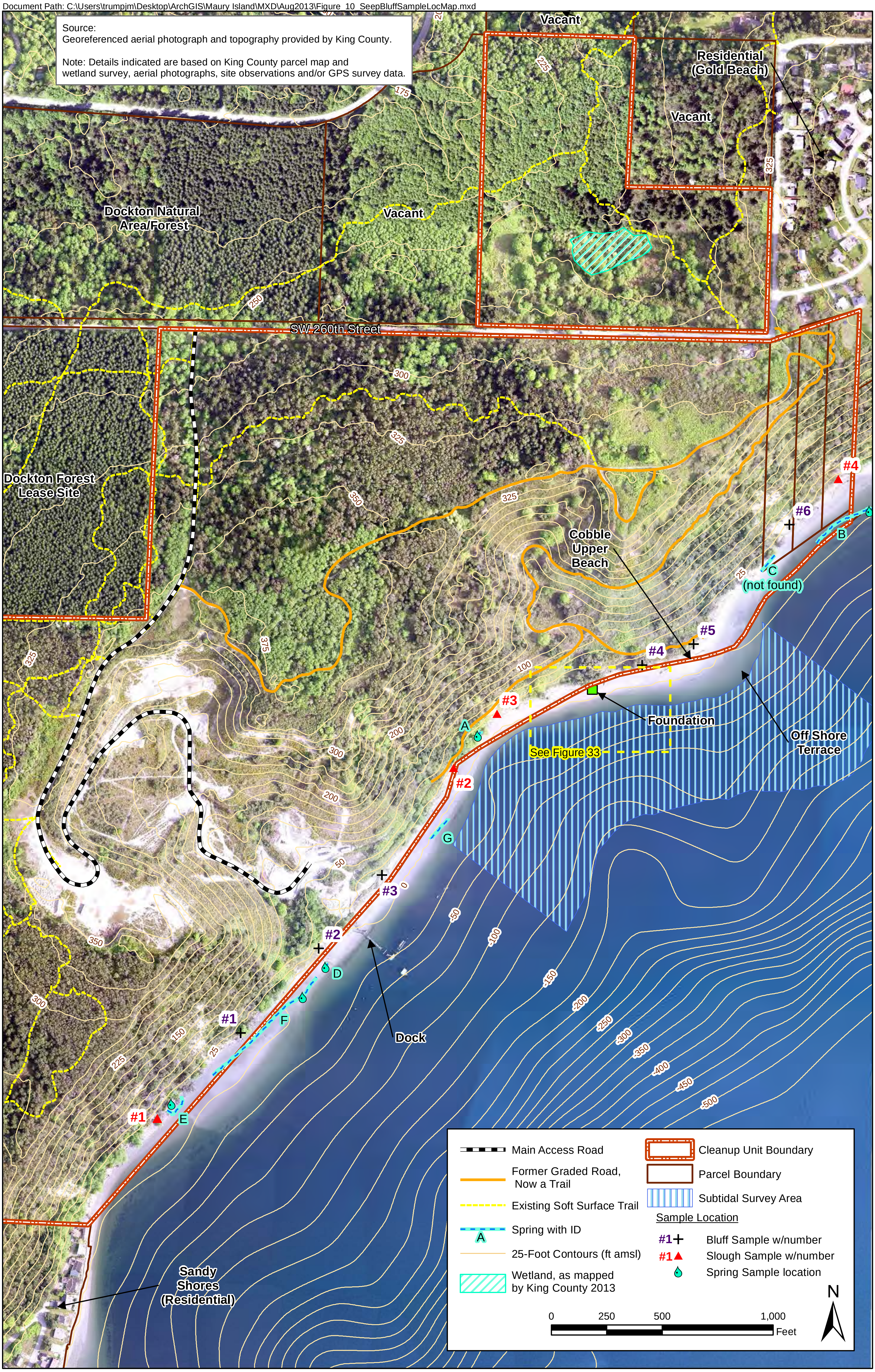
MAURY ISLAND, WASHINGTON

Figure No. 9
Groundwater Potentiometric Surface Map

Document Path: C:\Users\trumpjm\Desktop\ArchGIS\Maury Island\MXD\Aug2013\Figure_10_SeepBluffSampleLocMap.mxd



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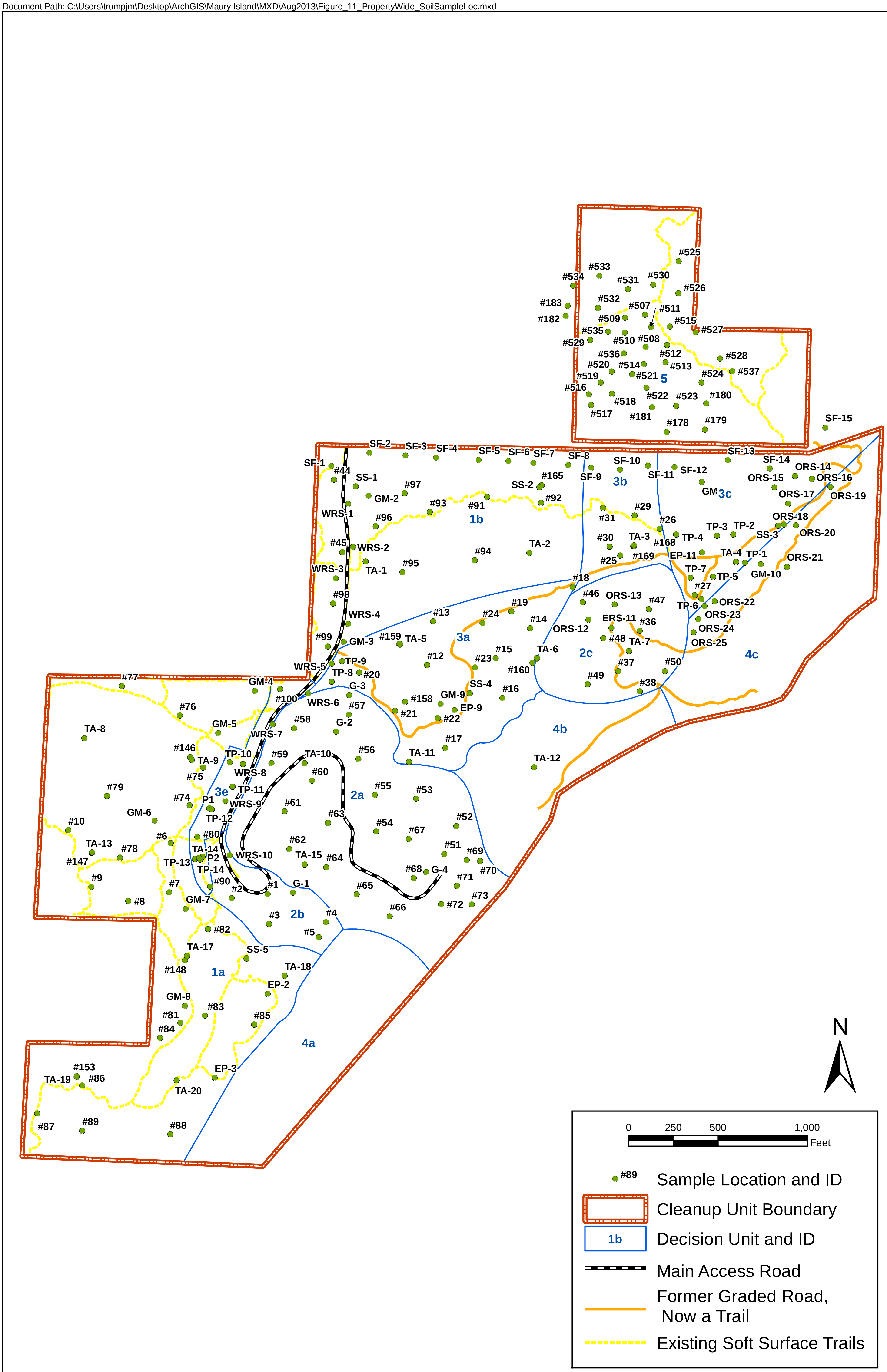
Maury Island Open Space Property RI
Maury Island, Washington

Figure 10
Spring and Bluff
Sample Location Map

Document Path: C:\Users\trumpjm\Desktop\ArcGIS\Maury Island\MXD\Aug2013\Figure_11_PropertyWide_SoilSampleLoc.mxd



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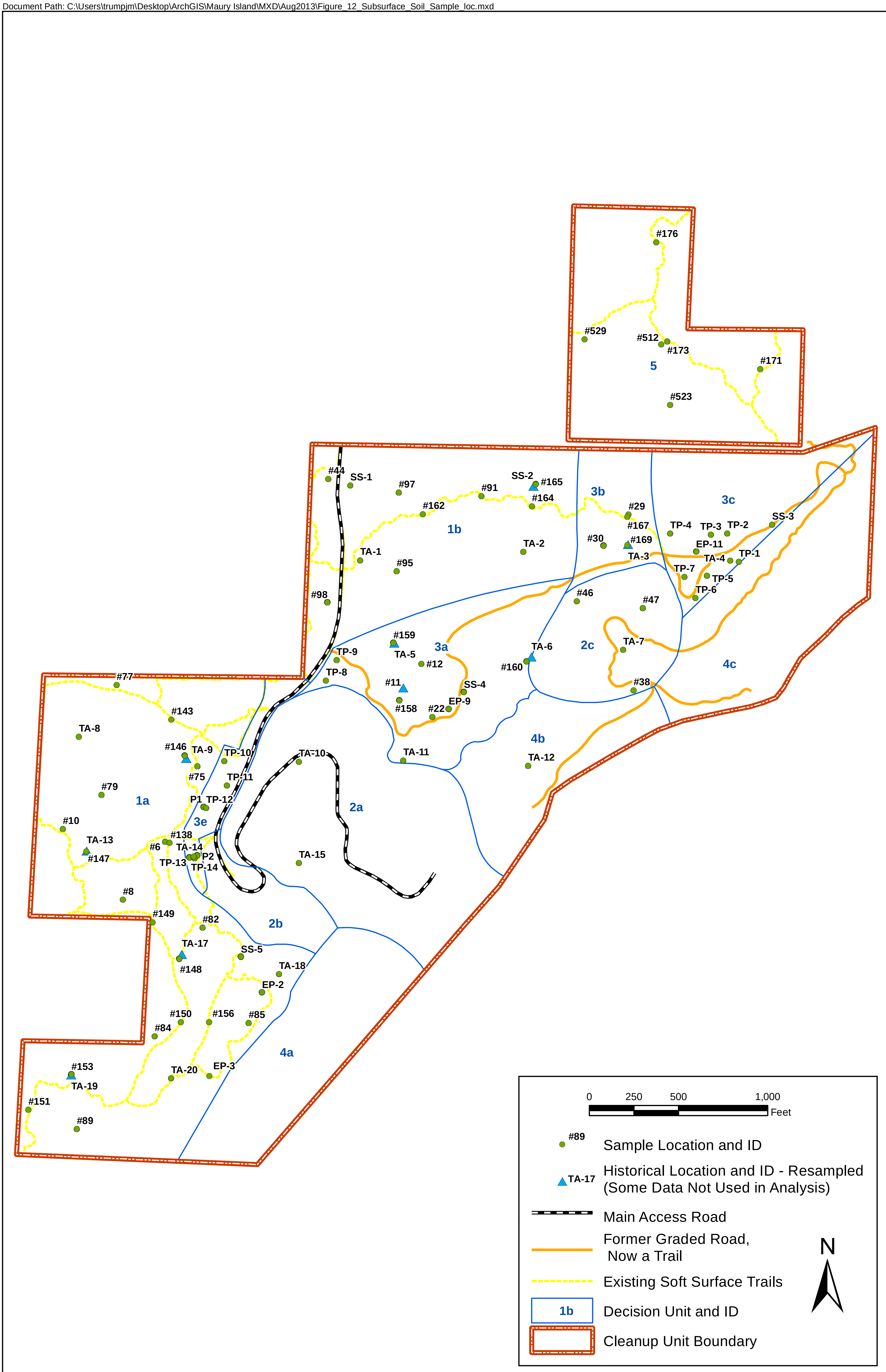
Maury Island, Washington

Figure 11
Property-Wide
Soil Sample Locations

Document Path: C:\Users\trumpjm\Desktop\ArchGIS\Maury Island\MXD\Aug2013\Figure_12_Subsurface_Soil_Sample_loc.mxd



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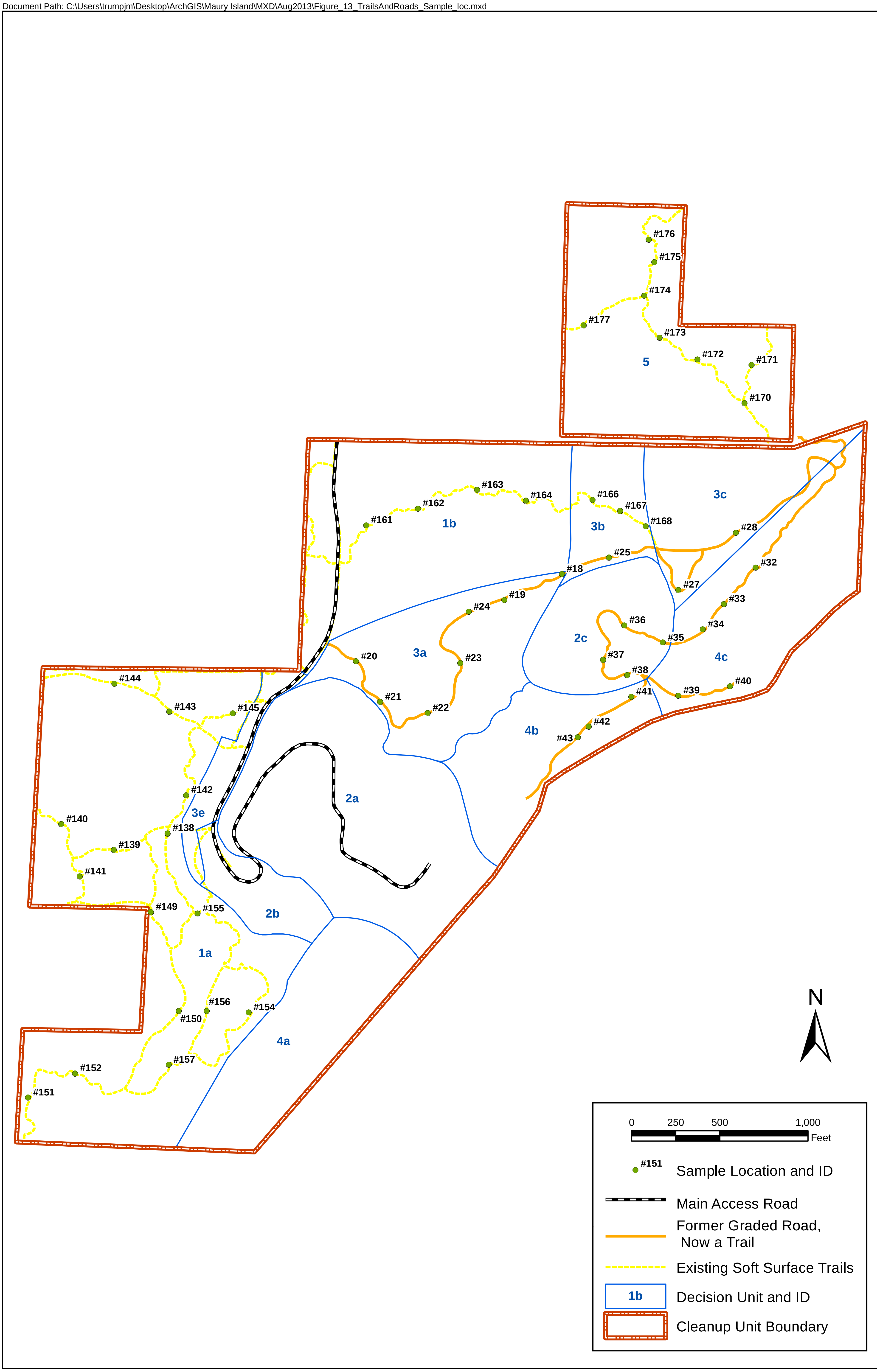
Maury Island, Washington

Figure 12
Subsurface
Soil Sample Location Map

Document Path: C:\Users\trumpjm\Desktop\ArcGIS\Maury Island\MXD\Aug2013\Figure_13_TrailsAndRoads_Sample_loc.mxd



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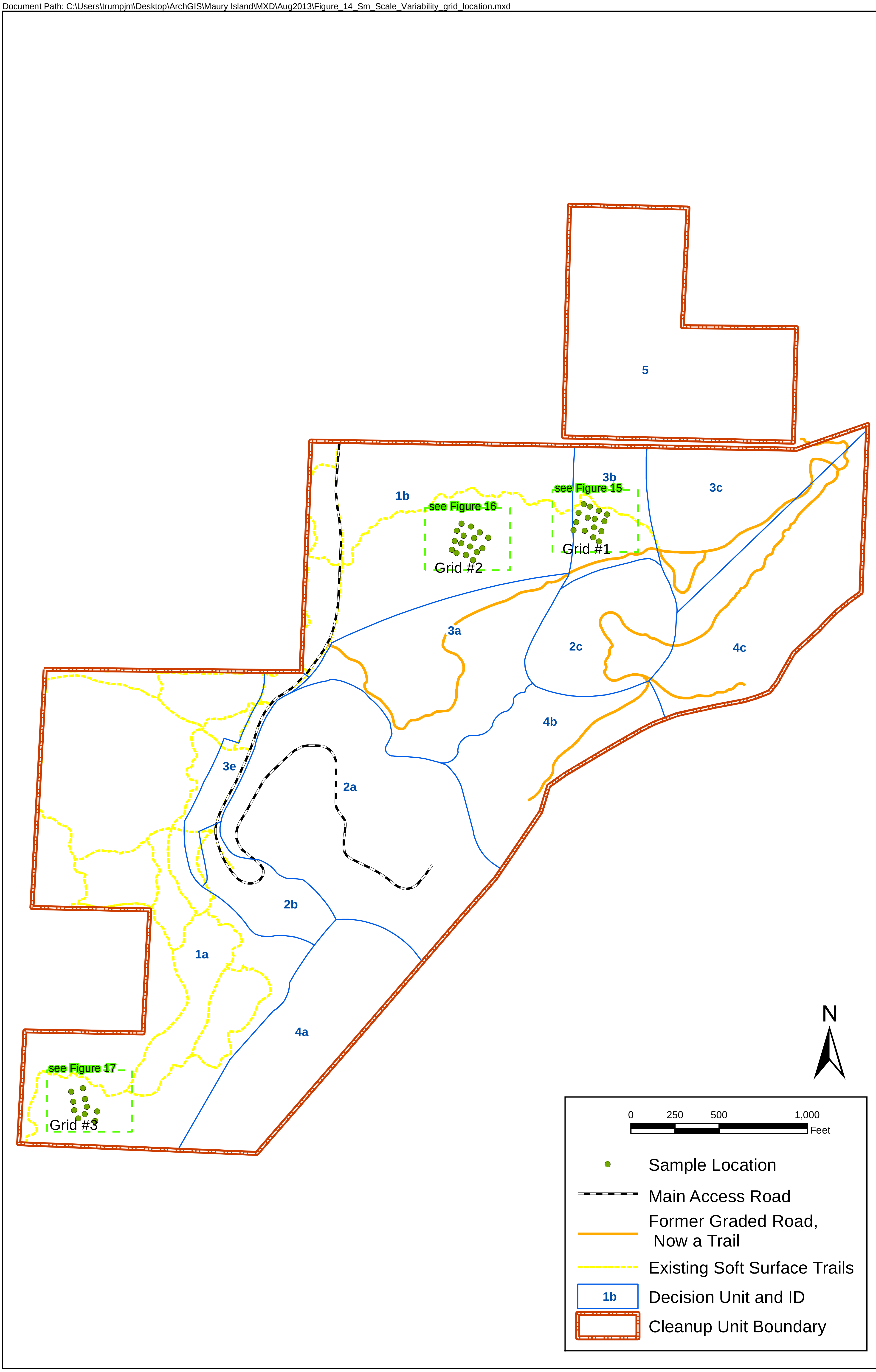
Maury Island Open Space Property RI
Maury Island, Washington

Figure 13
Sample Locations
on Roads and Trails

Document Path: C:\Users\trumpjm\Desktop\ArchGIS\Maury Island\MXD\Aug2013\Figure_14_Sm_Scale_Variability_grid_location.mxd



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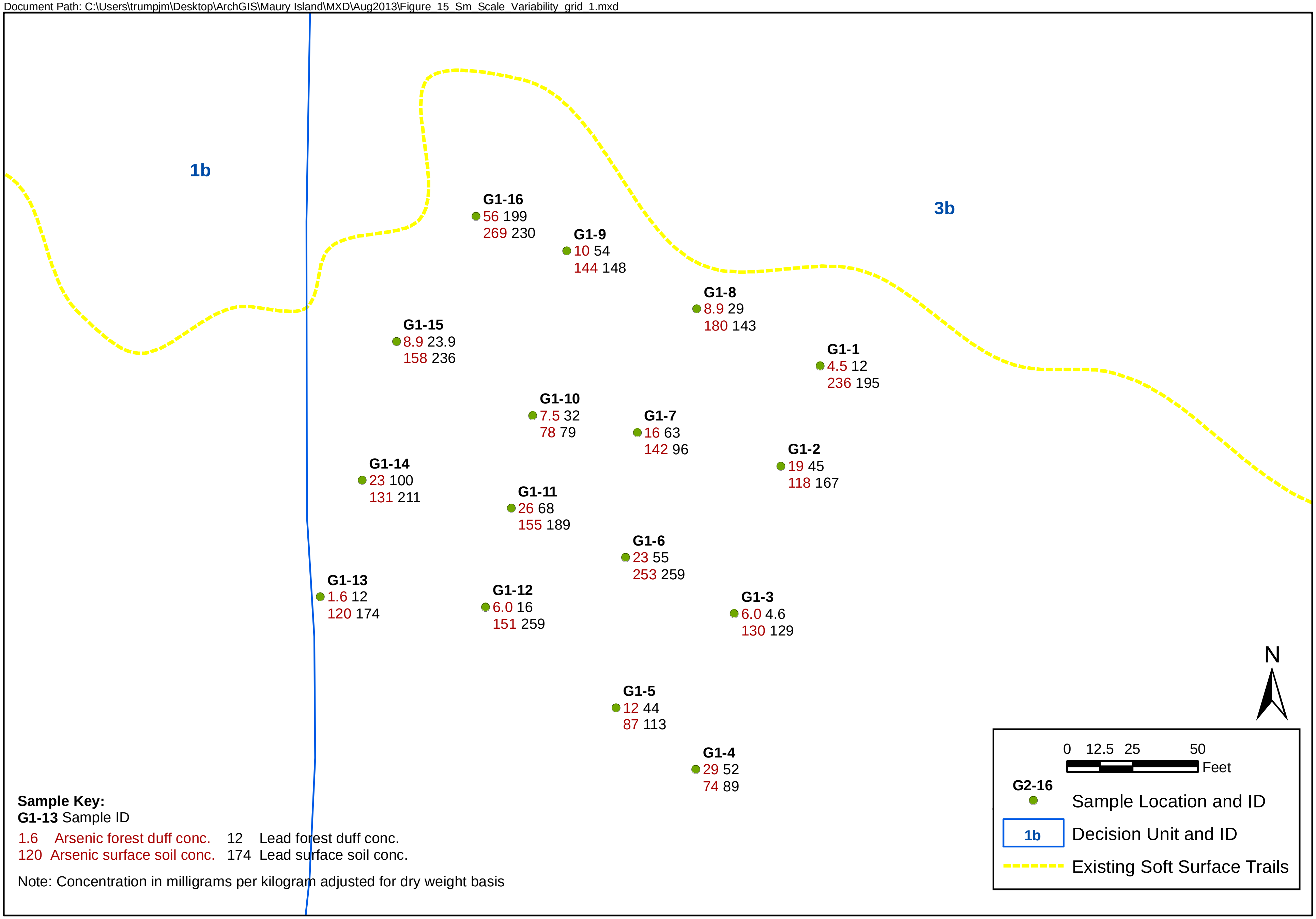
Maury Island Open Space Property RI
Maury Island, Washington

Figure 14
Small Scale Variability
Study Grid Location Map



Sample Key:
G1-13 Sample ID
1.6 Arsenic forest duff conc. 12 Lead forest duff conc.
120 Arsenic surface soil conc. 174 Lead surface soil conc.

Note: Concentration in milligrams per kilogram adjusted for dry weight basis

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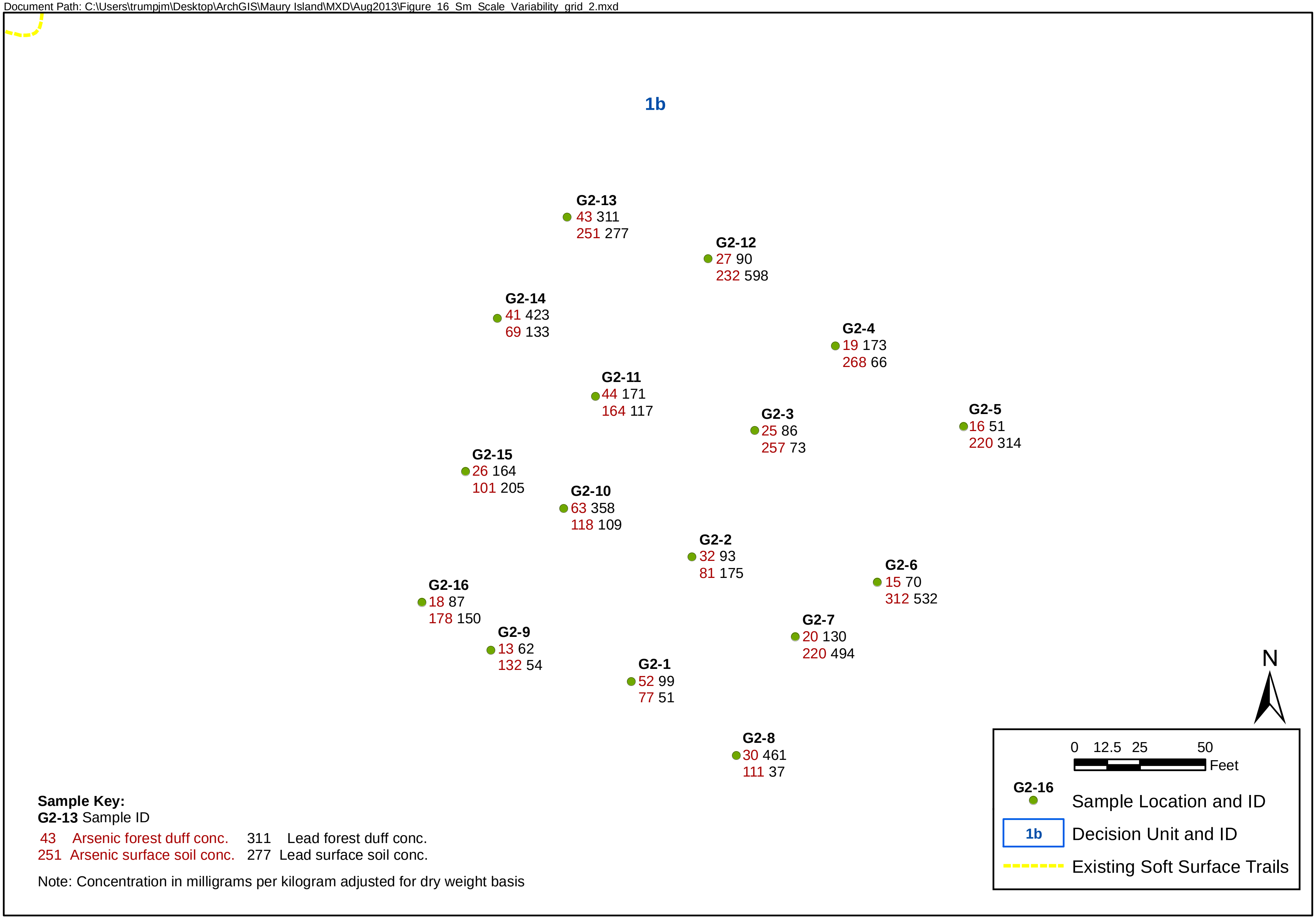
Maury Island Open Space Property RI
Maury Island, Washington

Figure 15
Small Scale Variability
Study Grid #1

Document Path: C:\Users\trumpjm\Desktop\ArchGIS\Maury Island\MXD\Aug2013\Figure_16_Sm_Scale_Variability_grid_2.mxd



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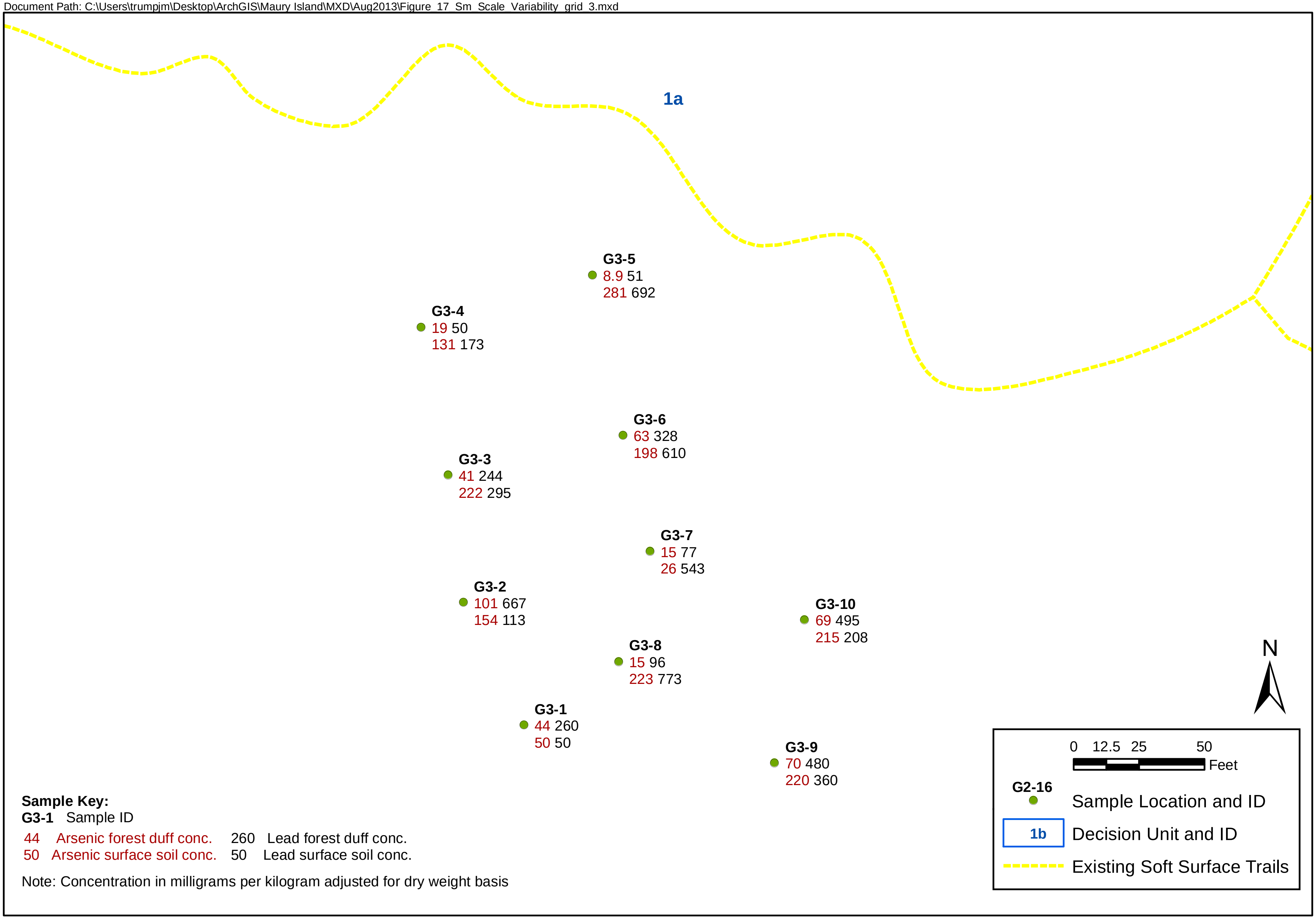
Maury Island Open Space Property RI
Maury Island, Washington

Figure 16
Small Scale Variability
Study Grid #2

Document Path: C:\Users\trumpjm\Desktop\ArchGIS\Maury Island\MXD\Aug2013\Figure_17_Sm_Scale_Variability_grid_3.mxd



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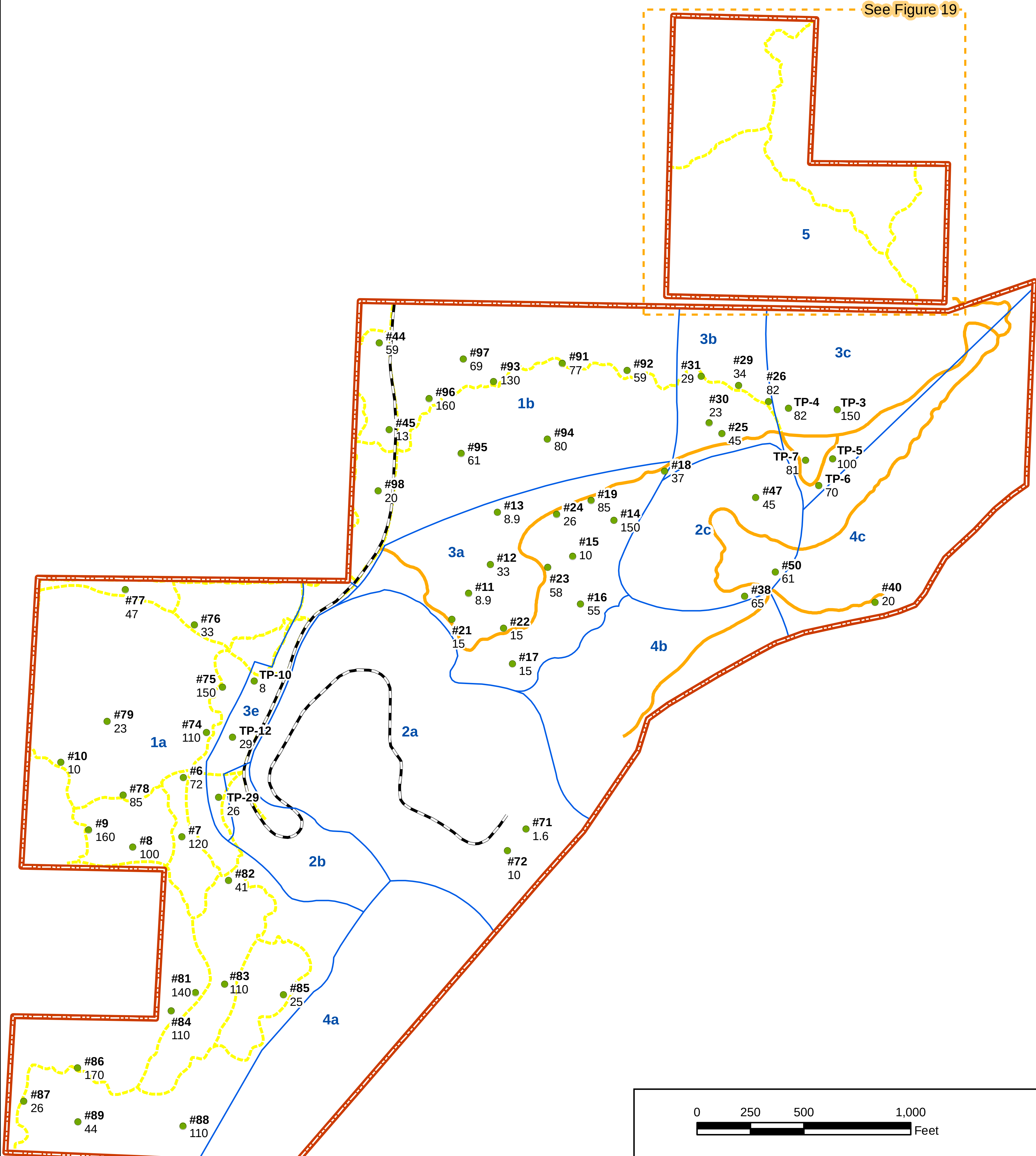
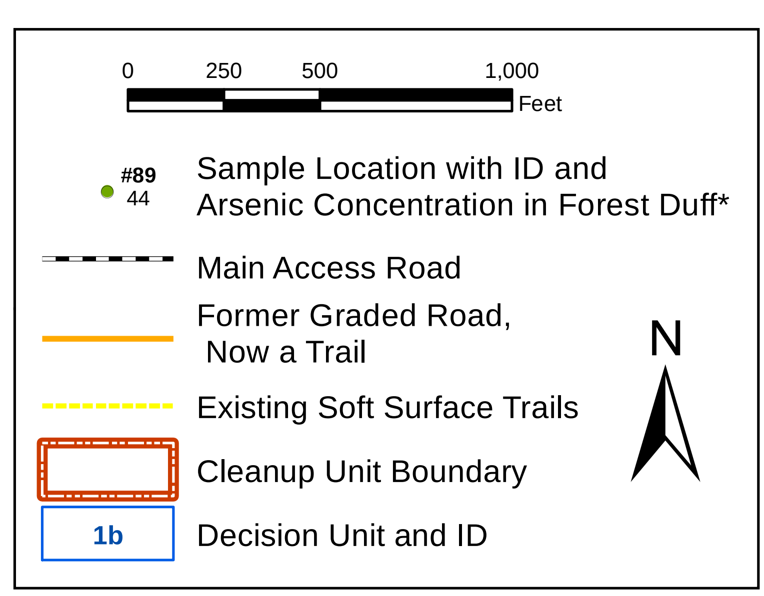
Maury Island Open Space Property RI
Maury Island, Washington

Figure 17
Small Scale Variability
Study Grid #3





Notes:
1. Concentration in milligrams per kilogram adjusted for dry weight basis
2) Concentrations may differ slightly from the summary tables due to rounding.
* or other organic layer

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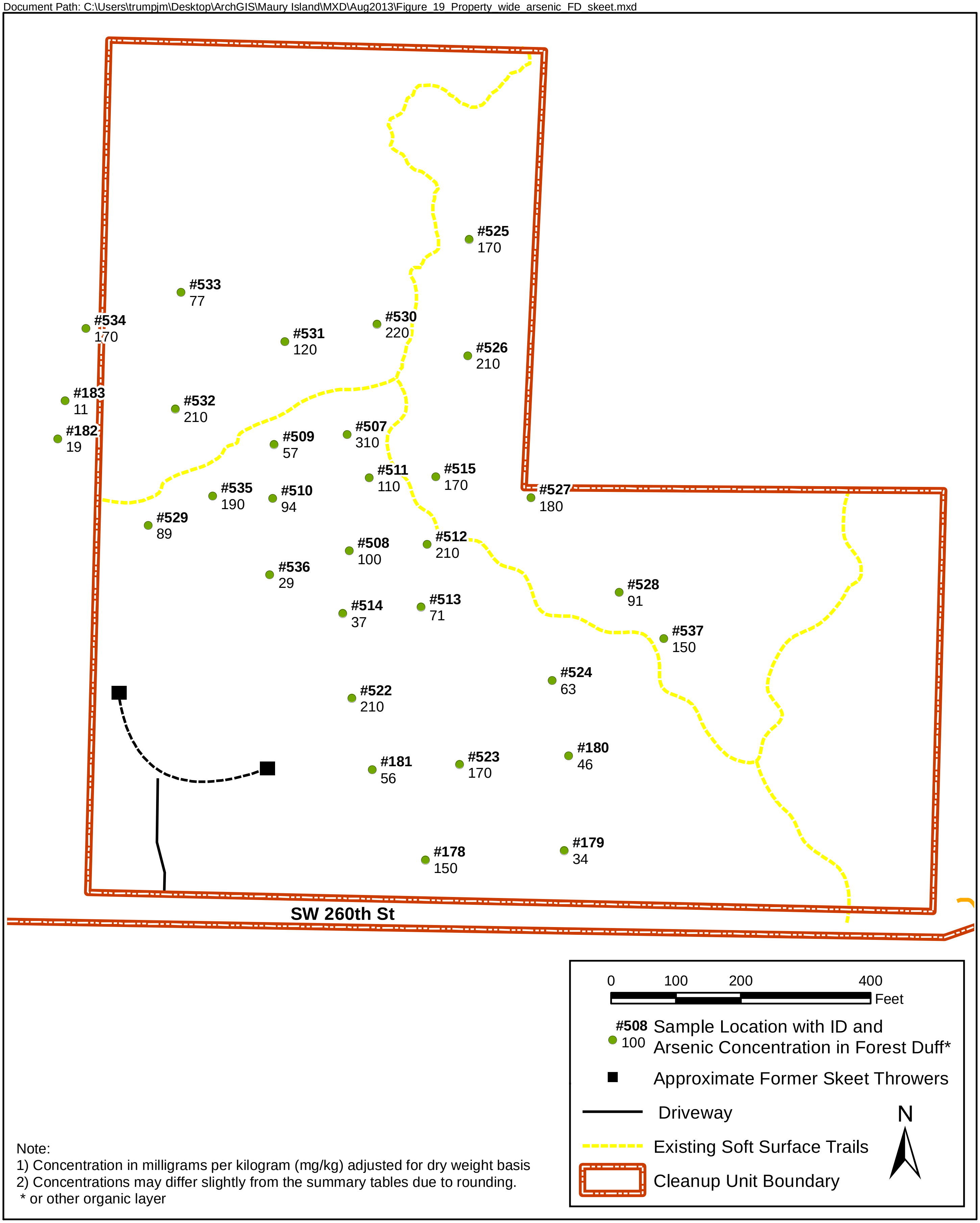
Maury Island Open Space Property RI
Maury Island, Washington

Figure 18
Property-Wide Arsenic Concentrations in Forest Duff Units South of SW 260th St.

Document Path: C:\Users\trumpjm\Desktop\ArchGIS\Maury Island\MXD\Aug2013\Figure_19_Property_wide_arsenic_FD_skeet.mxd



Note:
1) Concentration in milligrams per kilogram (mg/kg) adjusted for dry weight basis
2) Concentrations may differ slightly from the summary tables due to rounding.
* or other organic layer

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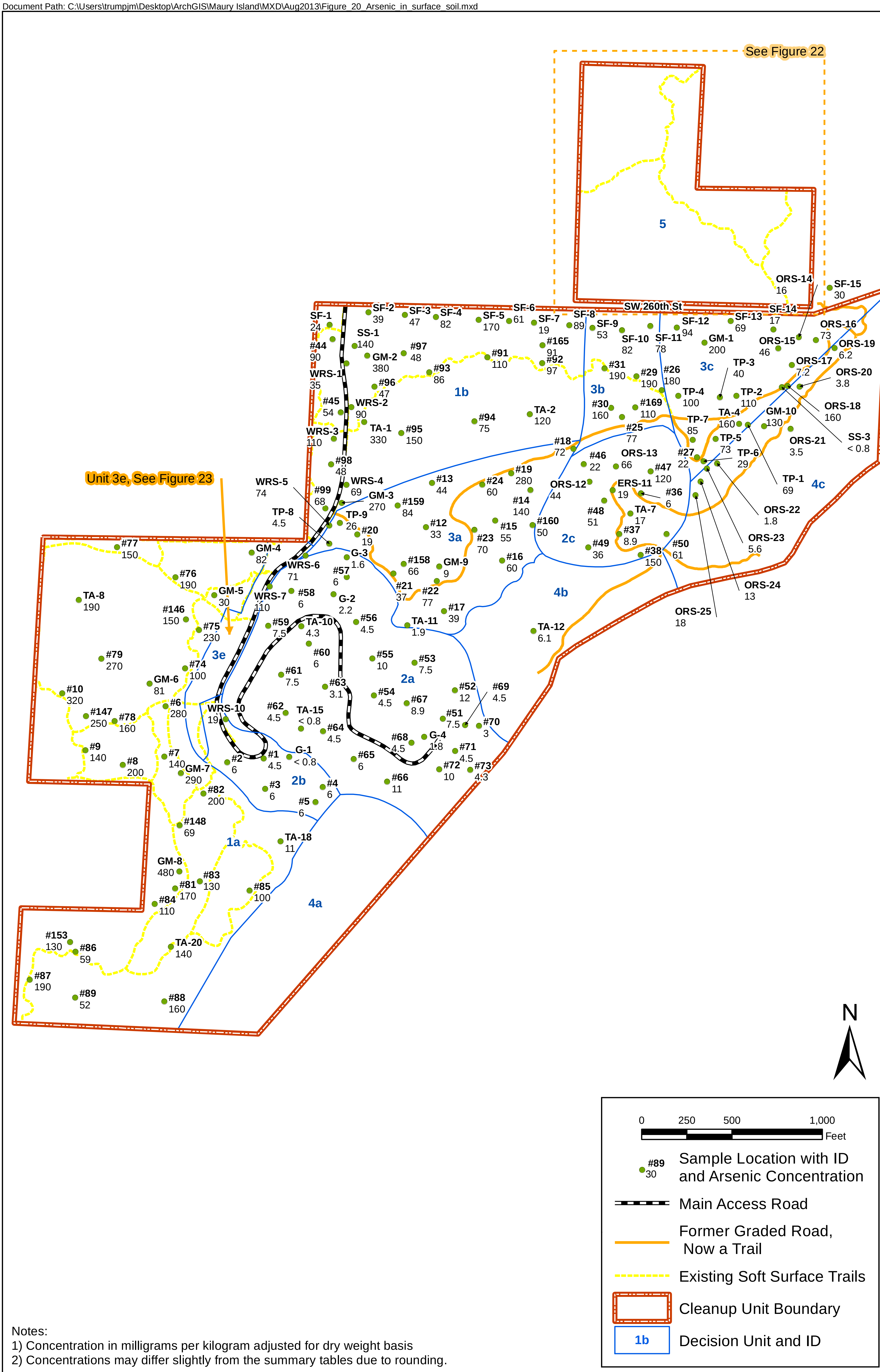
Maury Island Open Space Property RI
Maury Island, Washington

Figure 19
Property-Wide Arsenic Concentrations in Forest Duff
Unit 5



Notes:
1) Concentration in milligrams per kilogram adjusted for dry weight basis
2) Concentrations may differ slightly from the summary tables due to rounding.

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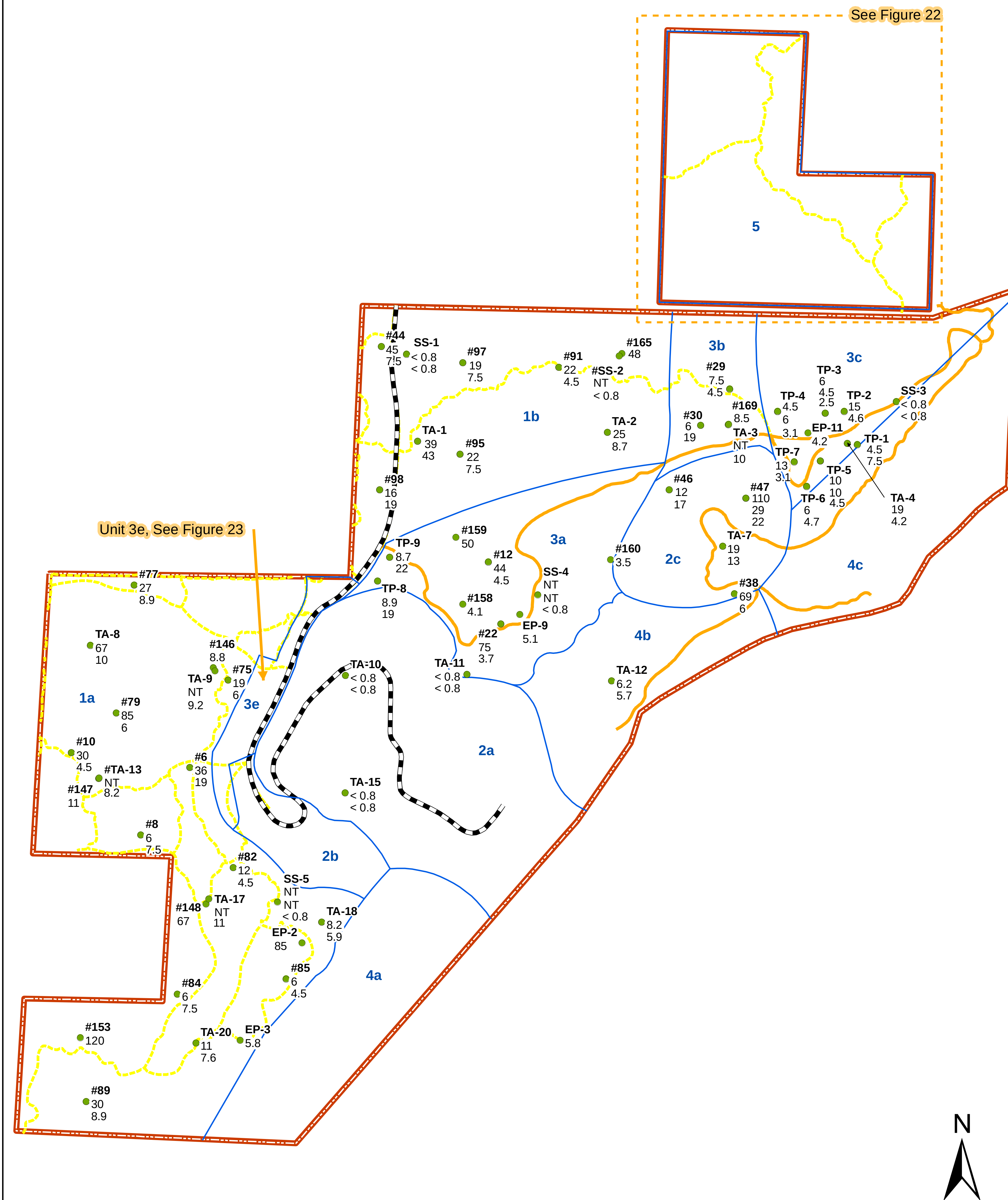
Maury Island Open Space Property RI
Maury Island, Washington

Figure 20
Property-Wide Arsenic Concentrations in Surface Soil Units South of SW 260th St.

Document Path: C:\Users\trumpjm\Desktop\ArchGIS\Maury Island\MXD\Aug2013\Figure_21_Arsenic_in_subsurface_soil.mxd



0 250 500 1,000 Feet

#89 30 8.9 Sample Location with ID and Arsenic Concentrations

Main Access Road

Former Graded Road, Now a Trail

Existing Soft Surface Trails

Cleanup Unit Boundary

1b Decision Unit and ID

Sample Key:

TP-4 Sample ID
6 Arsenic concentration at 9"
6 Arsenic concentration at 18"
3.1 Arsenic concentration at 24"

Notes:

1) Data presented below sample ID number is in descending order of depth, only sampled depths shown unless a preceding depth was not sampled, then NT (Not Tested) was used as a place holder.
2) Concentration in milligrams per kilogram adjusted for dry weight basis
3) Concentrations may differ slightly from the summary tables due to rounding.

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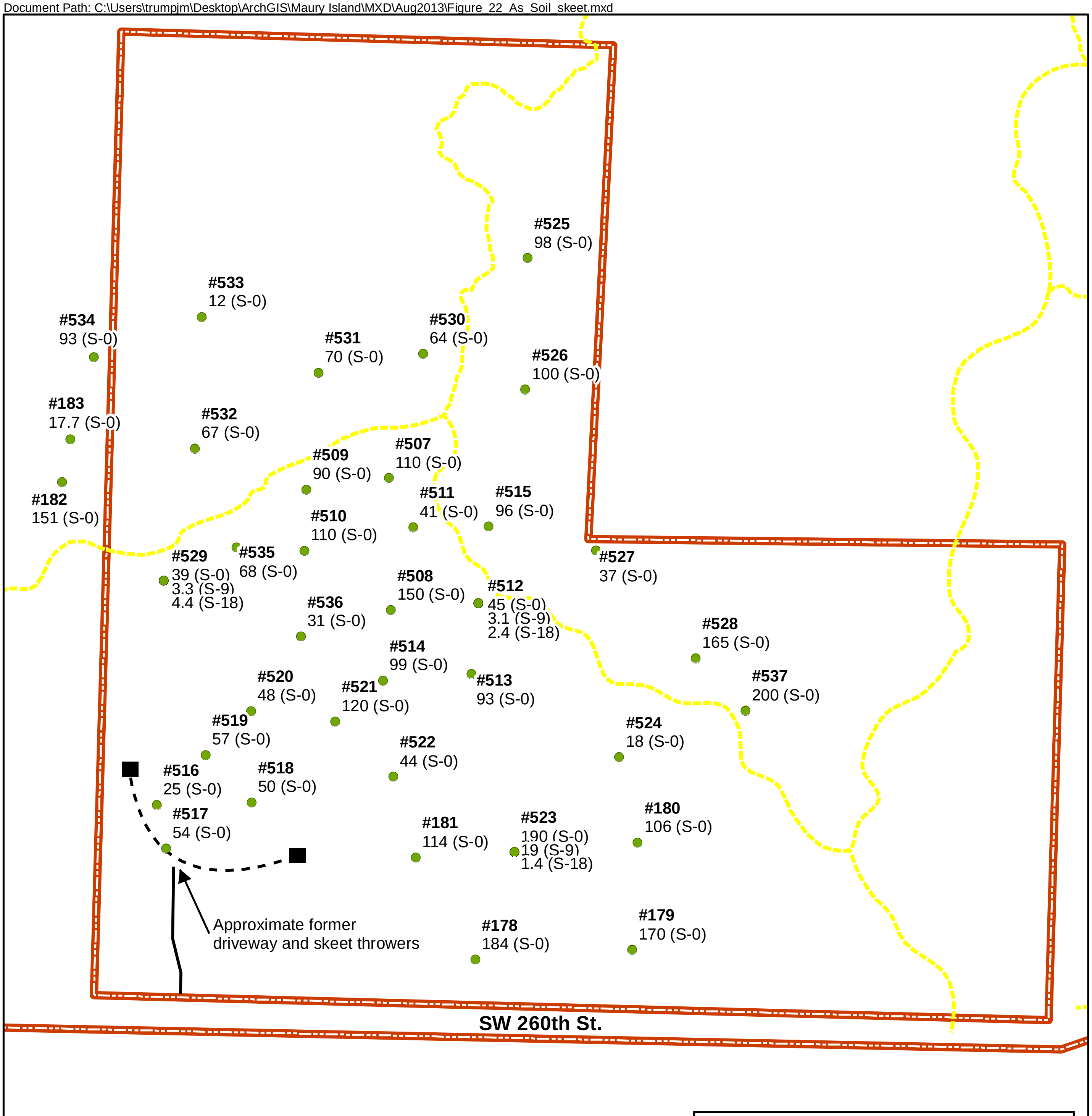
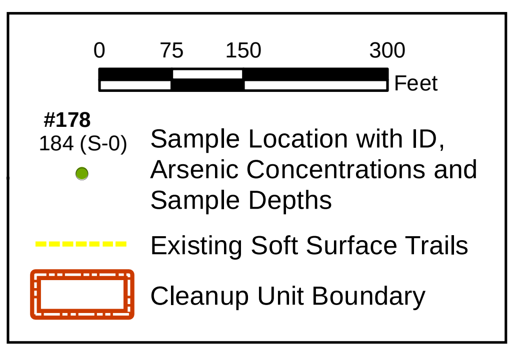
Maury Island Open Space Property RI
Maury Island, Washington

Figure 21
Property-Wide Arsenic Concentrations in Subsurface Soil Units South of SW 260th St.

Document Path: C:\Users\trumpjm\Desktop\ArchGIS\Maury Island\MXD\Aug2013\Figure_22_As_Soil_skeet.mxd



Notes:
1) Arsenic concentrations shown are in mg/kg
S-0: Surface Soil 0-2"
S-9: Soil at 9"
S-18: Soil at 18"
2) mg/kg: milligrams per kilogram for dry weight basis
3) Concentrations may differ slightly from the summary tables due to rounding.



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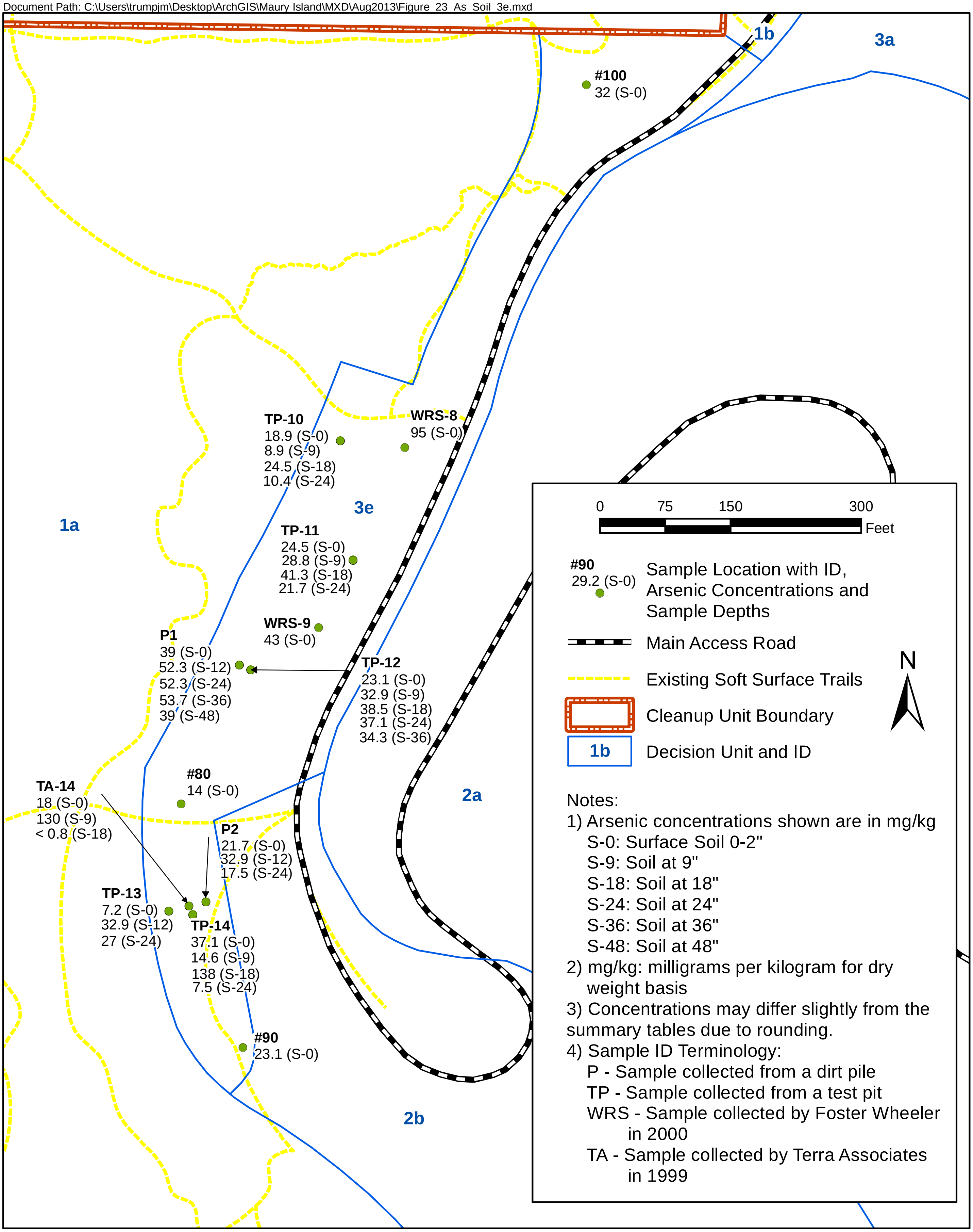
Maury Island Open Space Property RI
Maury Island, Washington

Figure 22
Property-Wide Arsenic Concentrations in Soil
Unit 5

Document Path: C:\Users\trumpjm\Desktop\ArchGIS\Maury Island\MXD\Aug2013\Figure_23_As_Soil_3e.mxd



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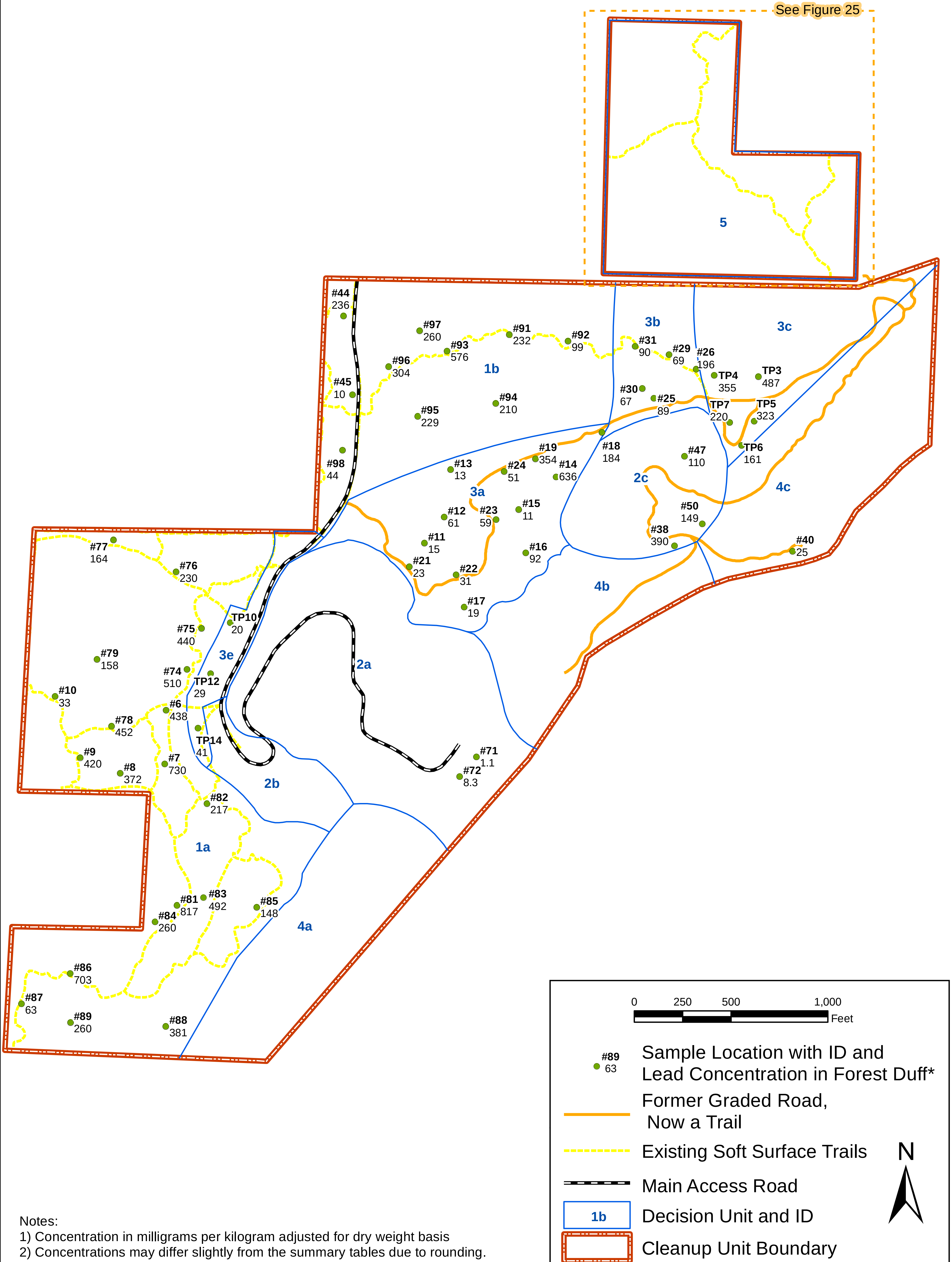
Maury Island Open Space Property RI
Maury Island, Washington

Figure 23
Property-Wide Arsenic Concentrations in Soil Unit 3e

Document Path: C:\Users\trumpjm\Desktop\ArchGIS\Maury Island\MXD\Aug2013\Figure_24_Property_wide_Lead_in_FD.mxd



Notes:
1) Concentration in milligrams per kilogram adjusted for dry weight basis
2) Concentrations may differ slightly from the summary tables due to rounding.
* or other organic layer

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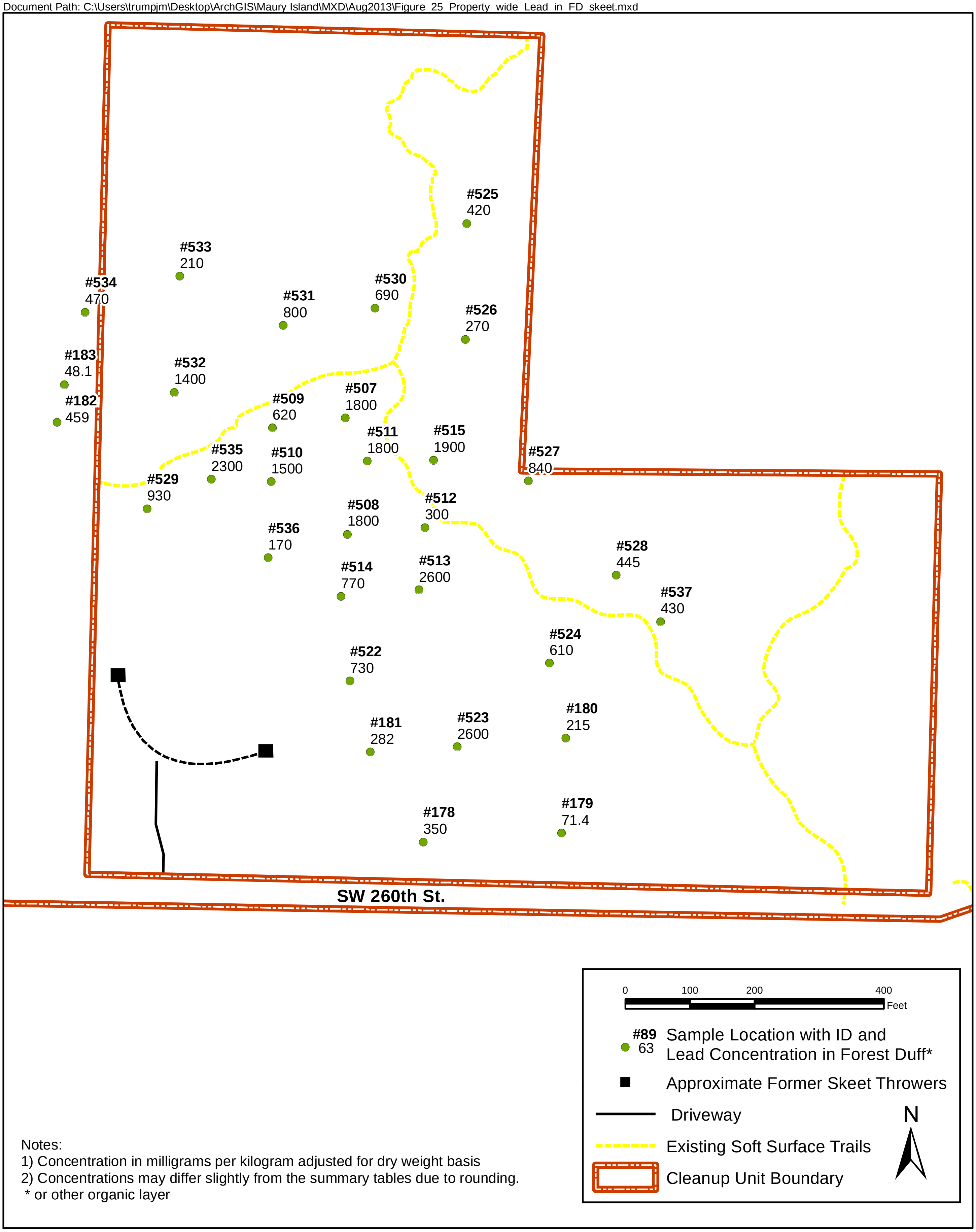
Maury Island Open Space Property RI
Maury Island, Washington

Figure 24
Property-Wide Lead Concentrations in Forest Duff
Units South of SW 260th St.

Document Path: C:\Users\trumpjm\Desktop\ArchGIS\Maury Island\MXD\Aug2013\Figure_25_Property_wide_Lead_in_FD_skeet.mxd



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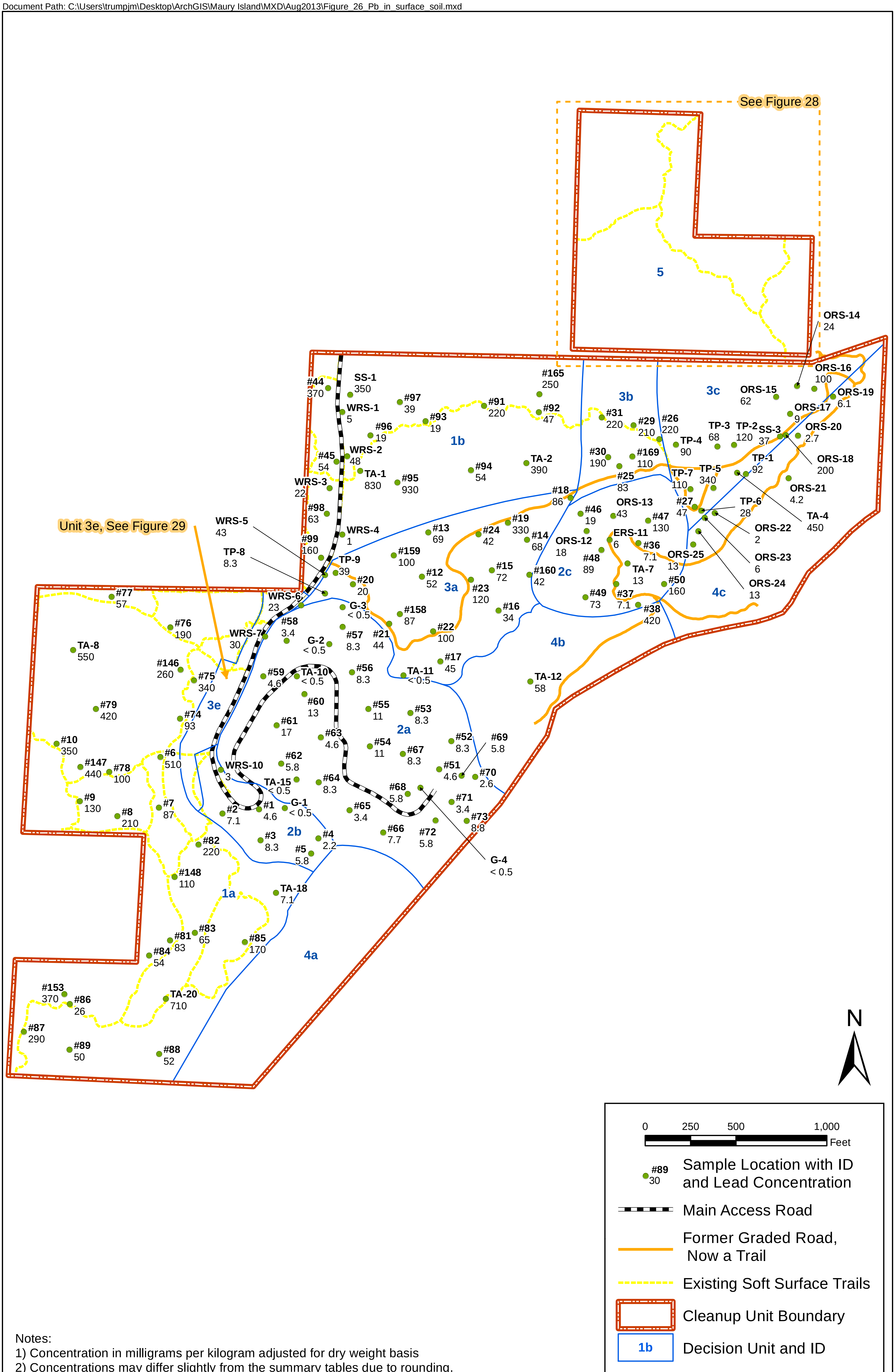
Maury Island Open Space Property RI
Maury Island, Washington

Figure 25
Property-Wide Lead
Concentrations in Forest Duff
Unit 5

Document Path: C:\Users\trumpjm\Desktop\ArchGIS\Maury Island\MXD\Aug2013\Figure_26_Pb_in_surface_soil.mxd



Notes:
1) Concentration in milligrams per kilogram adjusted for dry weight basis
2) Concentrations may differ slightly from the summary tables due to rounding.

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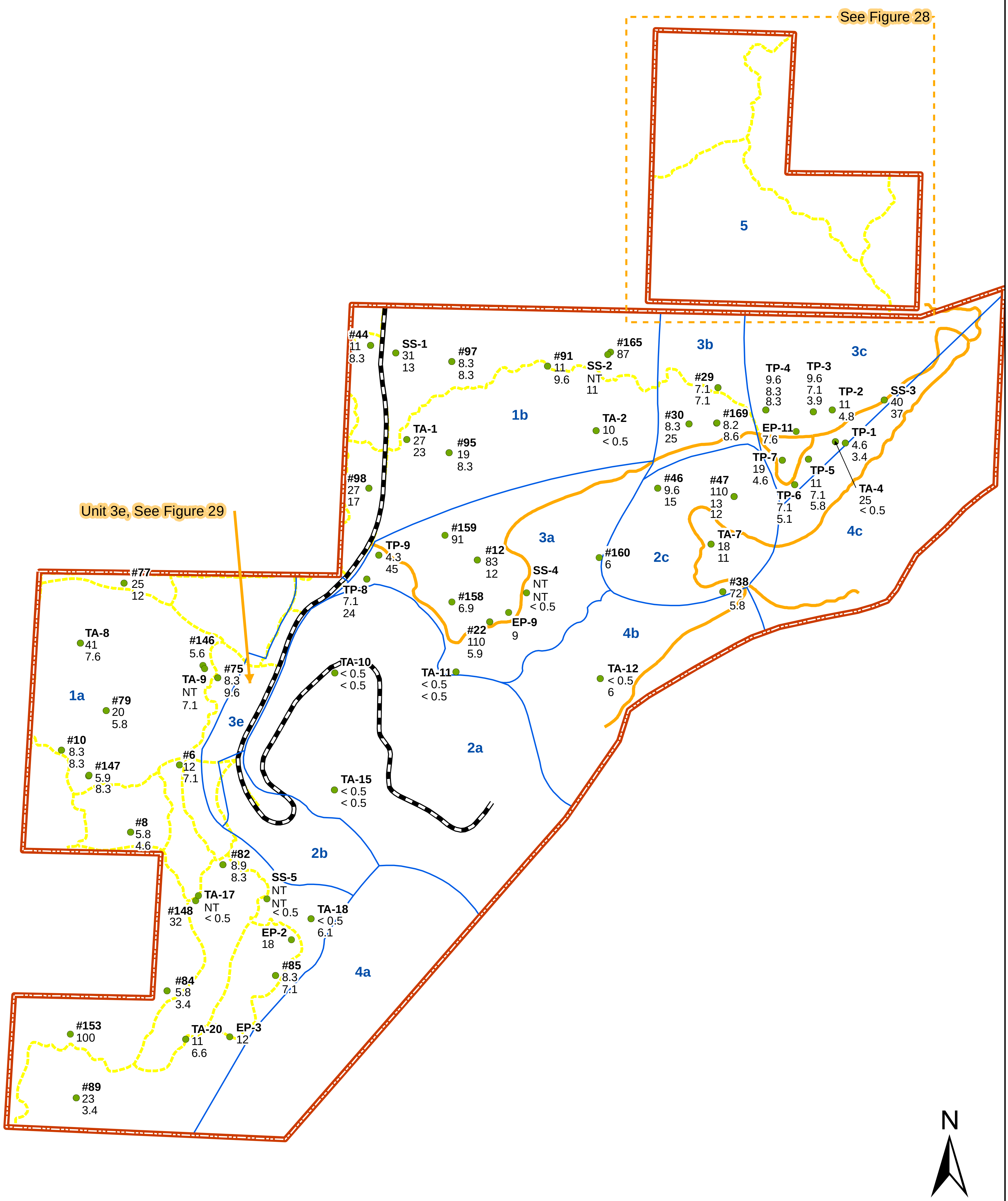
Maury Island Open Space Property RI
Maury Island, Washington

Figure 26
Property Wide Lead Concentrations in Surface Soil Units South of SW 260th St.

Document Path: C:\Users\trumpjm\Desktop\ArchGIS\Maury Island\MXD\Aug2013\Figure_27_Lead_in_subsurface_soil.mxd



Sample Key:

#89 Sample ID
6 Arsenic concentration at 9"
6 Arsenic concentration at 18"
3.1 Arsenic concentration at 24"

Notes:
1) Data presented below sample ID number is in descending order of depth, only sampled depths shown unless a preceding depth was not sampled, then NT (Not Tested) was used as a place holder.
2) Concentration in milligrams per kilogram adjusted for dry weight basis
3) Concentrations may differ slightly from the summary tables due to rounding.

0 250 500 1,000 Feet

#89 23 3.4 Sample Location with ID, Lead Concentrations
Main Access Road
Former Graded Road, Now a Trail
Existing Soft Surface Trails
Cleanup Unit Boundary
1b Decision Unit and ID

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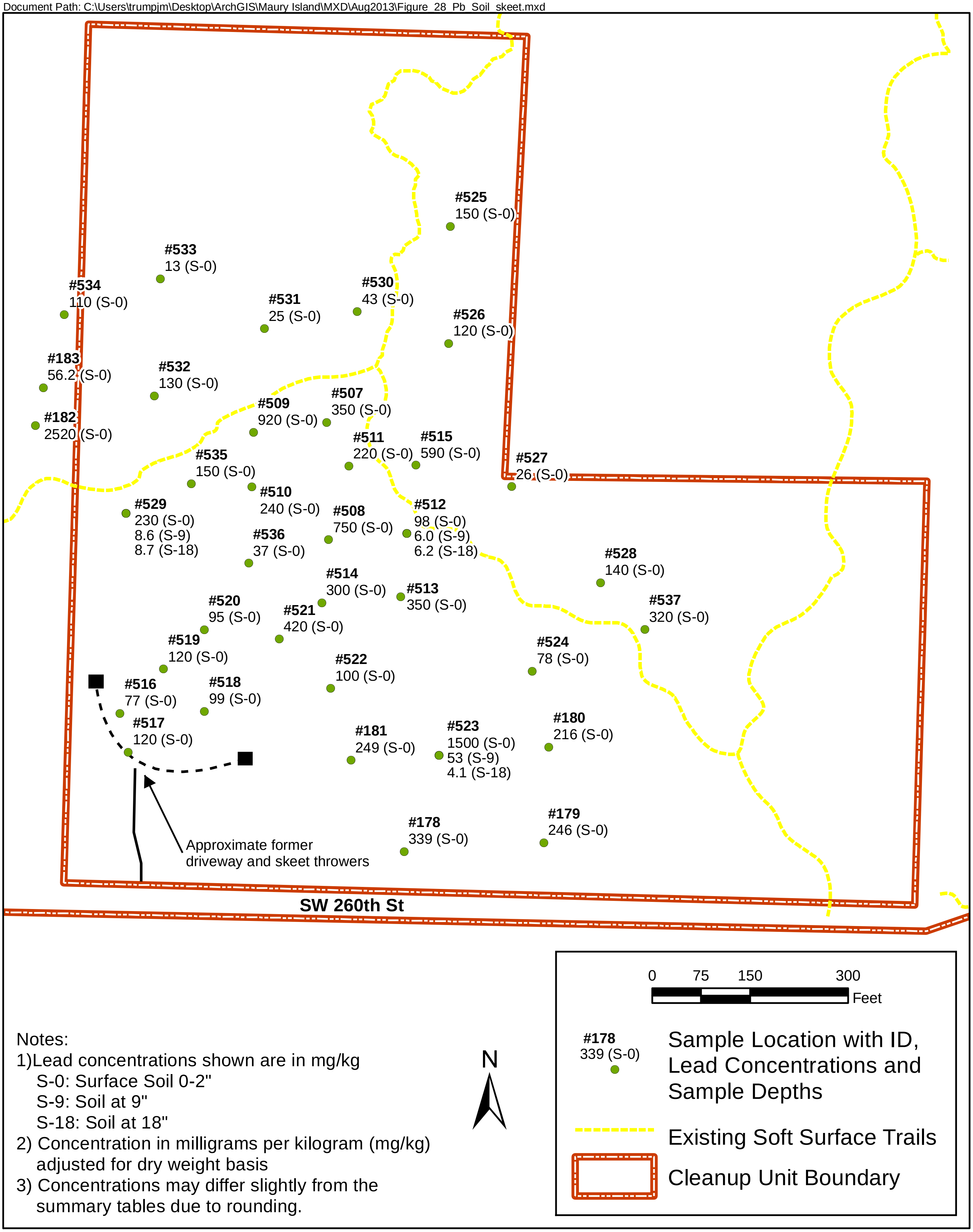
Maury Island Open Space Property RI
Maury Island, Washington

Figure 27
Property-Wide Lead Concentrations in Subsurface Soil
Units South of SW 260th St.

Document Path: C:\Users\trumpjm\Desktop\ArchGIS\Maury Island\MXD\Aug2013\Figure_28_Pb_Soil_skeet.mxd



Notes:
1)Lead concentrations shown are in mg/kg
S-0: Surface Soil 0-2"
S-9: Soil at 9"
S-18: Soil at 18"
2) Concentration in milligrams per kilogram (mg/kg) adjusted for dry weight basis
3) Concentrations may differ slightly from the summary tables due to rounding.

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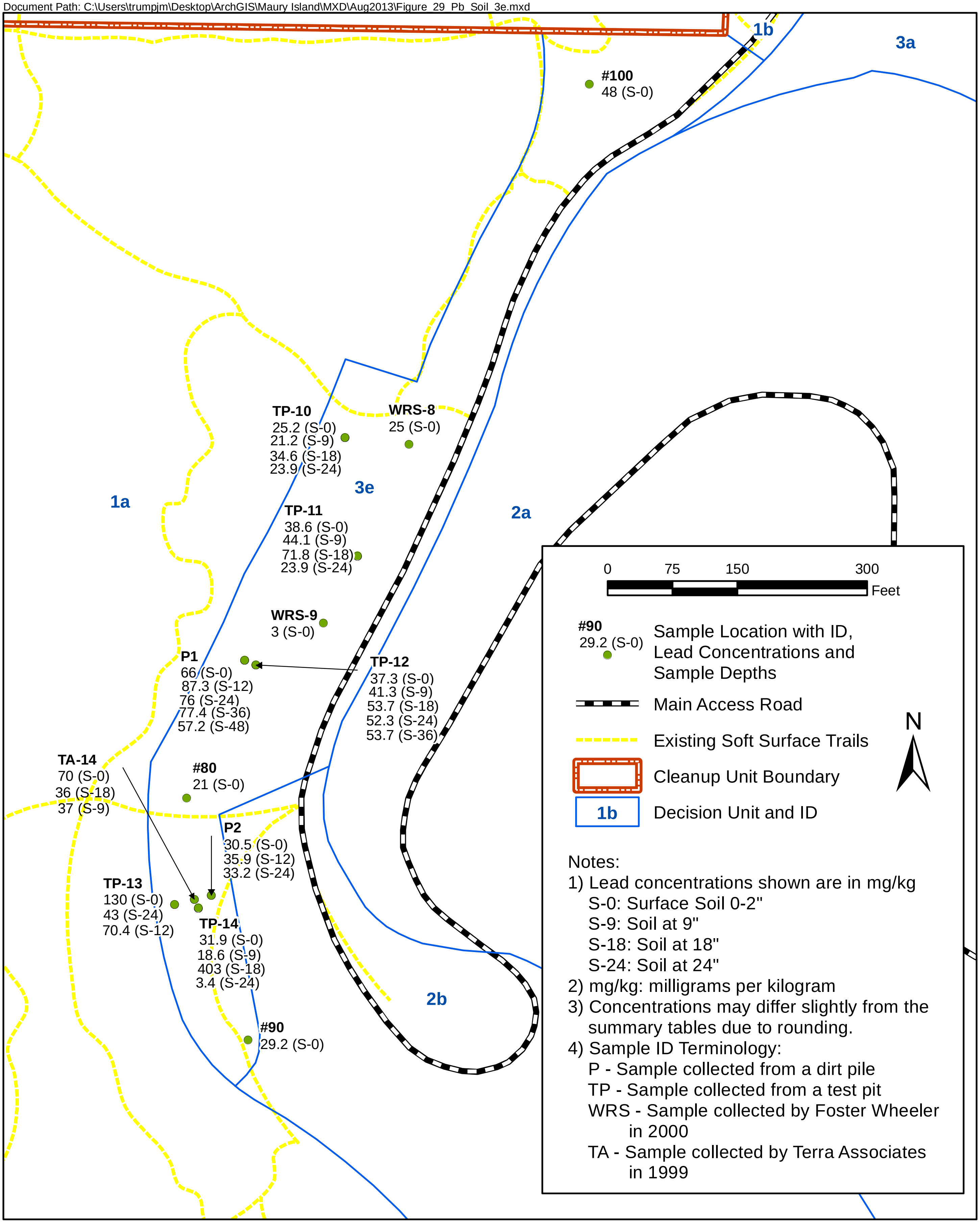
Maury Island Open Space Property RI
Maury Island, Washington

Figure 28
Property Wide Lead Concentrations in Soil Unit 5

Document Path: C:\Users\trumpjm\Desktop\ArchGIS\Maury Island\MXD\Aug2013\Figure_29_Pb_Soil_3e.mxd



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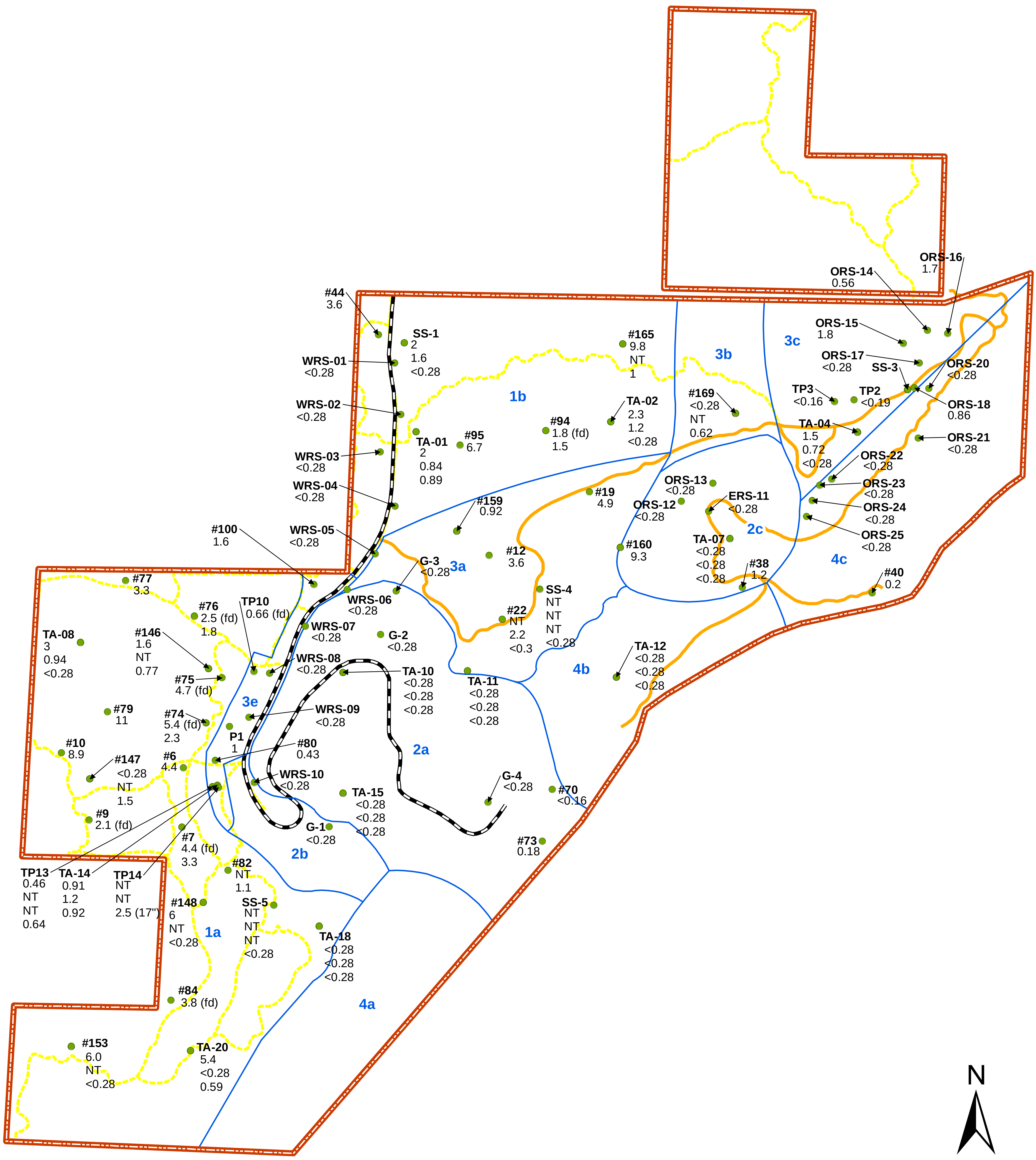
Maury Island Open Space Property RI
Maury Island, Washington

Figure 29
Property-Wide Lead Concentrations in Soil
Unit 3e

Document Path: C:\Users\trumpjm\Desktop\ArchGIS\Maury Island\MXD\Aug2013\Figure_30_Cadmium_in_FD_and_soil.mxd



Sample Key:
TA-19 Sample ID
99(fd) Cadmium concentration in forest duff
6.0 Cadmium concentration at 0-2"
1.4 Cadmium concentration at 9"
<0.28 Cadmium concentration at 18"
99 Cadmium concentration at 24"

Notes:
1) Data presented below sample ID number is in descending order of depth, only sampled depths shown unless a preceeding soil depth was not sampled, then NT (Not Tested) was used as a place holder. Forest duff samples are listed above soil and are designated with (fd).
2) Concentrations may differ slightly from the summary tables due to rounding.

0 250 500 1,000 Feet

#84 Sample Location and ID
Main Access Road
Former Graded Road, Now a Trail
Existing Soft Surface Trail
Cleanup Unit Boundary
1b Decision Unit and ID

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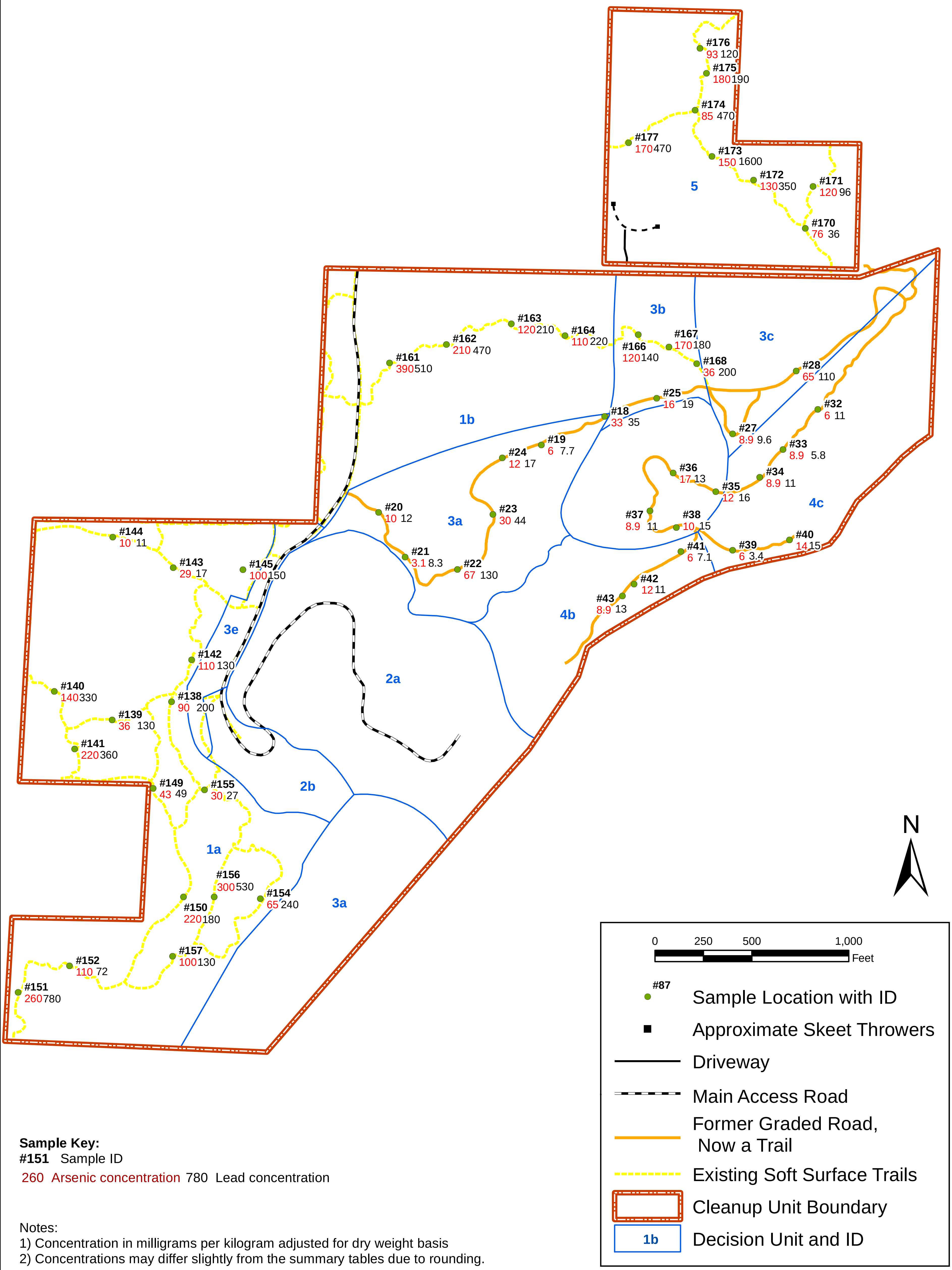
Maury Island Open Space Property RI
Maury Island, Washington

Figure 30
Property-Wide Cadmium
Concentration in Forest Duff and Soil



Sample Key:
#151 Sample ID
260 Arsenic concentration 780 Lead concentration

Notes:
1) Concentration in milligrams per kilogram adjusted for dry weight basis
2) Concentrations may differ slightly from the summary tables due to rounding.

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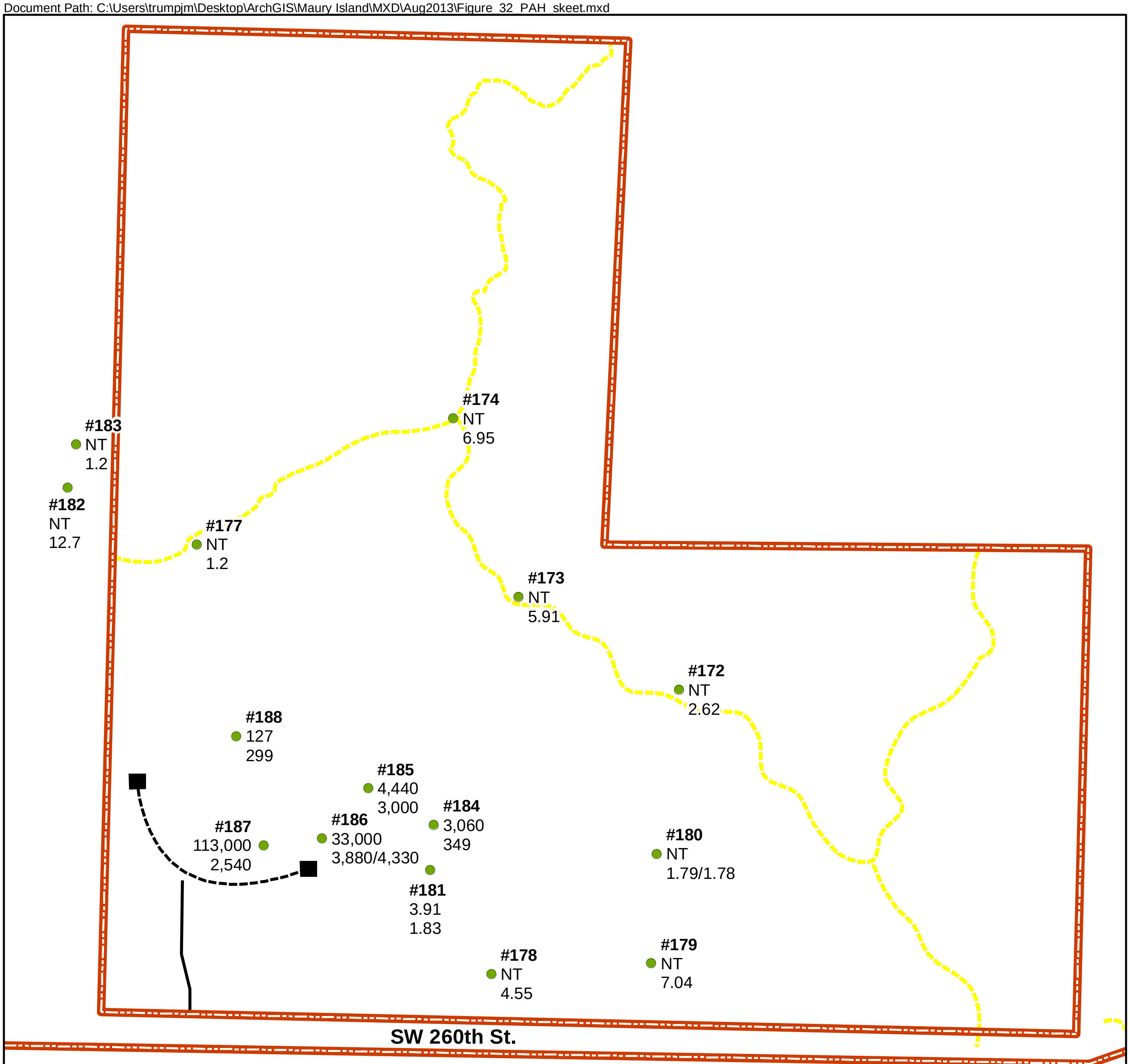
Maury Island Open Space Property RI
Maury Island, Washington

Figure 31
Arsenic and Lead
Concentrations on Trails and Roads

Document Path: C:\Users\trumpjm\Desktop\ArchGIS\Maury Island\MXD\Aug2013\Figure_32_PAH_skeet.mxd



Sample Key:
#186 Sample ID
33,000 cPAH TEQ concentration in forest duff
3,880 cPAH TEQ concentration in soil at 0-2" depth

Notes:
1) Data presented below sample ID number is in descending order of depth. Only sampled depths shown unless a preceding depth was not sampled; then NT (Not Tested) was used as a place holder.
2) Concentration in micrograms per kilogram adjusted for dry weight basis and TEQ.
3) Concentrations may differ slightly from the summary tables due to rounding.

/ # - Results of duplicate analyses
TEQ - Toxic equivalency
cPAH - Carcinogenic polycyclic aromatic hydrocarbons

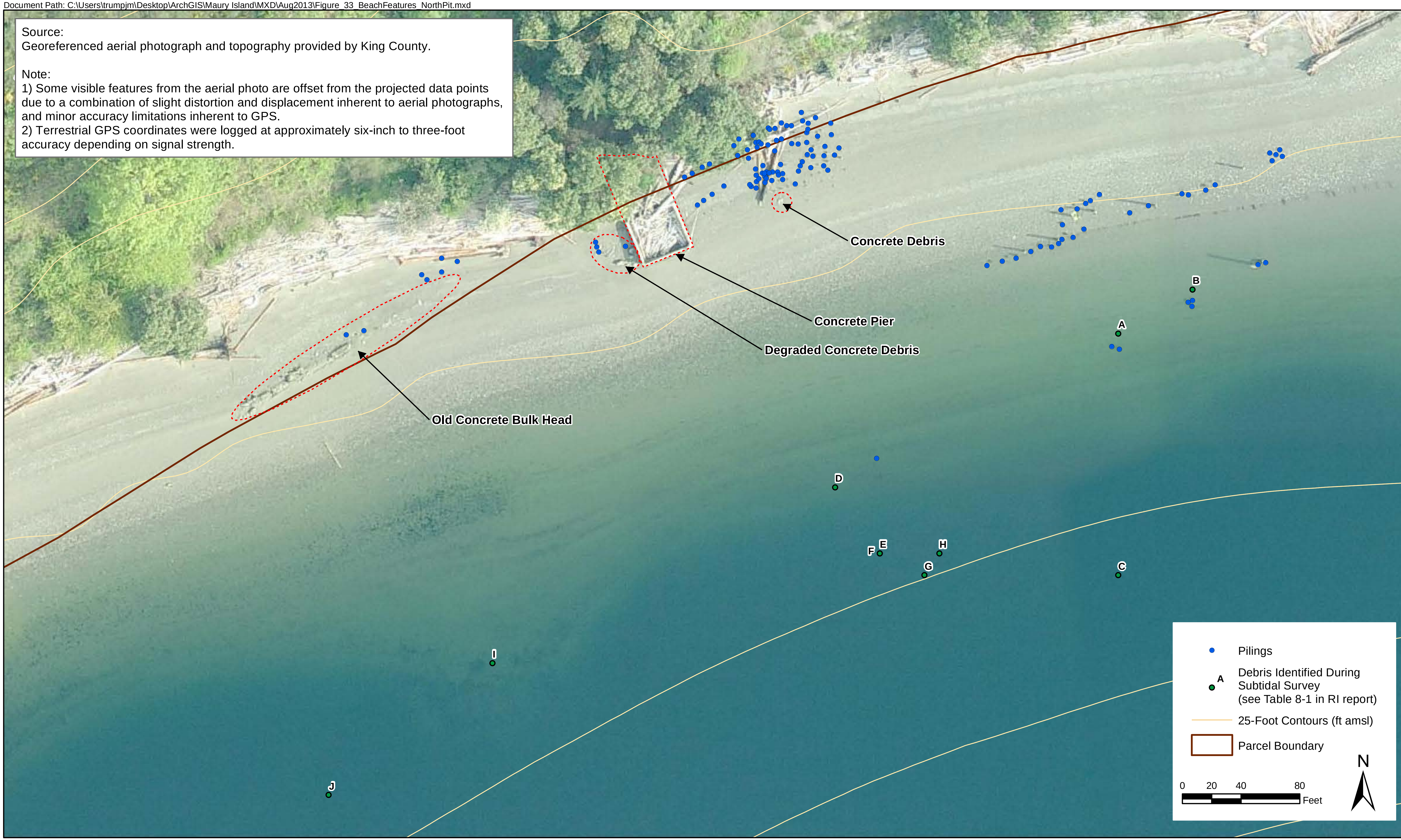
0 100 200 400 Feet

#186 Sample Location and ID
Approximate Former Skeet Throwers
Driveway
Existing Soft Surface Trails
Cleanup Unit Boundary
N

Maury Island Open Space Property RI
Maury Island, Washington

Figure 32
cPAH in
Forest Duff and Soil

Document Path: C:\Users\trumpjm\Desktop\ArchGIS\Maury Island\MXD\Aug2013\Figure_33_BeachFeatures_NorthPit.mxd



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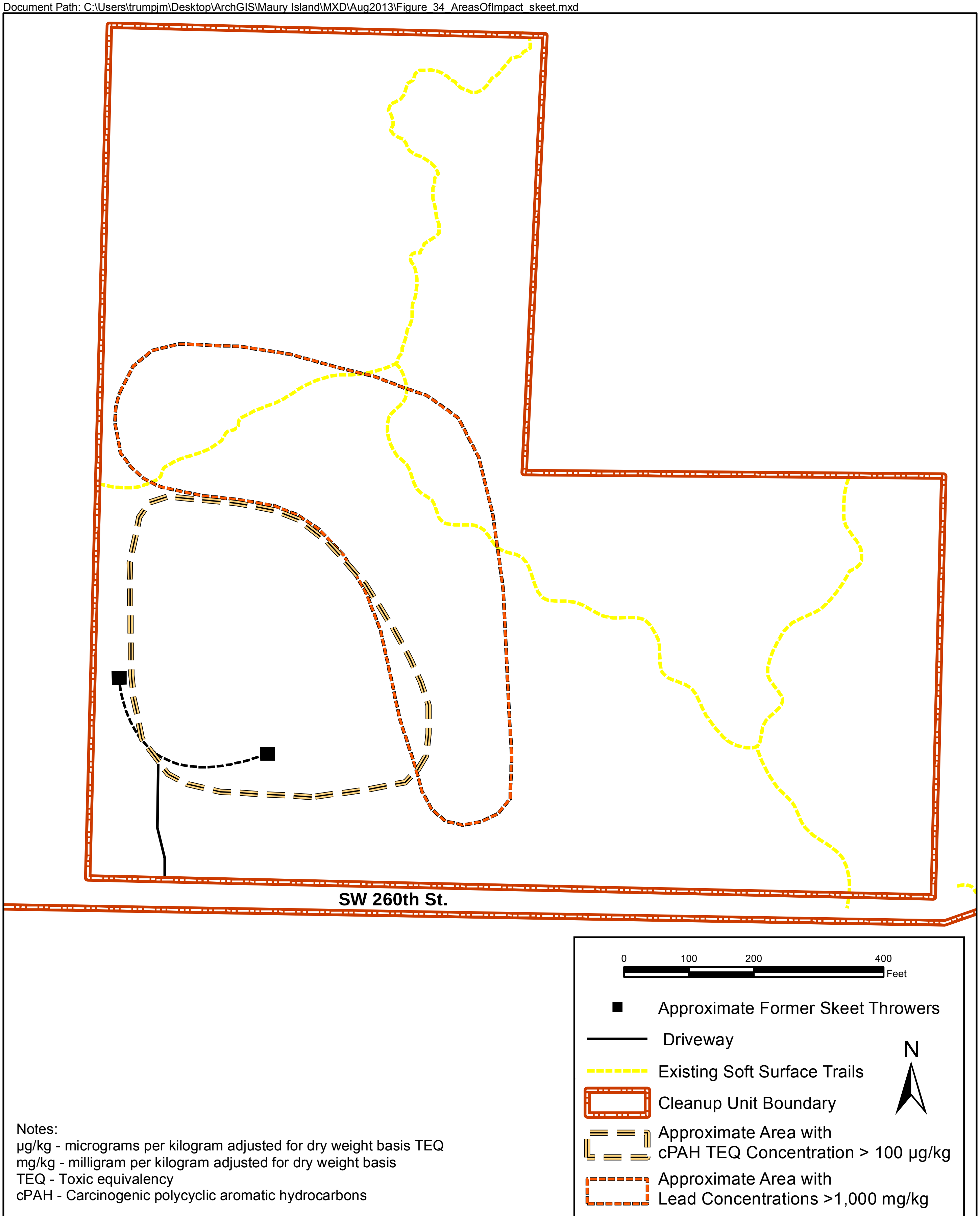
Maury Island Open Space Property RI
Maury Island, Washington

Figure 33
Beach and Subtidal Features
Associated with Early 1900s North Pit

Document Path: C:\Users\trumpjm\Desktop\ArchGIS\Maury Island\MXD\Aug2013\Figure_34_AreasOfImpact_skeet.mxd



Notes:
µg/kg - micrograms per kilogram adjusted for dry weight basis TEQ
mg/kg - milligram per kilogram adjusted for dry weight basis
TEQ - Toxic equivalency
cPAH - Carcinogenic polycyclic aromatic hydrocarbons

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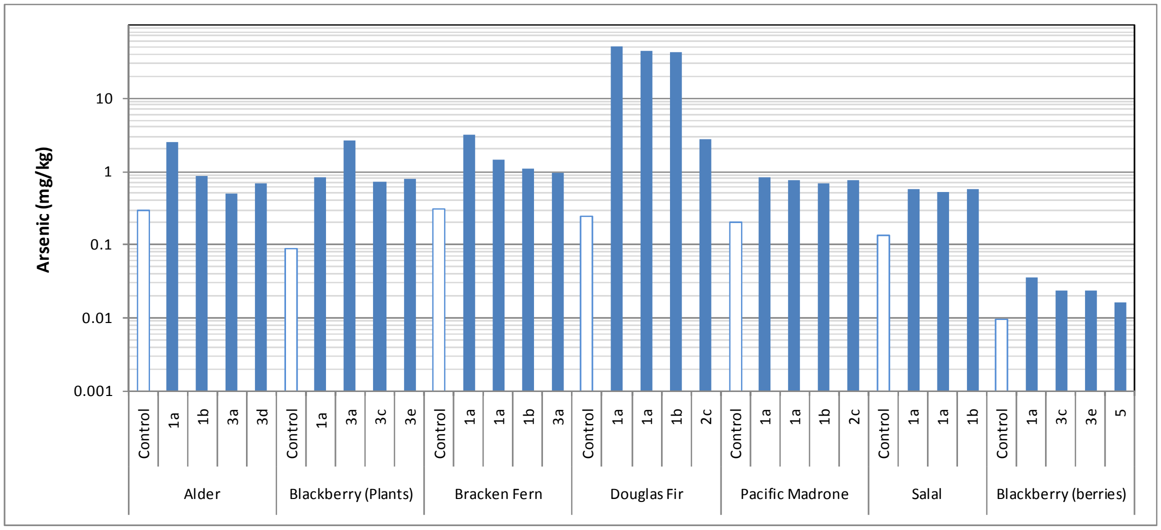
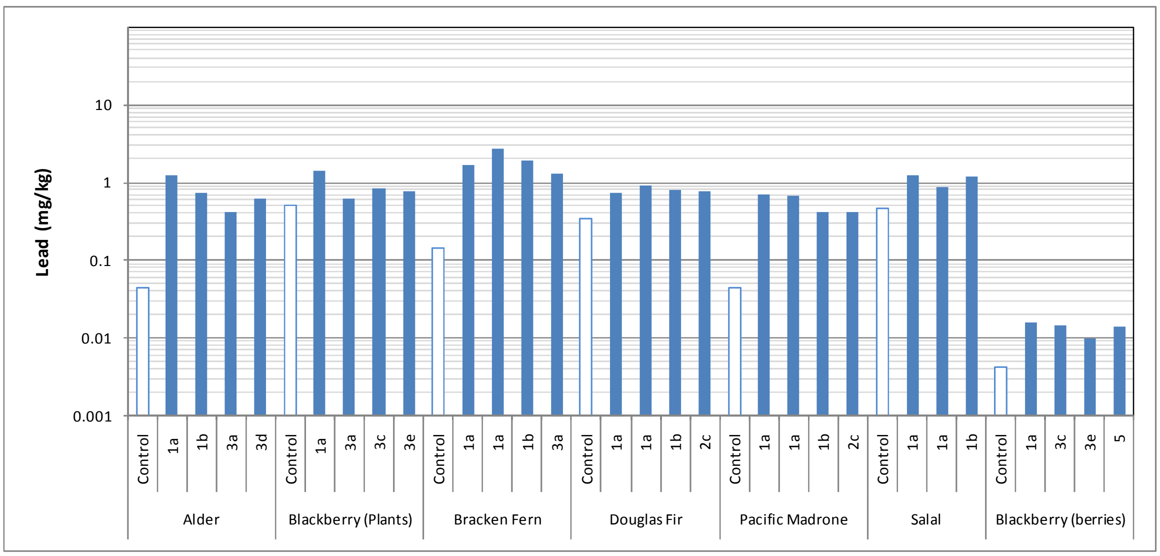
Maury Island Open Space Property RI
Maury Island, Washington

Figure 34
Estimated Area of Impact
by Former Skeet Shooting





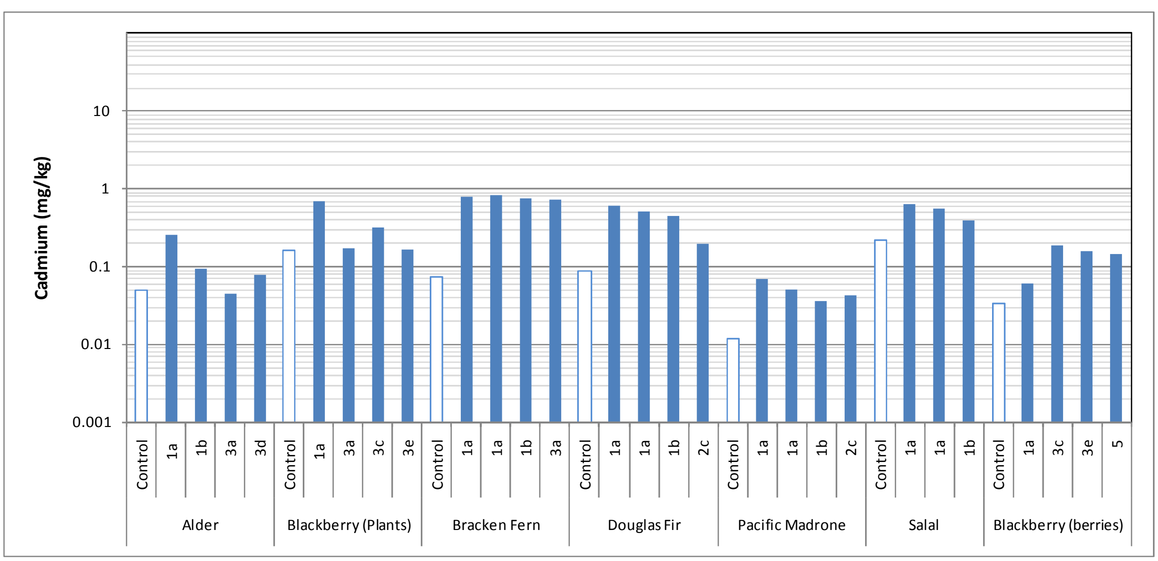
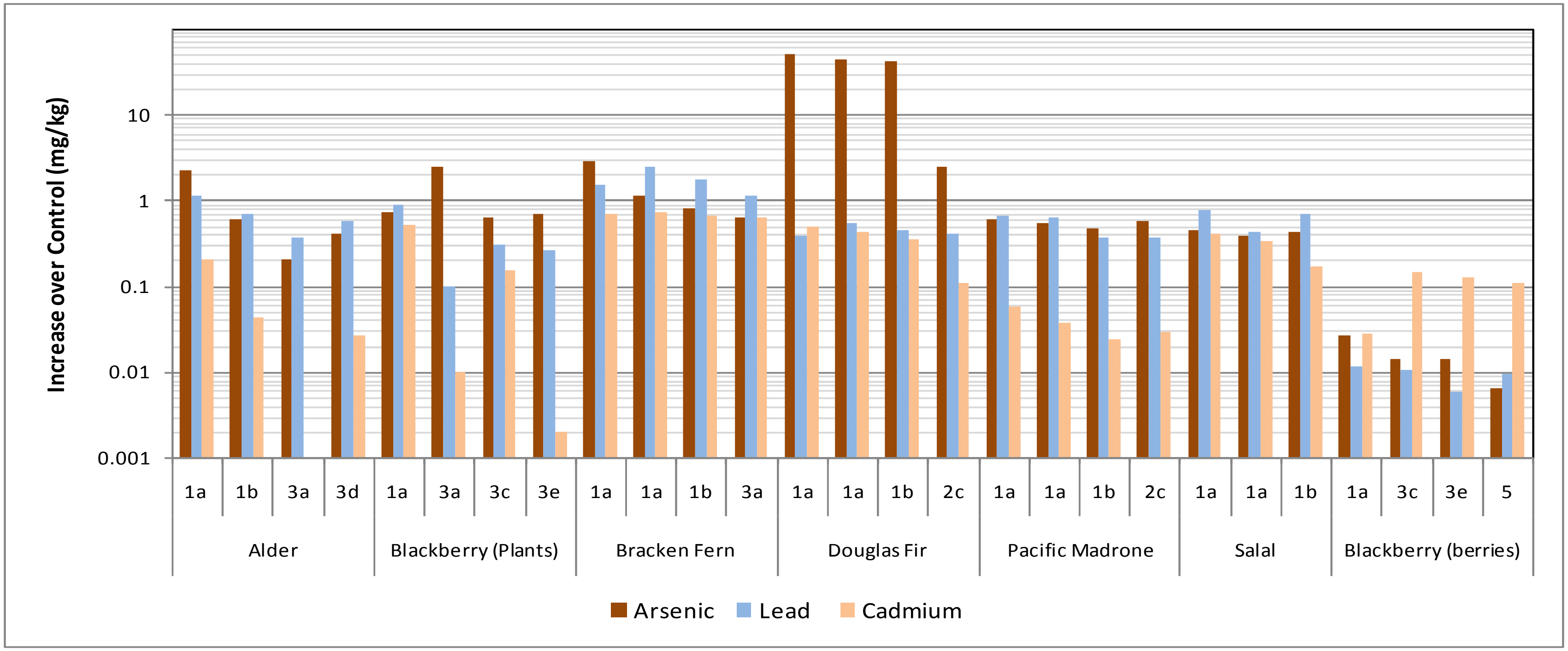


Figure 35
Comparison of Metals Concentrations
in Representative Plant Tissue Samples



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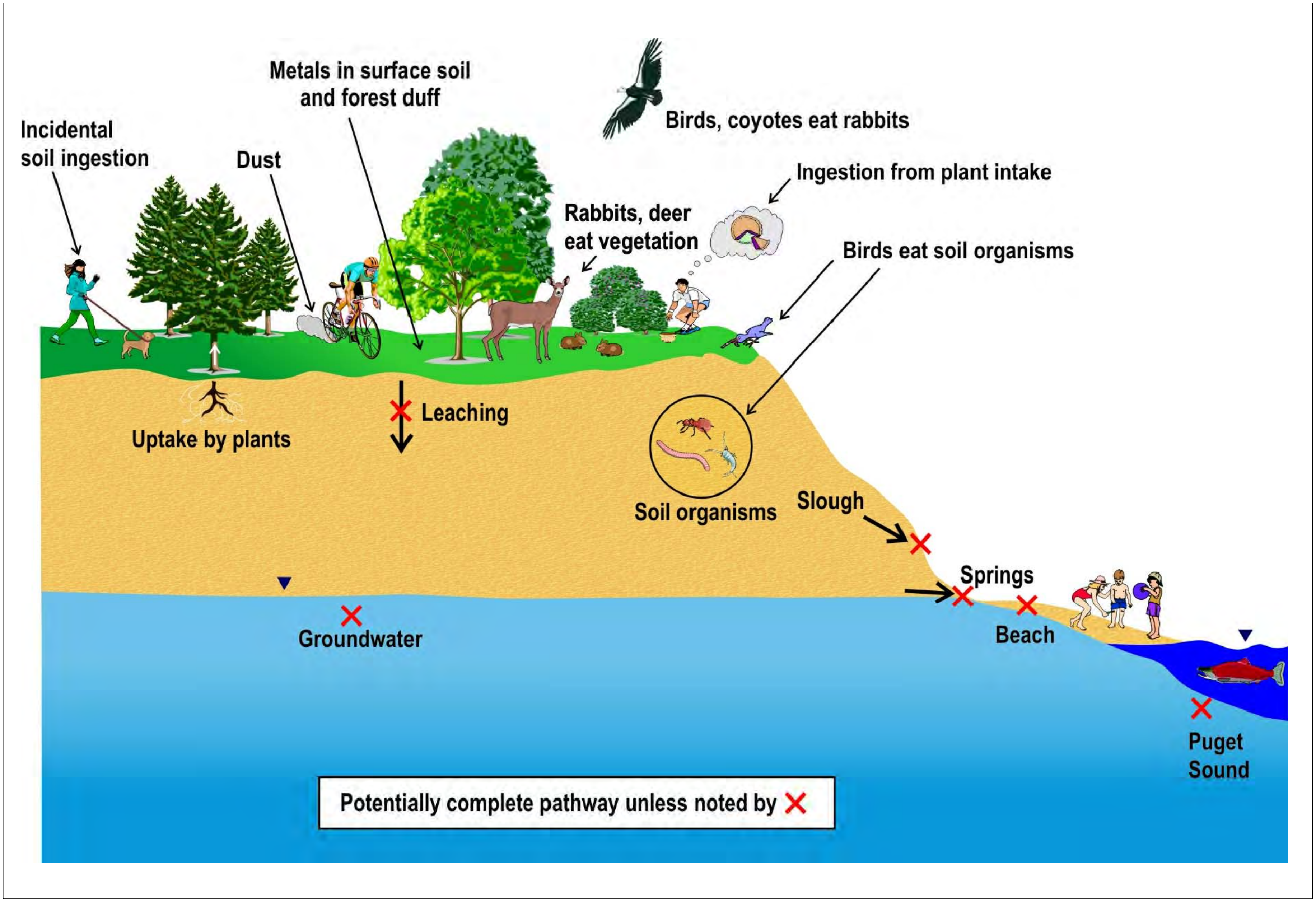
Maury Island Open Space Property RI
Maury Island, Washington

Figure 36
Increased Metals Concentrations in Plant Tissues Compared to Control Samples



MAURY ISLAND OPEN SPACE PROPERTY RI
MAURY ISLAND, WASHINGTON

Figure No. 37
Conceptual Site Exposure Model

Appendix A
Site Photographs

Photographs of
Maury Island Open Space Property
Maury Island, WA

Photograph No. 1

Description:
View of the Unit 2a from the beach. Remnant of mining conveyor structures and the road down to the beach shown.

Photograph No. 2

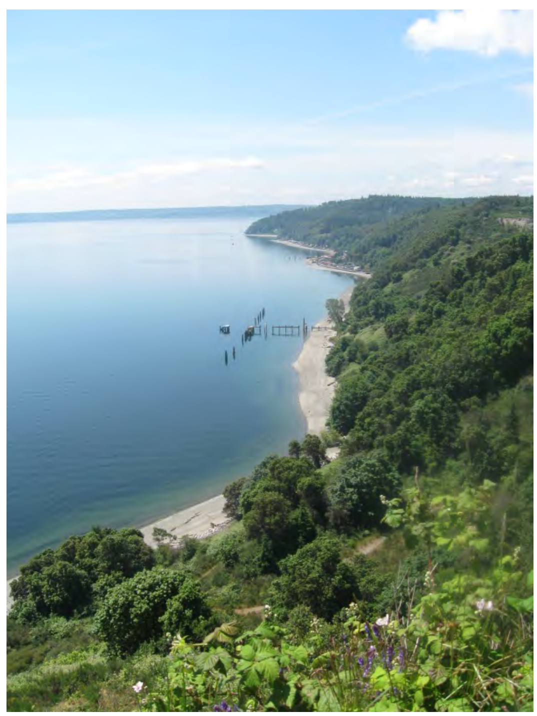
Description:
Partially reconstructed dock at the base of the Southern Pit.

Photograph No. 3

Description:
Looking across Unit 2b. Scot's broom and grasses beginning to encroach into this mined area.

Photograph No. 4

Description:
View of bluffs from Unit 3c.



Photograph No. 5

Description:
View of bluff from the beach.

Photograph No. 6

Description:
The trail (formerly a road) on Unit 4c now becoming overgrown with Scot's broom, blackberries, and poison oak.

Photograph No. 7

Description:
Using a backhoe to clear away blackberries in order to access and excavate test pit TP1

Photograph No. 8

Description:
XRF used to measure arsenic and lead concentrations in forest duff and soil. Bucket auger and hand trowel used for soil sample collection.

Photograph No. 9

Description:
Obtaining a sample in an area with dense underbrush.

Photograph No. 10

Description:
Obtaining a sample in a densely forested area.

Photograph No. 11

Description:
Backpack GPS used to locate and log sample locations.

Photograph No. 12

Description:
Collecting a sample on the graded road.

Photograph No. 13

Description:
Collecting a sample off the very steep hillside in Unit 2c.

Photograph No. 14

Description:
Test Pit TP8. Till evident at 2 ft bgs.

Photograph No. 15

Description:
Test Pit TP9. Glacial Till underlying outwash.

Photograph No. 16

Description:
Test Pit TP13. Concrete slabs uncovered.

Photograph No. 17

Description:
Test Pit TP13. Piece of wire found.

Photograph No. 18

Description: Location of sample "Slough #1."

Photograph No. 19

Description:
Location of sample "Slough #2."

Photograph No. 20

Description: Location of sample "Slough #3."

Photograph No. 21

Description:
Location of sample “Slough #4.”

Photograph No. 22

Description:
Location of Sample “Bluff #1.”

Photograph No. 23

Description:
Location of Sample "Bluff #2."

Photograph No. 24

Description:
Location of Sample "Bluff #3."

Photograph No. 25

Description:
Location of Sample “Bluff #4.”

Photograph No. 26

Description:
Location of Sample “Bluff #5.”

Photograph No. 27

Description:
Location of Sample "Bluff #6."

Photograph No. 28

Description:
Spring A

Photograph No. 29

Description:
Spring B

Photograph No. 30

Description:
Spring D

Photograph No. 31

Description:
Spring E

Photograph No. 32

Description:
Spring F

Photographs of
Maury Island Open Space Property
Maury Island, WA

Photograph No. 33

Description:
Concrete pier remaining from the North Pit mine

Photograph No. 34

Description:
Remnant bulkhead from the early 1900s mining operations.

Photograph No. 35

Description:
Recent concrete slab bulkhead east of the current dock.

Photograph No. 36

Description:
Remnant approximately 200 foot long bulkhead, likely was constructed between the 1930s and 1970s, that is near the current dock.

Photograph No. 37

Description:
Remnant pilings near the old North Pit concrete pier.

Photograph No. 38

Description:
Cobble dominated beach east of the North Pit concrete pier.

Photograph No. 39

Description:
Sand and mud intertidal terrace.

Photograph No. 40

Description:
Pacific madrone/Douglas fir forest in Unit 1b showing understory of salal and sword fern.

Photograph No. 41

Description:
Douglas fir forest in Unit 1a showing understory of salal.

Photograph No. 42

Description:
Douglas fir forest in Unit 1b showing understory of evergreen huckleberry.

Photograph No. 43

Description:
Douglas fir snag in Unit 1b showing evidence of pileated woodpecker use.

Photograph No. 44

Description:
Mixed deciduous forest in Unit 5.

Photograph No. 45

Description:
Previously mined area in Unit 2a beginning to recolonize, primarily with invasive Scot's broom.

Photograph No. 46

Description:
Scot's broom scrub habitat in Unit 2b.

Photograph No. 47

Description:
Unit 2c showing early succession of Pacific madrone with Scot's broom scrub habitat.

Photograph No. 48

Description:
Himalayan blackberries in Unit 3c.

Photographs of
Maury Island Open Space Property
Maury Island, WA

Photograph No. 49

Description:
Scot’s broom in Unit 3c.

Photograph No. 50

Description:
Partially reconstructed dock.

Appendix B

Cleanup Unit History

Cleanup Unit History

Information Sources

In December 2010 CDM Smith (previously Camp Dresser and McKee Inc. [CDM]) completed a Phase I Environmental Site Assessment (ESA) for the Cleanup Unit, which included research of the Cleanup Unit's history. CDM Smith's research included the following information sources (CDM, 2010b).

- Topographic and land use maps for the years 1897 and 1898 (obtained from Washington State University's online digital library), 1994 (obtained from the USGS website), and a current topographic map with 100-foot contour intervals (obtained from the King County iMap system).
- Historical atlases circa 1880s-1900s and 1914 (obtained from the Kroll Map Company), 1925 (obtained from the Vashon-Maury Island Heritage Association), and 1936, circa 1940, circa 1958, and circa 1970 (obtained from the Puget Sound Regional Archives).
- Aerial photographs (stereo pairs and singles) from 1936 through 2009 obtained from Aero-Metric of Seattle, King County's iMap system, Ecology's online shoreline photo collection, the University of Washington library, and Washington Department of Transportation. In addition, aerial photographs previously obtained by Shannon & Wilson, Inc. were provided to CDM Smith by CalPortland.
- Historical tax records from 1937 through 1998 obtained from the Puget Sound Regional Archives.
- Memoirs of a long-time resident of Maury Island (Bill Rendall) written in 1948, obtained from the Vashon-Maury Island Heritage Association.
- King County Department of Development and Environmental Services (DDES) permit and inspection records.
- Interview with Mr. Mike Middling of CalPortland to gain additional knowledge of a former skeet range.

Chronologic Summary

The history of the Cleanup Unit as summarized from all of these information sources, is presented below. The Cleanup Unit is described with respect to the decision units described in Section 2 and shown on **Figure 4** in the remedial investigation report.

Pre-1900s: The earliest available record of the Cleanup Unit is a homestead map from the late 1880s to early 1900s, which indicates that portions of the land constituting the Cleanup Unit were claimed by George Edwards, F.M. Bobbins, George W. Trace, and J. F. Nichlerson. An 1897 land use classification map shows that most of Maury Island had been recently logged.

The first documented development of the Cleanup Unit was in the late 1800s, when George Edwards homesteaded in the northeast portion of the Cleanup Unit, according to the above referenced homestead map and memoirs. Mr. Edwards built a home at the top of the hill by having lumber rafted to the beach and hauled up the hillside by a windlass. The residence was completed, but the Edwards family left it in 1891. The 1897 land use map and 1898 topographic map indicate one structure on the Cleanup Unit, which appears to be the Edwards' residence, located in Unit 3c.

1900s - 1920s: In approximately 1902, former executives of Pioneer Sand and Gravel purchased the John Edwards claim and some adjoining properties for development of a sand and gravel pit, according to the memoirs. Sometime after 1902, the mining operation began in the North Pit (Unit 2c) and included large washing and storage bunkers and a deep water dock for shipping by barge and scow. The facility had a steam plant to power the mine's equipment as electricity was not available on the island at that time. The mine was reportedly referred to as the Pembroke Gravel Pit as it was owned by Pembroke Investment Co.

The memoirs note that the owners of the Pembroke Gravel Pit also began a dairy business on the level upland area of the Cleanup Unit (Unit 3c). Approximately 50 acres were cleared for raising hay and silage crops and for pasture. Barns, silos, and other farm buildings were constructed, as well as a residence for the superintendent. Other homes were built for employees of both the farm and the gravel pit. The farm was in operation from sometime after 1902 until sometime between 1917 and 1923.

The mining operation at the North Pit reached its peak in about 1917 and the pit operated 24 hours a day, seven days a week. At about that time, electricity became available; the mine and the farm were electrified and the steam plant was removed. In about 1923, Pioneer Sand and Gravel purchased the mine (the North Pit) and operated it for a short time after which the entire plant was dismantled and all of the buildings torn down. In summary, historical records indicate the North Pit was operated from sometime after 1902 until shortly after 1923.

1930s: Historical atlases indicate that by the mid-1930s the Cleanup Unit was owned by Heney Sand & Gravel Co. Patrick Heney had been a partner in the Pembroke Investment Co. Subsequent historical atlases and tax records indicate the Cleanup Unit was owned by Pioneer Sand and Gravel from 1936 until at least the early 1970s.

The 1936 aerial photograph shows that the North Pit may have been abandoned at that time as there is some vegetation in the pit and the ramp to the dock and the storage bunkers had been removed. The only remnants of the former mining equipment appear to be a concrete foundation and some pilings on the beach at the base of the North Pit; these features are also currently present at the Cleanup Unit. Substantial grading extended northward from the North Pit (through Unit 3b). The former farm area (Unit 3c) appears to be open pasture with several structures or foundations remaining visible.

On the 30 acres that is north of SW 206th Street (Unit 5), the southern portion had been cleared (apparently for pasture), and an area in the southwestern portion of Unit 5 appears to have been cleared and graded and had at least one structure. Based on interviews, CDM Smith learned that, beginning in the 1930s, this graded area had been utilized by the Raab family for skeet shooting, so the clearing is consistent with that use.

1940s - 1960s: The Cleanup Unit is not indicated to have been actively mined during the 1940s-1950s. The 1940 and 1958 Kroll maps indicate that the Main Access Road on the Cleanup Unit was actually a County Road, which extended from SW 206th Street southward to approximately the juncture of Units 3e/2b/1a, where it turned westward, becoming SW 268th Street. The road extended westward across the north side of the horse acreage parcels. The road is still faintly evident on the 1961 photograph.

By the early 1960s aerial photographs shows substantial forest regrowth had occurred across the general area. The graded area north of the North Pit (Unit 3b) had filled in with trees, and the pasture areas around the former farmstead (Unit 3c) had become overgrown (apparently by blackberries as it is presently). Below the former farmstead, an area of the north bluff (Unit 4c) appeared to have been cleared.

Mining in the Southern Pit began sometime between 1965 and 1969 according to aerial photographs. By 1969, the dock was present with a conveyor extending from the mine to the dock and the footprint of the Southern Pit was similar to what it is presently. Two roads led to the Southern Pit: the "Main Access Road" from the north (as at the present time) and the "North Slope Access Road", which entered from the northeast corner of the Cleanup Unit, followed the topography around the former North Pit, and continued along the bluff close to the beach all the way to the Southern Pit. SW 268th Street was also evident in the 1969 photograph. The south and west edges of the Southern Pit (Units 3e and part of Unit 3d) appear to have been scraped and graded with some of the material apparently having been mined.

At Unit 5, the shed that is associated with the skeet shooting range is apparent in the 1960s photographs.

1970s: During the 1970s, mining activity at the Southern Pit varied. Tax records indicate a new dock was constructed in 1972 and aerial photographs indicate the mine was still active in 1974. An additional conveyor structure had been extended into the center of the mine pit and an additional access road extended from the northeastern corner of the Cleanup Unit, through Unit 3a, and joined the Main Access Road. Some of the area northeast of the mine (Unit 3a) was cleared at that time. By 1976, vegetation growing in the central area of the mine suggested that mining activity had slowed. A 1978 aerial photograph shows resumed mining activity particularly at the northern and western sides of the Southern Pit. Some small objects and piles are visible in the 1977 shoreline photo and a 1978 air photo in the approximate area where demolition debris was discovered during the RI activities (Unit 3e).

While most non-mined areas of the Cleanup Unit were reforested by the 1970s, areas in the northeast portion of the Cleanup Unit (Units 2c, 3c, 4b, and 4c) remained primarily scrubby (i.e., blackberries and/or scotch broom). This is similar to the vegetation pattern currently observed at the Cleanup Unit.

1980s – 1990s: By 1980, mining at the Southern Pit appears to have resumed as the central area of the pit was free of vegetation. In addition, an area northeast of the mine (Unit 3a) had been partially cleared of trees and additional grading occurred just below that area on the middle bluff (Unit 4b) to repair a slide that had occurred on the bluff. By 1982, mining of the central portion of the Southern Pit ceased and the area was revegetating. Mining activity continued primarily on the southern and western sides of the pit (Units 2b and 3e) through the 1990s with some material removed from the northern portion of the pit (Unit 2a) in the late 1990s.

The skeet shooting range area on Unit 5 was becoming overgrown by the mid-1980s, consistent with our understanding that the range use ceased by about 1985. The northwest portion of Unit 5 was logged in the late 1980s.

2000s: Aerial photographs from 2000 through 2009 show that the Cleanup Unit features remained similar to those observed in the late 1990s and similar to present conditions. Vegetative growth thickened in the central area of the Southern Pit, and mining appeared limited mainly to the southern side of the pit (Unit 2b) with some recent mining in the northern end of the pit (Unit 2a).

Conclusions of Historical Operations

Research of the Cleanup Unit history suggests that, with one exception, there have been no past anthropogenic activities that have resulted in recognized environmental conditions (RECs) beyond that of the impacts by the Tacoma Smelter Plume, including RECs commonly associated with gravel mine sites such as fuel storage or settling ponds. The exception is the former private skeet shooting range on the portion of the Cleanup Unit that lies north of SW 260th Street, which represents an additional potential source of lead contamination area from spent ammunition.

The basis of our conclusions is summarized below.

Throughout the historical period researched, the only structures ever observed on the Cleanup Unit, besides the residence/farm related structures in Unit 3c, have been small temporary or portable structures in vicinity of the Southern Pit. There has never been any evidence of above ground or underground fuel storage for mine-related equipment. CalPortland personnel have similarly reported no knowledge of such on-Cleanup Unit fuel storage.

None of the historical information sources reviewed suggest settling ponds were ever constructed for the Southern pit. A 1973 DDES inspection record cited potential concerns regarding land clearing in the western portion of the Cleanup Unit that may impact a "drainage ravine" if mining were expanded to that area. The inspector suggested settling ponds may be sufficient to address this concern in the event of future increased activity in that area. The 1974 air photo does show temporary roads that extend west of the pit, but the southern pit was never extended into that area and said settling ponds were never constructed. The referenced drainage ravine appeared to be more of a topographic feature than for conveying surface water runoff to any significant degree.

The historical information summarized above indicates gravel washing occurred in the North Pit, which suggests settling ponds may have been utilized at Unit 2c. However, based on anecdotal information that turbidity caused by the multiple operational gravel mines on Maury Island reached all the way to Tacoma, it is not likely that settling ponds were used at the North Pit.

Aerial photographs reviewed did indicate the possible presence of imported fill in one portion of the Cleanup Unit (3e).

Appendix C

Logs of Existing Observation Wells

WATER WELL REPORT

State of Washington

ENTERED

~~File~~ No. S.C. R 27643

Unique Well Tag No. AEJ 915

Water Right Permit No. 22-3E-28E

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

1) OWNER:
Name: AESI % Jill Wheeler Complete Address: 911 5th Ave Suite 100 Kirkland Wa 98033

2) LOCATION OF WELL: County King SW 1/4 NW 1/4 Sec 28 T 22 N R 3E WM

2a) STREET ADDRESS OF WELL (if known) Maury Island Pit (Lonestar)

3) PROPOSED USE: ☐ Domestic ☐ Test Well ☐ Industrial
resource Protection ☐ DeWater ☐ Irrigation ☒ Other ☐ Municipal

4) TYPE OF WORK: Owner's number of well (if more than one) OWW-[illegible]7
☐ Decommission ☒ New well ☐ Deepened ☐ Reconditioned
METHOD: ☐ Dug ☐ Bored ☐ Cable ☐ Driven ☒ Rotary ☐ Jetted

5) DIMENSIONS: Diameter of well 6 inches.
Drilled 300 feet. Depth of completed well 295 feet.

6) CONSTRUCTION DETAILS:
☒ Casing Installed 6 " Diam. from +2 ft. to 292 ft.
☐ Liner Installed ______ " Diam. from ______ ft. to ______ ft.

Perforations ☐ Yes ☒ No
Type of perforator used ______

Screens: ☒ Yes ☐ No
Manufacturer's name Johnson
Type Stainless Model No. ______
Diam 6 Slot size 6 from 290 ft. to 295 ft.
Diam ______ Slot size ______ from ______ ft. to ______ ft.

Gravel packed: ☐ Yes ☒ No
Gravel placed from ______ ft. to ______ ft.

Surface seal: ☒ Yes ☐ No To what depth? 18 ft.
Material used in seal Bentonite
Did any strata contain unusable water? ☐ Yes ☒ No
Type of water? ______ Depth of strata ______
Method of sealing strata off ______

7) WATER LEVELS: Land surface elevation above mean sea level ______ ft.
Static level 263 ft. below top of well Date 2-17-99
Artesian pressure ______ lbs. per square inch Date ______
Artesian water is controlled by ______ (cap, valve, etc.)

8) WELL TESTS: Was a pump test made? ☒ Yes ☐ No
Yield: 2 gal./min. with 28 ft. drawdown after 1 hrs.
Bailer test ______ gal./min. with ______ ft. drawdown after ______ hrs.
Airtest ______ gal./min. with stem set at ______ ft. for ______ hrs.
Artesian flow ______ g.p.m. Date ______
Temperature of water ______ Was a chemical analysis made? ☐ No ☐ Yes

10) WELL LOG OR DECOMMISSION PROCEDURE DESCRIPTION

Formation: Described by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. Clearly note water bearing zones and hydraulic characteristics

MATERIAL	From	To
Fill	0	1
Brown silty clay & gravel	1	10
Brown gravel & sand	10	76
Brown course sand & gravel	76	105
Brown med sand	105	180
Brown fine silty sand	180	185
Brown fine sand & silt layered	185	205
Brown fine sand	205	260
Brown fine sand & water	260	

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DRILLER'S COMMENTS (WORK STARTED): 2-1-99 / 2-17-99
Start to finish time laps due to Geo physics testing.

Cut casing 295' back filled w/ 3/8 chips from 298' to 295

WELL CONSTRUCTION CERTIFICATION:
I constructed/supervised and accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are tue to my best knowledge and belief.

(Please print or type)
DRILLING COMPANY Aquatech Well Drilling + pump Inc.
Address 2722 Butler Cr Rd Sedro Woolley
WELL DRILLER NAME Brannon Hopke License No. 1825
SIGNATURE [signature]
TRAINEE NAME & LICENSE # ______
Contractor's Registration No. AQUATWD040K4 Date 2-19-99, 19

Decommission: ☐ Perforated Casing ☐ Removed Casing
Amount of sealant used ______
Type of sealant used (Attach add'l sheet if necessary) ______

WATER WELL REPORT

State of Washington

ENTERED

Start No. S.C. R 27644

Unique Well Tag No. AEI 918

Water Right Permit No. 22-3E-28E

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

1) OWNER: Name: AESI % Jill Wheeler Complete Address: 911 5th Ave Suite 100 Kirkland Wa. 98033

2) LOCATION OF WELL: County King SW 1/4 NW 1/4 Sec 28 T 22 N R 3E WM

2a) STREET ADDRESS OF WELL (if known) Maury Island pit (Lonestar)

3) PROPOSED USE: ☐ Domestic ☐ Test Well ☐ Industrial resource protection ☐ DeWater ☐ Irrigation ☒ Other ☐ Municipal

4) TYPE OF WORK: Owner's number of well (if more than one) OBW-8

☐ Decommission ☒ New well ☐ Deepened ☐ Reconditioned

METHOD: ☐ Dug ☐ Bored ☐ Cable ☐ Driven ☒ Rotary ☐ Jetted

5) DIMENSIONS: Diameter of well 6 inches.

Drilled 100 feet. Depth of completed well 98 feet.

6) CONSTRUCTION DETAILS:

☒ Casing Installed 6 " Diam. from +2 ft. to 94 ft.

☐ Liner Installed ____ " Diam. from ____ ft. to ____ ft.

Perforations: ☐ Yes ☒ No

Type of perforator used ____

Screens ☒ Yes ☐ No

Manufacturer's name Johnson

Type Stainless Model No. ____

Diam. 6 Slot size .06 from 93 ft. to 98 ft.

Diam. ____ Slot size ____ from ____ ft. to ____ ft.

Gravel packed: ☐ Yes ☒ No

Gravel placed from ____ ft. to ____ ft.

Surface seal ☒ Yes ☐ No To what depth? 18 ft.

Material used in seal Bentonite

Did any strata contain unusable water? ☐ Yes ☒ No

Type of water? ____ Depth of strata ____

Method of sealing strata off ____

7) WATER LEVELS: Land surface elevation above mean sea level ____ ft.

Static level 67 ft. below top of well Date 2-4-99

Artesian pressure ____ lbs. per square inch Date ____

Artesian water is controlled by ____ (cap, valve, etc.)

8) WELL TESTS: Was a pump test made? ☒ Yes ☐ No

Yield ____ gal./min. with ____ ft. drawdown after ____ hrs.

Bailer test 10 gal./min. with 15 ft. drawdown after 1 hrs.

Airtest ____ gal./min. with stem set at ____ ft. for ____ hrs.

Artesian flow ____ g.p.m. Date ____

Temperature of water ____ Was a chemical analysis made? ☒ No ☐ Yes

WELL CONSTRUCTION CERTIFICATION:

I constructed/supervised and accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are tue to my best knowledge and belief.

(Please print or type)

DRILLING COMPANY Aquatech Well Drilling & pumps Inc.

Address 2722 Butler Cr Rd Sedro Woolley Wa

WELL DRILLER NAME Brannon Hophe License No. 1825

SIGNATURE [signature]

TRAINEE NAME & LICENSE # ____

Contractor's Registration No. AQUATWD040K4 Date 2-19-99, 19__

10) WELL LOG OR DECOMMISSION PROCEDURE DESCRIPTION

Formation: Described by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. Clearly note water bearing zones and hydraulic characteristics.

MATERIAL	From	To
Fill	0	1
Brown gravel, sand & silt	1	10
Brown med to carse sand	10	65
Brown med sand & water	65	90
Brown fine sand & water	90	

RECEIVED

FEB 22 1999

DEPT OF ECOLOGY

DRILLER'S COMMENTS (WORK STARTED): 2-3 / 2-4-99

Decommission: ☐ Perforated Casing ☐ Removed Casing

Amount of sealant used ____

Type of sealant used (Attach add'l sheet if necessary) ____

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File Original and First Copy with Department of Ecology
Second Copy - Owner's Copy
Third Copy - Driller's copy

ECY 050-1-20 (11/97)

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

289526

WATER WELL REPORT

State of Washington

ENTERED

Tag No. R 27647

Unique Well Tag No. AEI 916

Water Right Permit No. 22-3E-29R

1) OWNER: Name: AESI % Jill Wheeler Complete Address: 911 5th Ave Suite 100 Kirkland wa 98033

2) LOCATION OF WELL: County King SE 1/4 SE 1/4 Sec 29 T 22 N R 3E WM

2a) STREET ADDRESS OF WELL (if known) Maury Island pit (Lonestar)

3) PROPOSED USE: ☐ Domestic ☐ Test Well ☐ Industrial ☐ Irrigation ☒ Other ☐ Municipal monitoring ☐ DeWater

4) TYPE OF WORK: Owner's number of well (if more than one) OBW-5

☐ Decommission ☒ New well ☐ Deepened ☐ Reconditioned

METHOD: ☐ Dug ☐ Bored ☐ Cable ☐ Driven ☒ Rotary ☐ Jetted

5) DIMENSIONS: Diameter of well 6 inches. Drilled 260 feet. Depth of completed well 228 feet.

6) CONSTRUCTION DETAILS:

☒ Casing installed 6 " Diam. from +2 ft. to 223 ft.

☐ Liner installed ___ " Diam. from ___ ft. to ___ ft.

Perforations: ☐ Yes ☒ No

Type of perforator used ___

Screens: ☒ Yes ☐ No

Manufacturer's name Johnson

Type Stainless Model No ___

Diam. 6 Slot size .04 from 223 ft. to 228 ft.

Diam. ___ Slot size ___ from ___ ft. to ___ ft.

Gravel packed: ☐ Yes ☒ No

Gravel placed from ___ ft. to ___ ft.

Surface seal: ☒ Yes ☐ No To what depth? 18 ft.

Material used in seal Bentonite

Did any strata contain unusable water? ☐ Yes ☒ No

Type of water? ___ Depth of strata ___

Method of sealing strata off ___

7) WATER LEVELS: Land surface elevation above mean sea level ___ ft.

Static level 181 ft. below top of well Date 2-16-99

Artesian pressure ___ lbs. per square inch Date ___

Artesian water is controlled by ___ (cap, valve, etc.)

8) WELL TESTS: Was a pump test made? ☒ Yes ☐ No

Yield: ___ gal./min. with ___ ft. drawdown after ___ hrs.

Bailer test 2 gal./min with 35 ft. drawdown after 1 hrs.

Airtest ___ gal./min with stem set at ___ ft. for ___ hrs.

Artesian flow ___ g.p.m. Date ___

Temperature of water ___ Was a chemical analysis made? ☒ No ☐ Yes

10) WELL LOG OR DECOMMISSION PROCEDURE DESCRIPTION

Formation: Described by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. Clearly note water bearing zones and hydraulic characteristics

MATERIAL	From	To
Fill	0	1
Topsoil	1	3
Brown silty clay	3	10
Brown sand, gravel & silt	10	46
Brown med sand & silt	46	110
Brown med to fine sand	110	170
Brown fine sand	170	207
Brown fine sand seepage	207	230
Brown silt & sand layered	230	235
Gray fine sand & water	235	240
Brown fine sand & water	240	

RECEIVED
FEB 22 1999
DEPT OF ECOLOGY

DRILLER'S COMMENTS (WORK STARTED): 1-25-99 / 2-16-99

Start and Finish time laps due to Geo. physics testing.

Cut casing at 230', backfilled w/ 3/8 chips to 229' from 260'

Decommission: ☐ Perforated Casing ☐ Removed Casing

Amount of sealant used ___

Type of sealant used (Attach add'l sheet if necessary) ___

WELL CONSTRUCTION CERTIFICATION: I constructed/supervised and accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

(Please print or type)

DRILLING COMPANY Aquatech Well Drilling & Pumps Inc

Address 2722 Butler Cr Rd Sedro Woolley Wa

WELL DRILLER NAME Brannon Hopke License No. 1825

SIGNATURE B. H.

TRAINEE NAME & LICENSE # ___

Contractor's Registration No. AQUATWD040K4 Date 2-19-99, 19__

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File Original and First Copy with Department of Ecology
Second Copy - Owner's Copy
Third Copy - Driller's copy

ECY 050-1-20 (11/97)

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

WATER WELL REPORT

289524

State of Washington

ENTERED

~~Notice~~ No. S.C. R 27647

Unique Well Tag No. AEI 919

Water Right Permit No. 22-3E-28E

1) OWNER: Name: AESI c/o Jill Wheeler Complete Address: 911 5th Ave Suite 100 Kirkland Wa 98033

2) LOCATION OF WELL: County King SW 1/4 NW 1/4 Sec 28 T 22 N R 3E WM

2a) STREET ADDRESS OF WELL (if known) Maury Island pit (Lonestar)

3) PROPOSED USE: ☐ Domestic ☐ Test Well ☐ Industrial ☐ DeWater ☐ Irrigation ☒ Other resource protection ☐ Municipal

4) TYPE OF WORK: Owner's number of well (if more than one) OBW-9

☐ Decommission ☒ New well ☐ Deepened ☐ Reconditioned

METHOD: ☐ Dug ☐ Bored ☐ Cable ☐ Driven ☒ Rotary ☐ Jetted

5) DIMENSIONS: Diameter of well 6 inches.

Drilled 60 feet. Depth of completed well 42 feet.

6) CONSTRUCTION DETAILS:

☒ Casing Installed 6 " Diam. from +2 ft. to 38 ft.

☐ Liner Installed ______ " Diam. from ______ ft. to ______ ft.

Perforations: ☐ Yes ☒ No

Type of perforator used ______

Screens: ☒ Yes ☐ No

Manufacturer's name Johnston

Type Stainless Model No. ______

Diam. 6 Slot size .06 from 37 ft. to 42 ft.

Diam. ______ Slot size ______ from ______ ft. to ______ ft.

Gravel packed: ☐ Yes ☒ No

Gravel placed from ______ ft. to ______ ft.

Surface seal: ☒ Yes ☐ No To what depth? 18 ft.

Material used in seal Bentonite

Did any strata contain unusable water? ☐ Yes ☒ No

Type of water? ______ Depth of strata ______

Method of sealing strata off ______

7) WATER LEVELS: Land surface elevation above mean sea level ______ ft.

Static level 26 ft. below top of well Date 2-5-99

Artesian pressure ______ lbs. per square inch Date ______

Artesian water is controlled by ______ (cap, valve, etc.)

8) WELL TESTS: Was a pump test made? ☐ Yes ☐ No

Yield: 10 gal./min. with 12 ft. drawdown after 1 hrs.

Bailer test ______ gal./min. with ______ ft. drawdown after ______ hrs.

Airtest ______ gal./min. with stem set at ______ ft. for ______ hrs.

Artesian flow ______ g.p.m. Date ______

Temperature of water ______ Was a chemical analysis made? ☐ No ☒ Yes

10) WELL LOG OR DECOMMISSION PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. Clearly note water bearing zones and hydraulic characteristics

MATERIAL	From	To
Fill	0	3
Brown clay gravel & sand	3	12
Brown sand, gravel	12	20
Brown med sand	20	24
Brown sand & water	24	26
Brown sand wood (log) water	26	28
Brown sand - fine - water	28	50
Gray silt layer	50	51
Gray sand & water	51	

RECEIVED

FEB 22 1999

DEPT OF ECOLOGY

DRILLER'S COMMENTS (WORK STARTED): 2-4 /2-5-99

Decommission: ☐ Perforated Casing ☐ Removed Casing

Amount of sealant used ______

Type of sealant used (Attach add'l sheet if necessary) ______

WELL CONSTRUCTION CERTIFICATION:

I constructed/supervised and accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

(Please print or type)

DRILLING COMPANY Aquatech Well Drilling & Pumps Inc

Address 2722 Butler Cr Rd Sedro Woolley Wa

WELL DRILLER NAME Brennan Hoppe License No. 1825

SIGNATURE Br W

TRAINEE NAME & LICENSE # ______

Contractor's Registration No. AQUATWD040K4 Date 2-19-99, 19__

Ecology is an Equal Opportunity and Affirmative Action employer. For special accomodation needs, contact the Water Resources Program at (360) 407-6600. The TDD number is (360) 407-6006

File Original and First Copy with Department of Ecology
Second Copy - Owner's Copy
Third Copy - Driller's copy

ECY 050-1-20 (11/97)

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

WATER WELL REPORT

289525

State of Washington

ENTERED

File No. S.C. R 27647
Unique Well Tag No. AEJ 917
Water Right Permit No. 22-3E-29B

1) OWNER: Name: AESI % Jill Wheeler Complete Address: 911 5th Ave Suite 100 Kirkland wa 98033

2) LOCATION OF WELL: County King NW 1/4 NE 1/4 Sec 29 T 22 N R 3E WM

2a) STREET ADDRESS OF WELL (if known) Maury Island pit (Lonestar)

3) PROPOSED USE: [ ] Domestic [ ] Test Well [ ] Industrial recorce protector [ ] DeWater [ ] Irrigation [X] Other [ ] Municipal

4) TYPE OF WORK: Owner's number of well (if more than one) OBW-6

[ ] Decommission [X] New well [ ] Deepened [ ] Reconditioned

METHOD: [ ] Dug [ ] Bored [ ] Cable [ ] Driven [X] Rotary [ ] Jetted

5) DIMENSIONS: Diameter of well 6 inches. Drilled 240 feet. Depth of completed well 238 feet.

6) CONSTRUCTION DETAILS:

[X] Casing Installed 6 " Diam. from +2 ft. to 238 ft.

[ ] Liner Installed ____ " Diam. from ____ ft. to ____ ft.

Perforations: [ ] Yes [X] No

Type of perforator used ____

Screens: [X] Yes [ ] No

Manufacturer's name Johnson

Type Stainless Model No. ____

Diam. 6 Slot size 60 from 233 ft. to 238 ft.

Diam. ____ Slot size ____ from ____ ft. to ____ ft.

Gravel packed. [ ] Yes [X] No

Gravel placed from ____ ft. to ____ ft.

Surface seal: [X] Yes [ ] No To what depth? 18 ft.

Material used in seal Bentonite

Did any strata contain unusable water? [ ] Yes [X] No

Type of water? ____ Depth of strata ____

Method of sealing strata off ____

7) WATER LEVELS: Land surface elevation above mean sea level ____ ft.

Static level 218.6 ft. below top of well Date 2-12-99

Artesian pressure ____ lbs. per square inch Date ____

Artesian water is controlled by ____ (cap, valve, etc.)

8) WELL TESTS: Was a pump test made? [X] Yes [ ] No

Yield: 3.5 gal./min. with 15 ft. drawdown after 1 hrs.

Bailer test ____ gal./min. with ____ ft. drawdown after ____ hrs.

Airtest ____ gal./min. with stem set at ____ ft. for ____ hrs.

Artesian flow ____ g.p.m. Date ____

Temperature of water ____ Was a chemical analysis made? [X] No [ ] Yes

10) WELL LOG OR DECOMMISSION PROCEDURE DESCRIPTION

Formation: Described by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. Clearly note water bearing zones and hydraulic characteristics

MATERIAL	From	To
Topsoil	0	2
Brown silty clay	2	7
Brown gravel, sand silt	7	20
Brown med to corse sand, gravel	20	50
Brown fine sand	50	70
Brown course sand & gravel	70	76
Brown med sand	76	130
Brown course sand & gravel	130	138
Brown fine sand	138	150
Brown corse sand & gravel	150	159
Brown fine sand	159	220
Brown fine sand & water	220	

RECEIVED
FEB 22 1999
DEPT OF ECOLOGY

DRILLER'S COMMENTS (WORK STARTED): 1-28 / 2-12-99

Start to finish time laps due to Geo physics testing.

WELL CONSTRUCTION CERTIFICATION:

I constructed/supervised and accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

(Please print or type)

DRILLING COMPANY Aquatech Well Drilling & Pumps Inc

Address 2722 Butler Cr Rd Sedro Woolley Wa

WELL DRILLER NAME Brannon Hopke License No. 1825

SIGNATURE B H

TRAINEE NAME & LICENSE # ____

Contractor's Registration No. AQUATWD040KY Date 2-19-99, 19__

Decommission: [ ] Perforated Casing [ ] Removed Casing

Amount of sealant used ____

Type of sealant used (Attach add'l sheet if necessary) ____

Ecology is an Equal Opportunity and Affirmative Action employer. For special accomodation needs, contact the Water Resources Program at (360) 407-6600. The TDD number is (360) 407-6006.

File Original and First Copy with Department of Ecology
Second Copy - Owner's Copy
Third Copy - Driller's copy

ECY 050-1-20 (11/97)

Appendix D

Wetland Delineation

Maury Island Site
Wetland Delineation Study

August 2013

King County

Department of Natural Resources and Parks

Parks and Recreation Division
Resources Section
201 S. Jackson Street, Suite 700
Seattle, WA 98104

Wetland Delineation Study
For Maury Island Site

Prepared by Tina Miller, Senior Ecologist, King County Parks
August 2, 2013

Introduction

This wetland delineation report was completed as part of the Supplemental Remedial Investigation (RI) Work Plan at the King County Maury Island Open Space property. This work is being completed under Agreed Order No. DE 8439 with the Washington State Department of Ecology (Ecology) dated January 31, 2013, which requires King County to complete an RI, feasibility study (FS), and draft cleanup action plan(DCAP) for the area.

King County Parks acquired the Maury Island Open Space in 2010. Maury Island lies within the fallout area from the former ASARCO smelter in Ruston, Washington. It's been found that soils within the fallout area are impacted by arsenic, lead, and cadmium. This wetland study was completed on the 30 acre L-shaped parcel north of SW 260th Street where a former private skeet range was active between the 1930's to 1980's that is likely to have deposited additional lead.

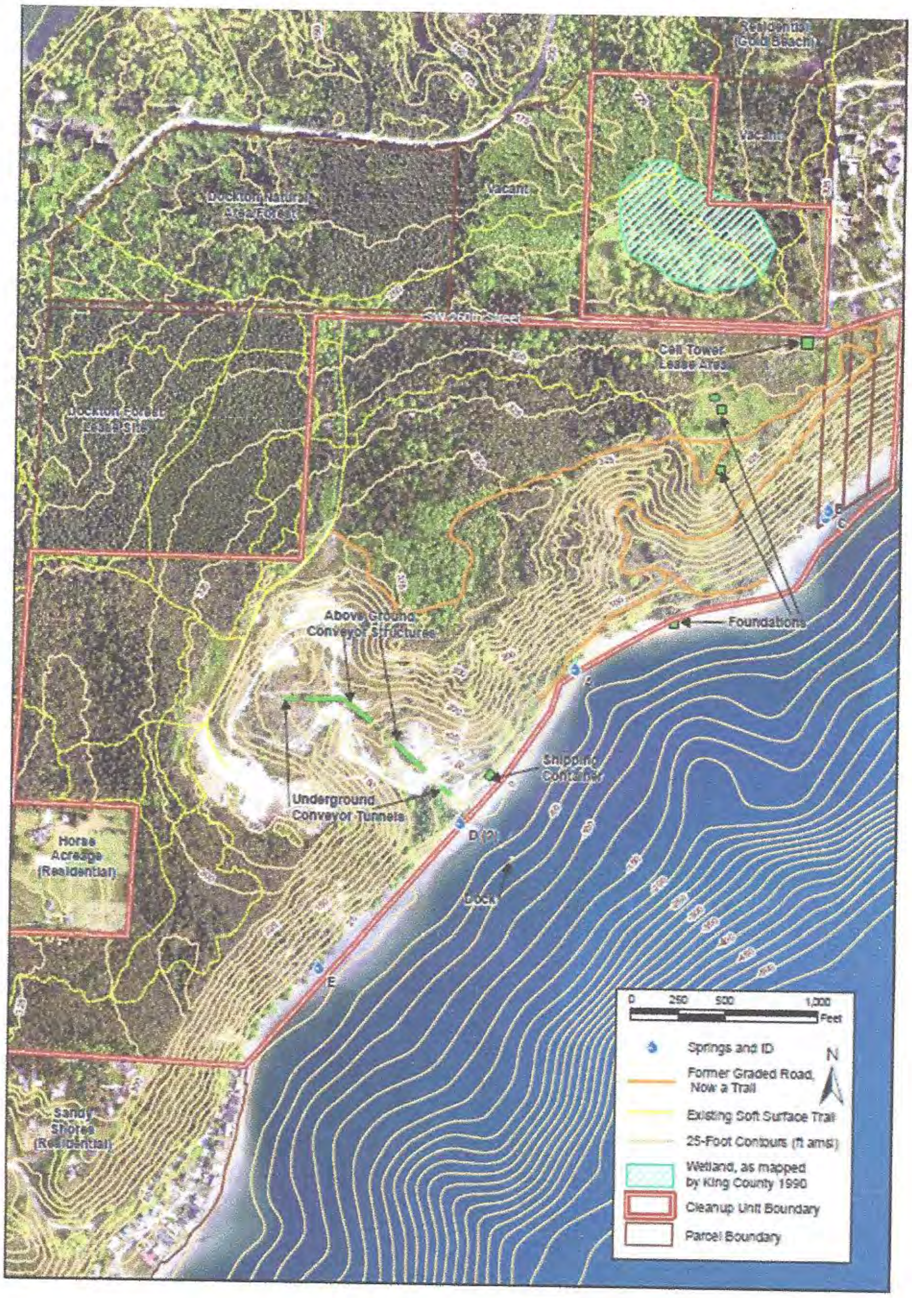
The 30 acre parcel is part of a 241 acre tax parcel #2822039023, the portion located on the north side of SW 260th Street, whereas the remaining approximately 210 acres is located on the south side of SW 260th Street. The site is located in Section 28, Township 22 North, Range 3 East, Willamette Meridian. The Property location is shown on **Figure 1**.

The site was visited on May 22, 2013 to conduct a wetland rating and delineation of the wetlands on this 30 acre site. This report includes the findings of the field work, wetland determination data forms, wetland rating forms, and presents the wetland boundary location based on GPS data points.

Methods

This 2013 wetland study was completed using methodology from the Corps Wetlands Delineation Manual, Technical Report Y-87-1 and the 2010 USACE Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0) and Western Washington Wetland Rating System (Washington Department of Ecology, 2004, version 2) (Hruby, 2004). Field observations, hydraulic study and aerial photos from King County's GIS website (iMap) were used to identify and rate the wetlands. Wetland boundaries were determined on the basis of an examination of vegetation, soils, and hydrology. Areas meeting the criteria set forth in the Manual were determined to be wetland. Soil, vegetation, and hydrologic data were collected at 4 locations. The delineated wetland boundaries and data plot locations were flagged and surveyed on May 22, 2013 using GPS.

Figure 1 – Maury Island Site Location Map, with NWI wetland location



Vicinity Description

The site is located on Maury Island, just south of Vashon Island but connected by an isthmus. A majority of the 250+ acre Maury Island Open Space was used as a sand and gravel quarry operation, which is located south of the SW 260th Street. This report deals with the area north of SW 260th Street. This 30 acre parcel was used as a private skeet range, where the native vegetation was removed over a portion of the site. Most of the skeet area has been recolonized by Himalayan blackberry (*Rubus armeniacus*).

The uplands forested portion of this 30-acre site is dominated by a mixed forest plant community. Observed species included mature second growth Douglas fir (*Pseudotsuga menziesii*), Western hemlock (*Tsuga heterophylla*), Western red cedar (*Thuja plicata*), big leaf maple (*Acer macrophyllum*), red alder (*Alnus rubra*), cascara (*Rhamnus purshiana*), and black cottonwood. The understory included vine maple (*Acer circinatum*), Oregon grape (*Berberis nervosa*), hazelnut (*Corylus cornuta*), salal (*Gaultheria shallon*), holly (*Ilex* spp.), Indian plum (*Oemleria cerasiformis*), Himalayan blackberry, Pacific blackberry (*Rubus ursinus*), sword fern (*Polystichum munitum*), bracken fern (*Pteridium aquilium*), bleeding heart (*Dicentra formosa*), geranium (*Geranium* spp.), Canadian thistle (*Cirsium arvensis)*, candy flower *(Claytonia sibirica)*, foamflower (*Tiarella trifoliata*), and stinging nettle (*Urtica dioica*).

The wetlands are dominated by Black cottonwood *(Populus trichocarpa*) and red alder, with a pocket of birch (*Betula sp.)* near the southwest corner. Most of the understory vegetation is dominated by hardhack (*Spiraea douglasii)* or willows (*Salix sp.)*. More details regarding the wetland vegetation is found in the wetlands section below.

NRCS Soil Survey

The NRCS soil survey has classified the area as moderately well drained Everett gravelly sandy loam (1hmt3) and Everett-Alderwood gravelly sandy loam (1hmt5) (See **Figure 2**). There were no hydric soils mapped by NRCS. For the most part the soil observations in the field were consistent with the NRCS classification. Soils in the upland portions of the site were a dry, gravelly sandy loam with 10YR4/3 color. The soils found in the depressional wetland had a lower chroma color 10YR4/2 with some mottling, indicating hydric conditions.

Figure 2 – NRCS Soil Survey of Area

Findings

The wetland on the property was previously identified in the King County 1990 Sensitive Areas Map Folio, where the wetland was mapped by the National Wetlands Inventory (NWI) but not field verified by King County staff. This wetland is mapped in the current King County iMap image from the same NWI information (see **Figure 3**). This mapped wetland appears to be shown three to four times larger than the existing wetland.

Figure 3 – King County iMap of NWI wetland location

The site was investigated on May 22 to determine the wetland edge. The assessment followed the methods and procedures of the Wetlands Delineation Manual and the Wetland Rating manual. A total of 4 plots were taken throughout the site to characterize the conditions. Data sheets are found in Appendix A. Locations of the plots are shown on **Maury Island Site skeet range wetland figure**.

Plot 1 was taken near the wettest location of the depressional wetland, near some standing water. There was 100% hydric vegetation including the oblique species slough sedge, *Carex obnupta*, and hydric soils showing low chroma with mottles, and saturated conditions. Plot 2 was clearly placed in upland conditions of the site in the adjacent mixed forest (Douglas fir/Red Alder) There was no hydrology present, brighter soils – 10YR4/2, and less than 50% hydrophytic vegetation. Plot 3 was located on the northwest side of the wetland in an area dominated by willows. This area supported 100% hydric vegetation, had soils with a low chroma color and moderate mottling. Plot 4 was in the buffer area upslope of Plot 3 in a characteristic upland Douglas fir forest with salal understory. The soil was not saturated in this area the color was bright, 10YR4/3 with no mottles.

Description of Wetland:

This is a Forested/Shrub-scrub depressional wetland, approximately 49,657 square feet in size (See **Maury Island Site skeet range wetland figure**). Photos of the wetland and buffer areas are found in Appendix B. It looks like the wetland was partial formed by construction of a berm along the northeastern section of the wetland. It could be that this 3 to 5 feet high berm may have been constructed as part of the skeet range to create a small open water pond. The wettest area of the wetland is adjacent to the berm. The wetland vegetation is dominated by hardhack (spirea) and willow in the understory, with black cottonwoods and red alders providing the forested canopy. There is a pocket of birch trees in the southwest corner. Hardhack is found throughout the area, with pockets of willows. Ponded water was observed over a small area (less than 10% of the wetland). The edge of the wetland in many areas supports emergent vegetation, with a band of slough sedge *(Carex obnupta)*. Saturated soils were found throughout the depressional wetland. Additional species observed in the wetland include salmonberry (*Rubus spectabilis)*, soft rush (*Juncus effusus)*, shuck cabbage (*Lysichitum americanus),* smartweed (*Polygonum spp.*) and mannagrass (*Glyceria sp.)*

Wetland Ratings and Buffers

King County rates wetlands according to the Washington State Wetland Rating System for Western Washington (Hruby, 2004). The Maury Island Site - Skeet Range wetland was rated a Category II based upon the four-tiered wetland rating system. Table 1 summarizes the rating for the depressional wetland. The rating system form is found in Appendix C.

Table 1 - Classification of Wetlands

HGM	**Category**	**Score**	**Required Buffer Width**
Depressional	II	53	150 ft. High Impact 75 ft. Low Impact

Ratings are assessed for three general categories of wetland functions: water quality, hydrology, and habitat. The total score for the wetland was 53, with its highest value being habitat (21) with water quality being 20. The hydrology score was 12.

Water quality scores are based on vegetation cover, water flow speed, quantity and quality of the water, and retention time of the water. Half of the water quality score comes from the potential for the wetland area to improve water quality because of the surrounding development. Dense vegetation helps to improve the water by removing sediment, nutrients, and toxicants from the water. Because there is no outlet of the wetland, there is a high retention value.

Hydrologic functions are based on wetland size, shape, topography, and vegetation to provide water storage and flood attenuation. Once again, half of the hydrologic score is based on the potential and opportunity to reduce flooding in this area. Since there is no flooding issue in this basin, the wetland is not reducing any flooding threats.

The general habitat value of the Maury Island wetland is medium-high (21). While the complex habitat communities makes it valuable, the large amount of disturbance to the wetland buffer from the roadway keeps it from being highly rated. The wetland structure is complex with a high richness of plant species, and high interspersion of habitats. Invasive plant cover in the wetland is below 25% for all canopy layers present.

King County Regulations

King County regulates wetlands and aquatic areas through the King County Critical Areas Ordinance. Wetland buffers are determined based on the wetland category associated with the wetland. Buffer widths also vary depending on the intensity of planned land use, whether the subject property is within or outside the Urban Growth Boundary (UGB), and value of the wetland habitat score. Because the wetlands are outside the UGB, a Category II wetland with habitat points between 20 and 29 require a 150 buffer for high impact activities and 75 feet for low impact activities such as passive recreational uses such as trails and nature viewing area. There is little disturbance in the existing buffer of the wetland. There is an existing backcountry trail located within the buffer to the north. The trail is outside of the wetland boundary.

Summary

There is a Category II depressional forested/scrub-shrub wetland on site. The wetland is about 1/3 the size of the NWI mapped wetland from aerial photographs. The wetland is functioning well and the vegetation does not appear to be impacted by arsenic, lead, and or cadmium. The wetland was rated with a total score of 53, with its highest value being habitat (21), than water quality (20) and hydrology (12). Disturbance within 150 feet of the wetland boundary is from an existing backcountry trail that is used for passive recreation.

References

Hruby, T. 2004. Washington State wetland rating system for western Washington-Revised. Washington State Department of Ecology Publication # 04-06-025.

King County GIS mapping website (iMap). 2011.

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Available online at http://websoilsurvey.nrcs.usda.gov/. Accessed May 5, 2011.

Washington State Department of Ecology. 1997. Washington State wetlands identification and delineation manual. Ecology Publications #96-94, Washington State Department of Ecology, Olympia, WA.

Maury Island Site skeet range wetland

Plots
Wetland Edge point
WetlandBoundary
Trail - backcountry

0 37.5 75 150 Feet

N

King County
Department of
Natural Resources and Parks
Parks and Recreation Division

June 25, 2013

Appendix A

Wetland Determination Forms

DATA FORM 1 (*Revised*)
ROUTINE WETLAND DETERMINATION
(WA State Wetland Delineation Manual or 1987 Corps Wetland Delineation Manual)

Project Site:	Maury Island Site – Skeet Range Wetland	Date:	5/22/13
Applicant/Owner:	King County - Parks and Recreation Division	County:	King
Investigator(s):	Tina Miller	State:	WA
		S/T/R:	28/22N/3E

Do Normal Circumstances exist on the site?	☒ Yes	☐ No	Community ID:	
Is the site significantly disturbed (atypical situation)?	☐ Yes	☒ No	Transect ID:	
Is Area a Potential Problem Area?	☐ Yes	☒ No	Plot ID:	1
Explanation of atypical or problem area:				

VEGETATION (For strata, indicate T = tree; S = shrub; H = herb; V = vine)

	Dominant Plant Species	Stratum	% Cover	Indicator		Dominant Plant Species	Stratum	% Cover	Indicator
1	Salix sitchensis	S	20	FACW	8				
2	Spiraea douglasii	S	50	FACW	9				
3	Alnus rubra	T	10	FAC	10				
4	Carex obnupta	E	10	OBL	11				
5	Rubus spectabilis	S	5	FAC	12				
6					13				
7					14				

Hydrophytic Vegetation Indicators: % of Dominants that are OBL, FACW or FAC: 100

Check all indicators that apply & explain below:

Visual observation of plant species growing in areas of prolonged inundation/saturation	yes	Physiological/reproductive adaptations	
		Wetland plant database	yes
Morphological adaptations		Personal knowledge of regional plant communities	yes
Technical Literature	yes	Other (explain)	

Hydrophytic Vegetation Present? ☒ Yes ☐ No

Rationale for decision/Remarks:
This location is close to the wettest portion of the wetland

HYDROLOGY

Is it the growing season? ☒ Yes ☐ No
Based on ☐ soil temp (record temp)
other (explain) ☒ season

Depth of inundation:	none	inches
Depth to free water in pit:	10	Inches
Depth to saturated soil:	surface	inches

Check all that apply and explain below:
Stream, Lake, or Gage Data ☐
Aerial Photographs ☐ Other ☐

Water Marks	☒ Yes ☐ No		Oxidized Root (live root) Channels <12 in.	☐ Yes ☐ No
Drift Lines	☐ Yes ☐ No		Drainage Patterns	☒ Yes ☐ No
FAC-Neutral Test	☐ Yes ☐ No		Local Soil Survey Data	☐ Yes ☐ No
Sediment Deposits	☒ Yes ☐ No		Water-Stained Leaves	☒ Yes ☐ No

Other (explain): This is located near the wettest section of the wetland where there is a pond of standing water.

Hydrophytic Conditions Present? ☒ Yes ☐ No

Rationale for decision/Remarks: Presence of water and saturated soils

SOILS

Map Unit Name (Series and Phase): Everett – Alderwood – gravelly sandy loam, 6 to 15% *Drainage Class: moderately well drained*
Taxonomy (Subgroup): Field Observations Confirm Mapped Type? ☐ Yes ☒ No

Profile Description:

Depth (inches)	Horizon	Matrix color (Munsell Moist)	Mottle colors (Munsell Moist)	Mottle abundance size contrast	Texture, concretions, structure, etc.	Drawing of Soil Profile (match description)
6	A	10YR4/2	none	none	Sandy loam	
12	A	10YR6/2		Slight amount	Sandy loam	

Hydric Soil Indicators: (check all that apply)

☐ Histosol	☐ Reducing Conditions	☐ High Organic Content in Surface Layer of Sandy Soils
☐ Histic Epipedon	☐ Gleyed or Low-Chroma (=1) Matrix	☐ Organic Streaking in Sandy Soils
☐ Sulfidic Odor	☒ Matrix Chroma with ≤ 2 with mottles	☐ Listed on National/Local Hydric Soils List
☒ Aquatic Moisture Regime	☐ Mg or Fe Concretions	☐ Other (explain in remarks)

Hydric Soils Present? ☒ Yes ☐ No

Rationale for decision/Remarks: Based on color and saturated conditions, typical of this soil type under hydric conditions.

WETLAND DETERMINATION (Circle)

Hydrophytic Vegetation Present?	☒ Yes	☐ No
Wetland Hydrology Present?	☒ Yes	☐ No
Hydric Soils Present?	☒ Yes	☐ No

Is this Sampling Point Within a Wetland? ☒ Yes ☐ No

Rationale/Remarks:
This plot is in typical wetland conditions

NOTES:

DATA FORM 1 (*Revised*)
ROUTINE WETLAND DETERMINATION
(WA State Wetland Delineation Manual or 1987 Corps Wetland Delineation Manual)

Project Site:	Maury Island Site – Skeet Range Wetland	Date:	5/22/13
Applicant/Owner:	King County - Parks and Recreation Division	County:	King
Investigator(s):	Tina Miller	State:	WA
		S/T/R:	28/22N/3E

Do Normal Circumstances exist on the site?	☒ Yes	☐ No	Community ID:	
Is the site significantly disturbed (atypical situation)?	☐ Yes	☒ No	Transect ID:	
Is Area a Potential Problem Area?	☐ Yes	☒ No	Plot ID:	2

Explanation of atypical or problem area:

VEGETATION (For strata, indicate T = tree; S = shrub; H = herb; V = vine)

	Dominant Plant Species	Stratum	% Cover	Indicator		Dominant Plant Species	Stratum	% Cover	Indicator
1	Pseudotsuga menziesii	T	50	FACU	8				
2	Polystichum munitum	H	20	FACU	9				
3	Alnus rubra	T	20	FAC	10				
4	Rubus ursinus	S	10	FACU	11				
5	Vaccinium parvifolium	S	5	UPL	12				
6	Glyceria spp.	H	1	FACW	13				
7	Claytonia sibirica	H	50	UPL	14				

Hydrophytic Vegetation Indicators: % of Dominants that are OBL, FACW or FAC: 28%

Check all indicators that apply & explain below:

Visual observation of plant species growing in areas of prolonged inundation/saturation	yes	Physiological/reproductive adaptations	
		Wetland plant database	yes
Morphological adaptations		Personal knowledge of regional plant communities	yes
Technical Literature	yes	Other (explain)	

Hydrophytic Vegetation Present? ☐ Yes ☒ No

Rationale for decision/Remarks:
This location is clearly outside of the wetland based on the species of vegetation

HYDROLOGY

Is it the growing season? ☒ Yes ☐ No
Based on ☐ soil temp (record temp)
other (explain) ☒ season

Depth of inundation:	None - 12	inches
Depth to free water in pit:	None - 12	inches
Depth to saturated soil:	None - 12	inches

Check all that apply and explain below:
Stream, Lake, or Gage Data ☐
Aerial Photographs ☐ Other ☐

Water Marks On	☐ Yes	☒ No	Oxidized Root (live root) Channels <12 in.	☐ Yes	☐ No
Drift Lines	☐ Yes	☒ No	Drainage Patterns	☐ Yes	☒ No
FAC-Neutral Test	☐ Yes	☐ No	Local Soil Survey Data	☐ Yes	☐ No
Sediment Deposits	☐ Yes	☒ No	Water-Stained Leaves	☐ Yes	☐ No

Other (explain): This is located outside of the wetland in a dense Douglas fir forest with candy flower understory.

Hydrophytic Conditions Present? ☐ Yes ☒ No

Rationale for decision/Remarks: No sign of hydric conditions

SOILS

Map Unit Name (Series and Phase): Everett – Alderwood – gravelly sandy loam, 6 to 15% *Drainage Class: moderately well drained*
Taxonomy (Subgroup):
Field Observations Confirm Mapped Type? ☒ Yes ☐ No

Profile Description:

Depth (inches)	Horizon	Matrix color (Munsell Moist)	Mottle colors (Munsell Moist)	Mottle abundance size contrast	Texture, concretions, structure, etc.	Drawing of Soil Profile (match description)
12	A	10YR4/3	none	none	Sandy loam	
					Sandy loam	

Hydric Soil Indicators: (check all that apply)

☐ Histosol	☐ Reducing Conditions	☐ High Organic Content in Surface Layer of Sandy Soils
☐ Histic Epipedon	☐ Gleyed or Low-Chroma (=1) Matrix	☐ Organic Streaking in Sandy Soils
☐ Sulfidic Odor	☐ Matrix Chroma with ≤ 2 with mottles	☐ Listed on National/Local Hydric Soils List
☐ Aquatic Moisture Regime	☐ Mg or Fe Concretions	☐ Other (explain in remarks)

Hydric Soils Present? ☐ Yes ☒ No

Rationale for decision/Remarks: No hydric soil indicators, typical Everett-Alderwood soils

WETLAND DETERMINATION (Circle)

Hydrophytic Vegetation Present?	☐ Yes	☒ No
Wetland Hydrology Present?	☐ Yes	☒ No
Hydric Soils Present?	☐ Yes	☒ No

Is this Sampling Point Within a Wetland? ☐ Yes ☒ No

Rationale/Remarks:
This plot is upland

NOTES:

DATA FORM 1 (*Revised*)
ROUTINE WETLAND DETERMINATION
(WA State Wetland Delineation Manual or 1987 Corps Wetland Delineation Manual)

Project Site:	Maury Island Site – Skeet Range Wetland	Date:	5/22/13
Applicant/Owner:	King County - Parks and Recreation Division	County:	King
Investigator(s):	Tina Miller	State:	WA
		S/T/R:	29/22N/3E

Do Normal Circumstances exist on the site?	☒ Yes	☐ No	Community ID:	
Is the site significantly disturbed (atypical situation)?	☐ Yes	☒ No	Transect ID:	
Is Area a Potential Problem Area?	☐ Yes	☒ No	Plot ID:	3
Explanation of atypical or problem area:				

VEGETATION (For strata, indicate T = tree; S = shrub; H = herb; V = vine)

	Dominant Plant Species	Stratum	% Cover	Indicator		Dominant Plant Species	Stratum	% Cover	Indicator
1	Salix sitchensis	S	100	FACW	8				
2	Spiraea douglasii	S	30	FACW	9				
3	Alnus rubra	T	10	FAC	10				
4	Carex obnupta	H	30	OBL	11				
5	Betula sp.	T	5	FAC	12				
6					13				
7					14				

Hydrophytic Vegetation Indicators: % of Dominants that are OBL, FACW or FAC: 100

Check all indicators that apply & explain below:

Visual observation of plant species growing in areas of prolonged inundation/saturation	yes	Physiological/reproductive adaptations	
		Wetland plant database	yes
Morphological adaptations		Personal knowledge of regional plant communities	yes
Technical Literature	yes	Other (explain)	

Hydrophytic Vegetation Present? ☒ Yes ☐ No

Rationale for decision/Remarks:
This location is close to the wettest portion of the wetland

HYDROLOGY

Is it the growing season? ☒ Yes ☐ No
Based on ☐ soil temp (record temp)
other (explain) ☒ season

Depth of inundation:	none	inches
Depth to free water in pit:	6	Inches
Depth to saturated soil:	surface	inches

Check all that apply and explain below:
Stream, Lake, or Gage Data ☐
Aerial Photographs ☐ Other ☐

Water Marks On	☒ Yes	☐ No	Oxidized Root (live root) Channels <12 in.	☐ Yes	☐ No
Drift Lines	☐ Yes	☐ No	Drainage Patterns	☒ Yes	☐ No
FAC-Neutral Test	☐ Yes	☐ No	Local Soil Survey Data	☐ Yes	☐ No
Sediment Deposits	☒ Yes	☐ No	Water-Stained Leaves	☒ Yes	☐ No

Other (explain): This is located near the edge of the wetland.

Hydrophytic Conditions Present? ☒ Yes ☐ No

Rationale for decision/Remarks: Presence of water and saturated soils

SOILS

Map Unit Name (Series and Phase): Everett – Alderwood – gravelly sandy loam, 6 to 15% *Drainage Class: moderately well drained*
Taxonomy (Subgroup):
Field Observations Confirm Mapped Type? ☐ Yes ☒ No

Profile Description:

Depth (inches)	Horizon	Matrix color (Munsell Moist)	Mottle colors (Munsell Moist)	Mottle abundance size contrast	Texture, concretions, structure, etc.	Drawing of Soil Profile (match description)
12	A	10YR4/2		Moderate amount	Sandy loam	

Hydric Soil Indicators: (check all that apply)

☐ Histosol	☐ Reducing Conditions	☐ High Organic Content in Surface Layer of Sandy Soils
☐ Histic Epipedon	☐ Gleyed or Low-Chroma (=1) Matrix	☐ Organic Streaking in Sandy Soils
☐ Sulfidic Odor	☒ Matrix Chroma with ≤ 2 with mottles	☐ Listed on National/Local Hydric Soils List
☒ Aquatic Moisture Regime	☐ Mg or Fe Concretions	☐ Other (explain in remarks)

Hydric Soils Present? ☒ Yes ☐ No

Rationale for decision/Remarks: Based on color and saturated conditions

WETLAND DETERMINATION (Circle)

Hydrophytic Vegetation Present?	☒ Yes	☐ No
Wetland Hydrology Present?	☒ Yes	☐ No
Hydric Soils Present?	☒ Yes	☐ No

Is this Sampling Point Within a Wetland? ☒ Yes ☐ No

Rationale/Remarks:
This plot is in typical wetland conditions

NOTES:

DATA FORM 1 (*Revised*)
ROUTINE WETLAND DETERMINATION
(WA State Wetland Delineation Manual or 1987 Corps Wetland Delineation Manual)

Project Site:	Maury Island Site – Skeet Range Wetland	Date:	5/22/13
Applicant/Owner:	King County - Parks and Recreation Division	County:	King
Investigator(s):	Tina Miller	State:	WA
		S/T/R:	29/22N/3E

Do Normal Circumstances exist on the site?	☒ Yes	☐ No	Community ID:	
Is the site significantly disturbed (atypical situation)?	☐ Yes	☒ No	Transect ID:	
Is Area a Potential Problem Area?	☐ Yes	☒ No	Plot ID:	4
Explanation of atypical or problem area:				

VEGETATION (For strata, indicate T = tree; S = shrub; H = herb; V = vine)

	Dominant Plant Species	Stratum	% Cover	Indicator		Dominant Plant Species	Stratum	% Cover	Indicator
1	Pseudotsuga menziesii	T	100	FACU	8				
2	Gaultheria shallon	S	50	UPL	9				
3					10				
4					11				
5					12				
6					13				
7					14				

Hydrophytic Vegetation Indicators: % of Dominants that are OBL, FACW or FAC: 0

Check all indicators that apply & explain below:

Visual observation of plant species growing in areas of prolonged inundation/saturation	no	Physiological/reproductive adaptations	
Morphological adaptations		Wetland plant database	yes
Technical Literature	yes	Personal knowledge of regional plant communities	yes
		Other (explain)	

Hydrophytic Vegetation Present? ☐ Yes ☒ No

Rationale for decision/Remarks:
This location is paired to Plot 3, in an upland forest community

HYDROLOGY

Is it the growing season? ☒ Yes ☐ No
Based on ☐ soil temp (record temp)
other (explain) ☒ season

Depth of inundation:	none	inches
Depth to free water in pit:	None at 12	Inches
Depth to saturated soil:	None at 12	inches

Check all that apply and explain below:
Stream, Lake, or Gage Data ☐
Aerial Photographs ☐ Other ☐

Water Marks On	☐ Yes	☒ No	Oxidized Root (live root) Channels <12 in.	☐ Yes	☐ No
Drift Lines	☐ Yes	☐ No	Drainage Patterns	☐ Yes	☒ No
FAC-Neutral Test	☐ Yes	☐ No	Local Soil Survey Data	☐ Yes	☐ No
Sediment Deposits	☐ Yes	☒ No	Water-Stained Leaves	☐ Yes	☒ No

Other (explain): This is located in a typical portion of the buffer community

Hydrophytic Conditions Present? ☐ Yes ☒ No

Rationale for decision/Remarks: No hydrology present

SOILS

Map Unit Name (Series and Phase): Everett – Alderwood – gravelly sandy loam, 6 to 15% *Drainage Class: moderately well drained*
Taxonomy (Subgroup): Field Observations Confirm Mapped Type? ☐ Yes ☒ No

Profile Description:

Depth (inches)	Horizon	Matrix color (Munsell Moist)	Mottle colors (Munsell Moist)	Mottle abundance size contrast	Texture, concretions, structure, etc.	Drawing of Soil Profile (match description)
12	A	10YR4/3	none	none	Sandy loam	

Hydric Soil Indicators: (check all that apply)

☐ Histosol	☐ Reducing Conditions	☐ High Organic Content in Surface Layer of Sandy Soils
☐ Histic Epipedon	☐ Gleyed or Low-Chroma (=1) Matrix	☐ Organic Streaking in Sandy Soils
☐ Sulfidic Odor	☐ Matrix Chroma with ≤ 2 with mottles	☐ Listed on National/Local Hydric Soils List
☐ Aquatic Moisture Regime	☐ Mg or Fe Concretions	☐ Other (explain in remarks)

Hydric Soils Present? ☐ Yes ☒ No

Rationale for decision/Remarks: Based on color and dryness

WETLAND DETERMINATION (Circle)

Hydrophytic Vegetation Present?	☐ Yes	☒ No
Wetland Hydrology Present?	☐ Yes	☒ No
Hydric Soils Present?	☐ Yes	☒ No

Is this Sampling Point Within a Wetland? ☐ Yes ☒ No

Rationale/Remarks:
Upland vegetation & soils

NOTES:

Appendix B

Maury Island Site

Wetland Photos

Maury Island Site – Photos Taken 5/22/13 of Wetland Area

Photo of Plot 1 – wettest location in wetland. Spirea and willow are the dominant vegetation

Photo of Plot 2 – buffer in upland Douglas fir/Madrone forested area

Photo of patch of Birch trees with spirea understory

Typical View of Wetland – Spirea with willows and occasional black cottonwoods

Photo of the backside of the berm in the red alder forest wetland buffer

Appendix C

Maury Island Site
Wetland Rating Form

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): Maury Island Site, Skeet Range Wetland Date of site visit: 5/22/2013

Rated by: Tina Miller Trained by Ecology? Yes ☒ No ☐ Date of training: 3/2005

SEC: 28 TOWNSHP: 22N RNGE: 3E Is S/T/R in Appendix D? Yes ☐ No ☒

Map of wetland unit: Figure 1 Estimated size 49,657 sq/ft

SUMMARY OF RATING

Category based on FUNCTIONS provided by wetland: ☐ I ☒ II ☐ III ☐ IV

Category I =	Score > 70
Category II =	Score 51 - 69
Category III =	Score 30 – 50
Category IV =	Score < 30

Score for Water Quality Functions	20
Score for Hydrologic Functions	12
Score for Habitat Functions	21
TOTAL Score for Functions	53

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	
Estuarine	☐
Natural Heritage Wetland	☐
Bog	☐
Mature Forest	☐
Old Growth Forest	☐
Coastal Lagoon	☐
Interdunal	☐
None of the above	☒

Wetland HGM Class used for Rating	
Depressional	☒
Riverine	☐
Lake-fringe	☐
Slope	☐
Flats	☐
Freshwater Tidal	☐
	☐
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.

Wetland name or number ____________

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 <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** ☐ 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** ☐ 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** ☐ 2
	Total for D 1 *Add the points in the boxes above*	10
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 _____ ☒ **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***	20
	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	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 ☐	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 ☐	5
	Total for D 3 *Add the points in the boxes above*	12

D 4	**Does the wetland have the <u>opportunity</u> 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 1
◆	**<u>TOTAL</u> – Hydrologic Functions** Multiply the score from D3 by D4; then ***add score to table on p. 1***	<u>12</u>

Comments: ____

These questions apply to wetlands of all HGM classes.

HABITAT FUNCTIONS – Indicators that wetland functions to provide important habitat.

Points (only 1 score per box)

H 1 **Does the wetland have the <u>potential</u> to provide habitat for many species?**

H 1.1 <u>Vegetation structure</u> *(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:
4 structures or more ....points = 4 ☐
3 structures .... points = 2 ☒
2 structures ....points = 1 ☐
1 structure.............. points = 0 ☐

Map of Cowardin vegetation classes

Figure ☐ — **2**

H 1.2 <u>Hydroperiods</u> *(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**

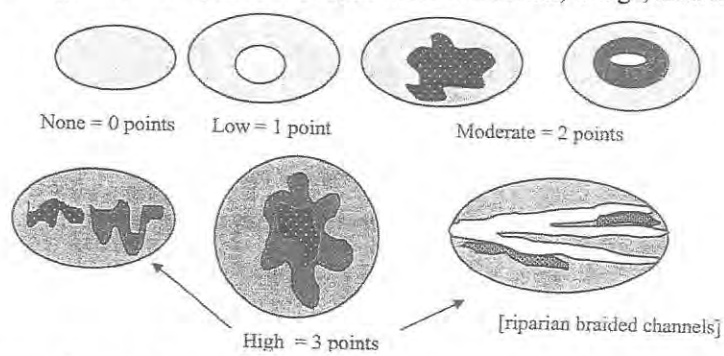
H 1.3 <u>Richness of Plant Species</u> *(see p. 75)*:
Count the number of plant species in the wetland that cover at least 10 ft^2 *(different patches of the same species can be combined to meet the size threshold)*
You do not have to name the species. Do not include Eurasian Milfoil, reed canarygrass, 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:

2

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 <u>Special Habitat Features</u> *(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.

3

H 1 TOTAL Score – potential for providing habitat *Add the points in the column above* **12**

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 • Within 1 mile of a lake greater than 20 acres? ☐ **YES** = 1 point ☐ **NO** = 0 points	2

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

Score: 0

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)

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 ☐

Score: 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	12
◆ **Total Score for Habitat Functions**	Add the points for H 1 and H 2; then ***record the result on p. 1***	21

Comments: _____

Wetland name or number ____________

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 cover)*? ☐ **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	**NA**

Comments: _____

Appendix E

Historical Groundwater Data

Table 1

Monitoring Well OBW-6

Water Quality Test Parameter [1][3]	MCL[2] limits	2/19/99	5/18/99	8/31/99	11/18/99	1/19/00	4/18/00	7/13/00	10/11/00	1/24/01	4/25/01	7/24/01	10/31/01	1/22/02	4/19/02	7/17/02	10/24/02	1/15/03	4/17/03	7/15/03	10/16/03	1/14/04	4/22/04	7/26/04	10/14/04	1/25/05	4/21/05	7/20/05	10/20/05	1/19/06	4/12/06	7/19/06	10/24/07	10/23/08	12/9/09
Conventionals																																			
Temperature (C) Field		11.0	12.0	13.2	12.2	7.5	11.2	10.5	9.6	9.7	10.0	10.7	9.2	11.3	9.9	12.1	11.2	11.1	11.2	11.8	11.7	11.2	11.2	11.1	11.1	11.2	11.2	11.2	11.1	10.9	10.8	10.9	11.2	10.2	10.9
pH Field		7.5	7.4	7.4	7.6	7.4	7.5	7.0	7.1	7.2	7.1	7.0	7.3	7.1	7.1	6.5	7.1	7.3	7.4	7.3	7.1	7.0	6.7	6.5	6.7	6.7	6.8	--	7.3	7.2	7.3	7.2	7.4	7.0	7.5
Conductivity (us/cm) Field		140	140	169	181	167	185	188	189	180	186	184	183	165	178	175	100	103	85	93	97	97	99	68	120	141	136	124	149	150	134	145	146	115	--
Turbidity (NTU) Field			3.4	2.0	2.1	2.3	4.3	2.5	5.2	2.8	1.9	2.3	3.7	1.5	1.8	1.4	1.7	1.4	2.1	1.9	2.2	1.3	1.3	2.7	1.7	2.4	2.3	1.9	1.7	1.5	1.9	2.2	--	0.9	1.2
pH	6.5 - 8.5	6.9	7.3	7.4	7.4	7.3	6.8	6.9	7.6	7.3	7.8	7.0	7.2	7.8	7.7	7.4	7.2	7.5	7.7	7.4	7.3	7.4	7.0	7.3	7.8	7.7	7.6	7.5	7.7	7.0	7.4	7.42	7.46	7.3	7.0
Alkalinity		48	46	51	43	41	39	42	14	44	NR	41	32	32	40	40	40	44	80	42	38	42	42	44	80	44	45	48	26	48	50	50	53.8	55	53
Total Organic Carbon		< 1	< 1	< 1	<1	<1	<1	2.4	<1	<2.0	3.7	<1	<1	<1	<1	<1		<1	<1	<1	4.9	<1	<1	12	<1	<1	5.7	<1	<1	<1	<1	2.1	<1	<1	<1
Chloride	250	3.4	4.4	4.9	5.6	5.1	5.9	2.9	4.4	4.02	4.80	5.40	7.3	5.2	5.9	6.4	6.7	4.2	7.7	6.3	9.0	4.2	4.2	6.9	8.8	6.6	1.9	8.2	14.0	12.0	6.7	14.0	10.1	4.4	4.1
Conductivity (us/cm)		130	140	160	160	180	160	170	200	134	200	140	220	110	140	140	150	140	200	170	150	150	160	160	200	200	190	160	200	180	190	180	195	171	160
Color (CU)	15	20	10	15	20	20	20	30	15	20	<5	15	15	<5	5	10	5	10	10	20	5	10	20	15	<5	<5	5	15	<5	<5	<5	<5	10.0	<5	5
Total Cyanide		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0200	<0.005	<0.005	<0.01	<0.005	<0.05
Fluoride	4	0.09	<0.1	0.12	<0.1	<0.1	0.05	0.13	<0.1	<0.01	<0.02	0.31	0.07	0.08	0.07	0.04	0.11	0.10	0.10	<0.02	0.20	0.02	0.08	0.14	<0.02	<0.02	0.11	0.04	0.02	0.11	0.10	<0.02	<0.10	<0.10	<.1
Hardness		49	61	53	58	52	59	46	53	58	120	59	52	53	46	54	47	50	53	53	53	56	57	63	47	73	79	72	69	72	79	70	75.6	68	71
Nitrate as Nitrogen	10	0.95	0.35	0.2	<0.1	0.16	0.25	0.34	0.20	0.513	0.32	0.07	0.05	0.02	0.10	0.07	--	--	--	--	--	0.02	--	--	--	--	--	--	<0.01	0.15	0.33	0.24	0.471	1.82	2.00
Nitrate		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.04	0.10	0.06	0.04	0.12	<0.05	0.09	0.36	1.10	0.21	<0.05	<0.05	<0.01	0.15	0.33	0.24	--	--	--
Nitrite		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.002	0.003	0.004	0.002	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	0.95
Total Oil & Grease		<1	<1	<1	<1	<1	NR	NR	<1	<5	<1	<1	<1	1.5	2.5	<1	<1	1	<1	<1	<1	<1	<1	<1	<1	2.7	<1	3	<1	<1	1.1	<1	<4.81	<5	<5
Total Petroleum Hydrocarbons		<1	<1	<1	<1	<1	<0.2	<0.2	<1	<5	<1	<1	<1	<1	1.5	<1	<1	<1	<1	<1	<1	<1	0.1	<1	<1	<1	<1	<2	<1	<1	<1	<1	<4.81	<0.0381	<5
Total Suspended Solids		1	<1	2	1	<1	<1	<1	5	4.0	1.0	<1	2.0	<1	<1	6.0	2.0	<1	1.0	<1	<1	10.0	1.0	2.0	<1	<1	<1	1.0	<1	<1	<1	1.0	<4.0	<4.0	<2
Sulfate	250	13	21	25	23	24	24	13	22	19.1	22	20	20	12	17	21	19	19	18	20	19	18	19	3	21	25	39	31	32	29	30	33	18.8	16	16
Surfactants		0.08	<0.25	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.22	<0.05	0.09	<0.05	<0.05	0.46	0.16	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Turbidity (NTU)		6.1	0.6	4.1	3.5	3.5	4.8	4.1	4.9	4.1	3.1	4.6	4.0	2.0	2.0	3.1	2.7	1.6	4.1	1.3	1.5	1.4	1.8	2.8	2.6	2.0	1.5	1.9	1.6	1.4	1.4	1.6	3.0	2.1	1.6
Total Metals (mg/l)																																			
Aluminum		0.06	0.06	<0.01	<0.01	<0.25	<0.01	0.05	<0.01	<0.25	0.03	0.01	0.02	<0.01	0.71	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.34	0.02	<0.01	<0.01	0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.25	<0.25	<0.40
Antimony		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.02200	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.003	<0.003	<0.002
Arsenic	0.00005	0.002	0.002	0.001	0.002	<0.001	0.001	0.002	0.002	0.0012	0.002	0.002	0.001	0.003	<0.001	<0.001	0.001	0.001	0.0016	0.0015	<0.00005	0.0016	0.0007	<0.001	0.0017	0.0010	0.0018	0.0013	0.0014	0.0018	0.0020	0.00124	0.00091	0.00306	0.00200
Barium	1.0	0.005	0.007	0.008	0.0056	<0.01	0.0042	0.0048	0.0045	<0.01	0.0051	0.0075	0.0067	0.0060	0.0045	0.0043	0.0054	0.0031	0.0074	0.0078	0.0068	0.0068	0.0065	0.0076	0.0098	0.0072	0.0078	0.0073	0.0100	0.0094	0.0097	0.0099	0.0121	0.0154	0.0120
Beryllium		<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.002
Calcium		6.7	7.9	6.9	8	7.6	7.5	6.2	7.6	<0.25	7.2	7.7	7.4	8.0	6.9	10.0	6.8	7.3	7.0	7.3	7.9	8.3	7.8	9.2	1.0	11.0	11.0	11.0	10.0	11.0	12.0	9.7	11.8	9.45	<40
Cadmium	0.01	0.003	<0.002	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00120	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.002
Chromium	0.05	<0.006	<0.006	<0.001	0.004	<0.001	0.003	<0.001	0.021	0.0021	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.006	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0044	0.00108	0.003
Copper	1.0	0.016	<0.002	<0.001	<0.001	<0.001	0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	0.0100	<0.001	0.018	<0.001	0.0170	0.0210	0.0020	0.0030	0.0010	0.0030	<0.001	0.004	<0.001	0.00106	<0.005
Iron	0.3	0.77	0.78	0.86	0.92	1.00	0.99	1.30	1.10	1.47	1.00	1.10	1.2	0.82	0.89	0.91	0.90	0.79	0.88	0.89	0.69	0.82	0.84	0.90	1.10	0.90	0.86	0.70	0.61	0.67	0.54	0.621	0.752	0.622	0.430
Mercury	0.002	<0.0008	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Magnesium		7.8	9.9	8.7	9.4	8	9.7	7.3	8.4	9.1	8.3	9.6	8.2	8.1	6.9	7.1	7.2	7.8	8.5	8.4	8.0	8.6	9.0	9.8	11.0	11.0	12.0	11.0	11.0	11.0	12.0	11.0	12.4	10.3	11.0
Manganese	0.05	0.03	0.047	0.038	0.051	0.053	0.047	0.052	0.055	0.0643	0.053	0.062	0.056	0.054	0.038	0.037	0.040	0.030	0.041	0.041	0.033	0.031	0.027	0.031	0.043	0.041	0.037	0.032	0.027	0.035	0.030	0.031	0.0344	0.356	0.019
Sodium		6.2	8.7	5.7	7.1	5.9	6.0	4.4	1.1	5.4	<0.05	6.4	5.1	6.4	5.7	6.1	5.2	5.8	7.3	6.9	6	6.9	11	5.9	7.2	7	7.2	6.6	12	6.9	7.4	5.9	6.98	6.8	<50
Nickel		<0.01	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.00138	0.00254	<0.002
Lead	0.05	<0.001	<0.001	<0.001	0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.003	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.007	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002
Selenium	0.01	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	0.003	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002
Silver	0.05	<0.01	<0.01	<0.01	<0.01	<0.001	<0.01	<0.01	<0.01	<0.001	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001	<0.001	<0.002
Thallium		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.000480	<0.004
Zinc	5.0	0.038	0.037	0.048	0.039	<0.001	0.15	0.032	0.016	0.0188	0.011	<0.001	0.011	0.12	0.004	0.007	0.004	<0.001	0.008	0.015	0.025	<0.001	0.006	0.007	0.039	0.03	0.017	0.011	0.018	0.018	0.020	0.013	0.0143	0.00698	0.01300

Explanation:

(1) Units in mg/L unless otherwise noted. (2) Maximum Contaminate Levels for Groundwater (WAC 173-200).

(3) Beginning 10/24/2007, samples were analyzed by Test America. "<" refers to Test America reporting limit, not instrument detection limit. See attached sample results.

Note that each laboratory has different measuring and reporting limits.

NR = Not reported by lab

Monitoring Well OBW-7

Water Quality Test Parameter[1][3]	MCL[2] limits	2/19/99	5/18/99	8/31/99	11/18/99	1/19/00	4/18/00	7/13/00	10/11/00	1/24/01	4/25/01	7/24/01	10/31/01	1/22/02	4/19/02	7/17/02	10/24/02	1/15/03	4/17/03	7/15/03	10/16/03	1/14/04	4/22/04	7/26/04	10/14/04	1/25/05	4/21/05	7/20/05	10/20/05	1/19/06	4/12/06	7/19/06	10/24/07	10/23/08	12/9/09
Conventionals																																			
Temperature Field		12.5	15.0	16.6	13.9	9.6	12.7	15.7	15.0	9.9	16.0	14.6	9.9	12.4	11.4	14.7	12.7	12.5	12.7	13.6	13.3	12.6	12.7	12.6	12.5	12.6	12.3	12.9	12.6	12.3	12.4		12.8	11.9	12.4
pH Field		7.1	7.4	7.3	7.5	7.4	7.6	7.3	7.1	7.2	7.0	7.1	7.1	7.0	7.0	6.7	7.1	7.2	7.1	7.0	7.1	7.0	6.9	6.6	6.5	6.6	6.8	--	7.2	7.1	7.1		7.2	7.0	7.1
Conductivity (us/cm) Field		260	250	176	246	274	224	219	234	284	273	255	259	206	282	252	198	205	169	193	192	195	189	123	199	227	220	207	221	226	218		216	217	235
Turbidity (NTU) Field			11.7	1.1	1.2	1.6	1.6	1.7	1.6	2.5	1.5	1.8	1.7	1.9	1.6	1.7	2.2	1.6	2.6	3.8	2.7	2.2	6.7	2.6	2.6	3.1	6.2	3.6	3.2	3.0	3.6		--	3.7	5.5
pH	6.5 - 8.5	7.1	7.6	7.3	7.4	7.4	6.7	7.0	7.4	7.3	7.5	7.2	7.2	7.6	7.5	7.3	7.2	7.4	7.6	7.3	7.2	7.2	7.4	7.4	7.7	7.4	7.5	7.4	7.7	7.1	7.3		7.34	7.3	7.2
Alkalinity		82	86	84	77	78	75	71	30	80	NR	76	68	76	72	76	80	79	44	82	84	79	80	80	100	74	84	86	86	86	86		86.8	92	78
Total Organic Carbon		< 1	< 1	<1	<1	<1	<1	3.3	<1	2.1	<1	<1	<1	<1	3.4	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	3.8	3.3	<1	<1	<1	No	<1	<1	<1
Chloride	250	10.0	9.9	9.6	10.0	8.2	9.5	3.8	8.3	9.3	9.9	11.0	12.0	9.1	12.0	11.0	13.0	12.0	13.0	9.2	12.0	6.6	6.1	9.7	19.0	8.2	1.4	10.0	10.0	13.0	8.3	Access	7.42	10.4	9.4
Conductivity (us/cm)		250	240	260	270	310	290	270	350	272	330	250	440	180	270	270	280	280	400	290	280	280	300	330	310	310	300	190	280	260	280		280	312	280
Color (CU)	15	20	35	5	10	15	10	15	10	5	<5	<5	5	<5	<5	<5	<5	5	<5	15	<5	10	20	10	<5	<5	5	15	<5	5	<5		10.0	<5	10
Total Cyanide		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.014	<0.005		<0.01	<0.005	<0.05
Fluoride	4	0.07	<0.1	<0.1	<0.1	<0.1	0.02	0.14	<0.1	<0.1	<0.02	<0.02	0.07	0.08	0.13	0.05	0.16	0.06	0.04	<0.02	0.14	<0.02	0.07	0.15	<0.02	<0.02	0.13	0.04	<0.02	0.13	0.10		<0.1	5.56	<0.1
Hardness		100	100	100	100	99	110	92	100	118	120	120	110	110	110	100	100	100	110	120	110	120	120	120	120	120	130	130	120	120	130		111	127	120
Nitrate as Nitrogen	10	5.0	4.6	4.3	5.6	4.2	4.9	3.8	1.8	5.2	5.0	5.3	5.5	5.0	5.9	0.6	--	--	--	--	--	7.2	--	--	--	--	--	4.70	6.40	5.90	5.20		5.50	6.45	6.60
Nitrate		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4.7	5.0	0.02	6.6	7.8	7.2	7.5	7.2	7.8	7.8	3.8*	4.9	6.4	5.9	--		--	--	--
Nitrite		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.015	0.009	0.015	0.017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.01	<0.01		<0.01	<0.01	1.200
Total Oil & Grease		<1	<1	<1	<1	<1	<1	<1	<1	<5	<1	1.3	<1	<1	3	<1	4	<1	<1	2.3	<1	<1	<1	<1	<1	1.6	<1	3.4	<1	<1	<1		<4.85	<5	<5
Total Petroleum Hydrocarbons		<1	<1	<1	<1	<1	<0.2	<0.2	<1	<5	<1	<1	<1	<1	1.5	<1	<1	<1	<1	2.3	<1	<1	0.1	<1	<1	<1	<1	<2	<1	<1	<1		<4.85	<0.0381	<5
Total Suspended Solids		2	4	1	<1	<1	<1	<1	1	5	5	<1	1	<1	<1	6	3	<1	1	1	1	<1	1	1	<1	1	<1	<1	<1	<1	3.0		<4.0	<4.0	<2.0
Sulfate	250	21	26	25	24	26	23	14	23	24	25	24	23	13	20	27	25	28	24	22	18	14	14	11	13	19	10	21	18	16	18		31.8	20	19
Surfactants		0.15	0.62	<0.05	<0.05	2.0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	1.20	<0.05	0.07	<0.05	<0.05	0.26	0.64	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05	<0.05
Turbidity (NTU)		6.7	16	1.6	1.8	2.1	1.9	2	2.2	1.73	1.9	2.4	2.4	1.5	2.1	1.3	1.4	1.1	4.3	1.8	2.4	2.3	2.8	1.8	3.4	2.1	1.8	2.5	2.5	2.2	1.9		4.23	3.86	4.3
Total Metals																																			
Aluminum		0.02	0.04	<0.01	<0.01	<0.01	<0.01	0.05	<0.01	<0.25	0.04	0.03	0.02	<0.01	0.97	0.34	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.25	0.06	<0.01	<0.01	0.04	<0.01	<0.01	<0.01	0.04		<0.25	<0.25	<.4
Antimony		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.014	<0.001	<0.001	<0.001	<0.001	<0.001		<0.003	<0.003	<0.002
Arsenic	0.00005	0.002	0.001	0.001	0.002	<0.001	0.001	0.002	<0.001	0.002	<0.001	0.003	0.001	0.003	0.002	0.002	0.001	0.001	0.0023	0.0032	0.001	0.003	0.0013	<0.001	0.0026	0.0021	0.0028	0.0024	0.0019	0.0033	0.0027		0.00196	0.00189	0.00300
Barium	1.0	0.01	0.017	0.011	0.0091	<0.0005	0.0074	0.0084	0.0084	0.011	0.0092	0.01	0.0085	0.0071	0.0081	0.0074	0.016	0.0072	0.0097	0.011	0.0092	0.0099	0.0087	0.0088	0.0100	0.0071	0.0092	0.0093	0.0099	0.0100	0.0098		0.0122	0.0114	0.0130
Beryllium		<0.0002	<0.0002	<0.0002	<0.0002	<0.05	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005		<0.001	<0.001	<0.002
Calcium		15	15	15	16	15	17	12	15	18	17	17	16	17	15	15	14	14	16	17	16	17	16	18	18	17	18	18	17	17	19	No	16.0	17.7	<50
Cadmium	0.01	<0.002	<0.002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	Access	<0.001	<0.001	<0.002
Chromium	0.05	<0.006	<0.006	<0.001	0.001	<0.001	0.003	<0.001	0.026	0.0024	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	0.008	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	0.002	<0.001	<0.001	<0.001	<0.001		0.00255	0.00241	0.0028
Copper	1.0	0.017	<0.002	<0.001	<0.001	<0.001	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.003	0.003	<0.001	<0.001	0.002	0.008	<0.001	0.002	0.004	0.020	0.022	0.002	0.003	0.004	0.001	<0.001		<0.001	0.00109	<0.005
Iron	0.3	0.88	4.8	0.43	0.27	0.27	0.12	0.31	0.28	0.57	0.12	0.27	0.08	0.16	0.16	0.16	0.22	0.26	0.36	0.46	0.28	0.36	0.39	0.21	0.26	0.40	0.49	0.33	0.50	0.41	0.34		0.492	0.536	1.000
Mercury	0.002	<0.0008	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002		<0.0002	<0.0002	<0.0002
Magnesium		16	16	16	15	15	17	15	16	18	18	20	17	17	19	16	17	16	17	20	17	19	18	19	19	18	21	21	20	20	21		17.2	19.8	20.0
Manganese	0.05	0.07	0.13	0.057	0.047	0.041	0.042	0.042	0.042	0.0443	0.039	0.033	0.028	0.033	0.025	0.024	0.029	0.019	0.02	0.018	0.014	0.013	0.012	0.0089	0.014	0.012	0.014	0.013	0.019	0.027	0.012		0.0258	0.0197	0.023
Sodium		8.7	9.1	8	9.8	8.6	8.8	7.4	4.1	8.3	<0.05	11	8.5	9.8	9.4	10	8.4	9.1	11	12	9.4	11	13	9.5	10	9.6	10	9.5	10	9.5	10		9.56	10.5	<50
Nickel		<0.01	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0015	<0.05	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		0.00156	0.00167	0.002
Lead	0.05	0.001	<0.001	<0.001	0.002	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	0.001	0.006	<0.001	<0.001	<0.001	<0.001		<0.001	<0.001	<0.002
Selenium	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	0.004	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001		<0.001	<0.001	<0.002
Silver	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		<0.001	<0.001	<0.002
Thallium		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		<0.001	0.0003	<0.004
Zinc	5.0	0.06	0.045	0.037	0.027	<0.001	0.010	0.023	0.016	0.0259	0.01	<0.001	0.014	<0.001	0.005	0.005	0.009	<0.001	0.017	0.024	0.03	0.004	0.013	0.012	0.044	0.037	0.027	0.018	0.02	0.024	0.025		0.0262	0.0228	0.028

Explanation:

(1) Units in mg/L unless otherwise noted. (2) Maximum Contaminate Levels for Groundwater (WAC 173-200).

(3) Beginning 10/24/2007, samples were analyzed by Test America. "<" refers to Test America reporting limit, not instrument detection limit. See attached sample results.

Note that each laboratory has different measuring and reporting limits.

NR = Not reported by lab

Monitoring Well OBW-9

Water Quality Test Parameter[1][3]	MCL[2] limits	2/19/99	5/18/99	8/31/99	11/18/99	1/19/00	4/18/00	7/13/00	10/11/00	1/24/01	4/25/01	7/24/01	10/31/01	1/22/02	4/19/02	7/17/02
Conventionals																
Temperature Field		12.0	14.0	14.7	12.8	8.6	11.9	13.9	11.2	9.0	12.7	11.8	9.4	11.7	10.2	13.7
pH Field		7.5	7.8	7.9	8.3	8.1	8.2	7.9	7.7	7.8	7.8	7.7	7.9	7.7	7.6	7.3
Conductivity (us/cm) Field		190	190	183	192	216	172	179	190	215	205	200	209	169	234	207
Turbidity (NTU) Field			1.7	2.4	2.4	0.9	1.1	1.1	1.5	1.4	0.6	0.6	0.4	0.3	1.1	0.3
pH	6.5 - 8.5	7.6	7.9	7.5	7.9	7.9	7.4	7.6	8.0	7.9	7.8	7.8	7.9	8.0	8.0	7.9
Alkalinity		94	94	93	92	96	92	93	35	100	NR	91	72	84	84	84
Total Organic Carbon		< 1	< 1	<1	<1	<1	<1	2.7	<1	2.2	<1	6.0	<1	<1	<1	<1
Chloride	250	3.3	3.7	4.0	3.9	2.3	<0.02	2.6	3.0	3.17	4.5	3.4	5.9	3.4	5.4	4.8
Conductivity (us/cm)		190	190	190	200	240	220	220	250	195	200	190	330	170	220	220
Color (CU)	15	10	5	10	15	15	15	15	10	10	<5	5	<5	<5	<5	<5
Total Cyanide		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0100	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Fluoride	4	0.13	<0.1	0.16	<0.1	<0.1	<0.02	0.16	<0.1	0.12	<0.02	0.16	0.08	0.10	0.08	0.05
Hardness		80	87	81	84	84	92	73	90	105	95	95	90	96	97	91
Nitrate as Nitrogen	10	<0.25	<0.02	<0.1	<0.1	<0.1	<0.02	<0.02	<0.05	<0.1	0.04	0.08	0.13	0.11	0.10	0.04
Nitrate		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nitrite		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Oil & Grease		<1	<1	<1	<1	<1	<1	NR	<1	<5	<1	1.1	<1	<1	2.5	<1
Total Petroleum Hydrocarbons		<1	<1	<1	<1	<1	<0.2	<0.2	<1	<5	<1	<1	<1	<1	1	<1
Total Suspended Solids		1	<1	<1	1	<1	<1	<1	1	4.0	<1	<1	<1	<1	<1	4.0
Sulfate	250	10	12	12	25	6.6	<0.1	7.2	6.3	4.7	7.8	9.5	17.0	12.0	15.0	17.0
Surfactants		0.13	0.18	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.28	<0.05
Turbidity (NTU)		0.78	1.5	1.4	1.6	0.64	1.7	1.2	1.5	<1	0.4	0.84	0.29	0.03	0.47	0.26
Total Metals																
Aluminum		<0.01	0.05	<0.01	<0.01	<0.01	<0.01	0.04	<0.001	<0.25	0.04	0.02	0.03	<0.01	1.1	0.44
Antimony		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic	0.00005	0.004	0.005	0.002	0.004	0.004	<0.001	0.005	0.005	0.0034	0.003	0.003	0.003	0.003	0.001	0.002
Barium	1.0	0.008	0.01	0.012	0.011	0.011	<0.0005	0.012	0.013	0.0165	0.015	0.014	0.012	0.011	0.012	0.012
Beryllium		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Calcium		15	15	15	15	15	16	12	16	17	15	15	16	19	17	18
Cadmium	0.01	<0.002	<0.002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Chromium	0.05	<0.006	<0.006	<0.001	<0.001	<0.001	<0.001	<0.001	0.019	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.005
Copper	1.0	0.006	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0023	<0.001	<0.001	<0.001	<0.001	0.003	0.003
Iron	0.3	0.13	0.29	0.30	0.20	0.17	0.20	0.28	0.30	0.37	0.30	0.20	0.21	0.13	0.15	0.10
Mercury	0.002	<0.0004	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Magnesium		10	12	11	11	11	13.0	10.0	12.0	15.2	14.0	14.0	12.0	12.0	13.0	11.0
Manganese	0.05	0.23	0.10	0.077	0.12	0.09	0.09	0.11	0.11	0.11	0.11	0.14	0.17	0.19	0.22	0.23
Sodium		6.8	7.2	6.8	8.1	7.3	7.2	5.2	2.4	7.7	<0.05	9.0	<0.05	7.6	7.0	8.1
Nickel		<0.01	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0012	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Lead	0.05	<0.001	<0.001	<0.001	0.002	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	0.003	<0.001	0.002	<0.001	<0.001
Selenium	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.004	<0.001	<0.001	<0.001	<0.001	0.001	0.002	<0.001
Silver	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Thallium		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	5.0	<0.002	0.012	0.015	0.002	<0.001	<0.001	0.008	<0.001	<0.01	<0.001	<0.001	<0.001	<0.001	0.002	0.002

Water Quality Test Parameter[1][3]	10/24/02	1/15/03	4/17/03	7/15/03	10/16/03	1/14/04	4/22/04	7/26/04	10/14/04	5/18/05	7/20/05	10/20/05	1/19/06	4/12/06	7/19/06	10/24/07	10/23/08	12/9/09
Conventionals																		
Temperature Field	11.3	11.3	11.4	11.6	11.6	11.3	11.4	11.6	11.4	11.4	11.4	12.6	11.1	11.1	11.1	11.4	10.3	11.1
pH Field	7.6	7.6	7.5	7.4	7.4	7.3	7.1	6.7	6.9	6.7	--	7.2	7.4	7.4	7.3	7.5	7.3	7.3
Conductivity (us/cm) Field	153	159	130	139	139	116	136	86	142	147	147	221	170	159	156	167	145	166
Turbidity (NTU) Field	0.5	0.3	0.5	0.2	0.7	0.3	0.4	0.7	0.5	1.4	0.8	3.6	1.4	1.7	--	--	1.1	1.1
pH	7.8	7.8	8.0	7.7	7.6	7.6	7.7	7.2	7.9	7.3	7.7	7.7	7.3	7.6	7.63	7.65	7.56	7.46
Alkalinity	92	92	150	90	90	84	100	80	110	90	96	94	94	94	84	91.2	87	86
Total Organic Carbon	<1	<1	<1	<1	1.2	<1	<1	5.0	<1	<1	<1	7.3	<1	<1	<1	<1	<1	<1
Chloride	4.2	4.0	4.9	1.5	7.0	3.0	2.5	4.0	9.4	3.5	3.8	4.3	6.0	3.1	5.4	5.95	3.9	3.5
Conductivity (us/cm)	220	220	310	210	210	210	220	240	230	210	190	240	210	210	480	225	217	200
Color (CU)	<5	5	5	5	5	10	15	10	<5	<5	10	<5	<5	<5	<5	10.0	<5	5
Total Cyanide	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.036	<0.005	<0.005	<0.01	<0.005	<0.05
Fluoride	0.22	0.10	0.09	<0.02	0.15	0.02	0.10	0.08	0.04	0.16	0.08	0.04	0.12	0.13	0.10	<0.100	0.12	<0.1
Hardness	85	89	98	92	87	73	90	92	92	93	100	92	93	94	76	94.0	91	82
Nitrate as Nitrogen	--	--	--	--	--	0.03	--	--	--	--	--	0.012	<0.05	0.110	0.240	0.670	0.284	<.9
Nitrate	0.03	0.14	0.29	0.04	0.12	<0.05	0.06	0.26	0.99	<0.05	<0.05	0.012	<0.05	0.110	0.240	--	--	--
Nitrite	0.002	0.006	0.003	0.001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.300
Total Oil & Grease	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	2.1	<1	<1	1.2	2	<4.85	<5	<5
Total Petroleum Hydrocarbons	<1	<1	<1	<1	<1	<1	0.1	<1	<1	<1	<2	<1	<1	<1	<1	<4.85	<0.0381	<5
Total Suspended Solids	<1	4.0	2.0	<1	<1	<1	2.0	1.0	<1	<1	<1	<1	1.0	5.0	3.0	<4.0	<4.0	<2
Sulfate	12.0	18.0	12.0	11.0	8.0	9.0	4.9	4.7	7.9	9.0	11.0	9.6	9.6	10.0	13.0	13.2	9.7	12.0
Surfactants	<0.05	<0.05	<0.05	0.05	0.48	0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Turbidity (NTU)	0.45	0.34	0.58	0.4	0.48	0.30	0.47	0.94	0.05	0.62	0.31	0.68	0.51	0.54	0.78	1.40	1.66	0.88
Total Metals																		
Aluminum	<0.01	<0.01	<0.01	<0.01	0.01	0.02	0.21	0.08	<0.01	<0.01	<0.01	<0.01	<0.01	0.06	<0.01	<0.25	<0.25	<0.40
Antimony	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.003	<0.003	<0.002
Arsenic	0.002	<0.001	0.0026	0.0037	0.0019	0.0039	0.0032	0.0020	0.0037	0.0040	0.0038	0.0024	0.0032	0.0032	0.0026	0.00337	0.00292	0.00360
Barium	0.013	0.015	0.033	0.026	0.022	0.017	0.017	0.015	0.016	0.013	0.014	0.014	0.014	0.015	0.0146	0.0198	0.0156	0.015
Beryllium	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.002
Calcium	15	18	19	18	17	14	17	19	18	18	17	17	17	18	14	17.0	14	<50
Cadmium	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.002
Chromium	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.003	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.00091	<0.002
Copper	<0.001	<0.001	0.004	0.002	0.005	<0.001	0.004	<0.001	0.024	0.004	0.003	<0.001	0.004	<0.001	0.005	<0.001	0.00138	<0.005
Iron	0.14	0.18	0.21	0.24	0.22	0.11	0.26	0.23	0.25	0.21	0.19	0.30	0.30	0.26	0.42	0.303	0.489	0.280
Mercury	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Magnesium	11.0	11.0	12.0	12.0	11.0	9.0	11.0	11.0	11.0	12.0	14.0	12.0	12.0	12.0	10.0	13.1	13.2	12.0
Manganese	0.26	0.32	0.37	0.34	0.34	0.29	0.40	0.43	0.45	0.48	0.51	0.54	0.5	0.44	0.34	0.327	0.349	0.220
Sodium	7.4	7.4	10.0	9.2	7.8	6.6	10.0	7.8	8.5	8.9	8.0	8.3	8.1	8.3	6.3	7.53	8.26	<50
Nickel	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.00359	0.00264	<0.002
Lead	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002
Selenium	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002
Silver	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001	<0.001	<0.002
Thallium	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.004
Zinc	<0.001	<0.001	0.005	0.009	0.008	<0.001	<0.001	0.003	0.038	0.009	0.007	0.010	0.014	0.014	0.008	<0.01	0.013	0.007

Explanation:

(1) Units in mg/L unless otherwise noted. (2) Maximum Contaminate Levels for Groundwater (WAC 173-200).

(3) Beginning 10/24/2007, samples were analyzed by Test America. "<" refers to Test America reporting limit, not instrument detection limit. See attached sample results.

Note that each laboratory has different measuring and reporting limits.

NR = Not reported by lab

Appendix F

2010 Laboratory Analytical and Data Validation Reports

Data Validation Summary

Project Name:	Maury Island Glacier Pit	**Sampling Dates:**	November 8-10, 2010
Project Number:	19897-79698	**Matrices:**	Soil, Forest Duff
Site Location:	Maury Island	**Contract Laboratory:**	OnSite
		Lab Report ID:	1011-121
Analytical Methods:	Arsenic, Cadmium, Lead EPA Method 6020		

Sample Date:	11/8/2010	11/9/2010	11/10/2010
Sample IDs:	1a-S-06-0	3a-Fd-12	3a-S-22-9
	1a-S-D2 (Dup)	3a-S-11-9	3a-S-D1 (Dup)
	1a-Fd-07	31-S-19-0	3a-S-22-18
	1a-FD-D1 (Dup)		
	1a-S-07-0		
	1a-Fd-09		
	1a-S-10-0		

Note: (Dup) = Duplicate of previous sample listed

Quality assurance data reviewed:

	Organic				Inorganic			
	Reported		Results Qualified		Reported		Results Qualified	
	Yes	No	Yes	No	Yes	No	Yes	No
Method Blank		NA			X			X
Matrix Spike and MS Duplicate		NA			X			X
Laboratory Duplicate		NA			X			X
Laboratory Control Sample		NA				X		X
Initial and Continuing Calibration		NA				X		X
Surrogate Spikes		NA				NA		

Notes:
NA = Not applicable or Not analyzed

Comments:

Laboratory quality control analyses were performed on batch-specific samples.

Note: Data validation was performed in accordance with EPA National Functional Guidelines (NFG) for Organic and Inorganic Data Review.

Data Validation Summary

Project Name:	Maury Island Glacier Pit	**Sampling Dates:**	November 8-10, 2010
Project Number:	19897-79698	**Matrices:**	Soil, Forest Duff
Site Location:	Maury Island	**Contract Laboratory:**	OnSite
		Lab Report ID:	1011-121
Analytical Methods:	Arsenic, Cadmium, Lead EPA Method 6020		

Other performance information:

	Reported		Results Qualified	
	Yes	No	Yes	No
Field Records		X		X
Chain of Custody	X			X
Holding Times	X			X
Reporting Limits	X			X
Equipment Rinsate		N/A		
Trip Blanks		N/A		
Field Duplicates	X			X

Summary of data qualifiers:

All data are considered quantitative except for the constituents listed below.

Sample ID	Constituent	Qualifier	Reason

Explanation:

Note: No data were qualified on the basis of field duplicate results. The analysis results and relative percent difference (RPD) for each field duplicate pair are listed on the attached page to demonstrate sample variability.

Validator: Dion Valdez Signed & Dated: Dion Valdez January 10, 2011

Note: Data validation was performed in accordance with EPA National Functional Guidelines (NFG) for Organic and Inorganic Data Review.

Data Validation Summary

Project Name:	Maury Island Glacier Pit	**Sampling Dates:**	November 11-19, 2010
Project Number:	19897-79698	**Matrices:**	Soil, Forest Duff
Site Location:	Maury Island	**Contract Laboratory:**	OnSite
		Lab Report ID:	1011-216
Analytical Methods:	Arsenic, Cadmium, Lead EPA Method 6020		

Sample Date:	11/11/2010	11/15/2010	11/16/2010	11/17/2010
Sample IDs:	2c-fd-38	3c-TP2-18	3e-TP14-Black Layer	1a-S-76-0
	2c-fd-D2 (Dup)	3c-TP3-24	3e-TP1D-FD	1a-FD-74-0
	4c-S-40-0		3e-TP13-24	2a-S-70-0
	3d-S-44-0		3e-P1-0	1a-S-74-0
			3e-TP13-0	1a-S-77-0
				1a-FD-76-0
				2a-S-73-0
				1a-FD-75

Sample Date:	11/18/2010	11/19/2010
Sample IDs:	1a-S-79-0	3d-S-100-0
	3e-S-80	1b-S-94-0
	1a-S-82-9	1b-Fd-94-0
	1A-Fd-84	1b-S-95-0

Note: (Dup) = Duplicate of previous sample listed

Quality assurance data reviewed:

	Organic				Inorganic			
	Reported		Results Qualified		Reported		Results Qualified	
	Yes	No	Yes	No	Yes	No	Yes	No
Method Blank		NA			X			X
Matrix Spike and MS Duplicate		NA			X			X
Laboratory Duplicate		NA			X			X
Laboratory Control Sample		NA				X		X
Initial and Continuing Calibration		NA				X		X
Surrogate Spikes		NA				NA		

Notes:
NA = Not applicable or Not analyzed

Comments:

Laboratory quality control analyses were performed on batch-specific samples.

Note: Data validation was performed in accordance with EPA National Functional Guidelines (NFG) for Organic and Inorganic Data Review.

Data Validation Summary

Project Name:	Maury Island Glacier Pit	**Sampling Dates:**	November 11-19, 2010
Project Number:	19897-79698	**Matrices:**	Soil, Forest Duff
Site Location:	Maury Island	**Contract Laboratory:**	OnSite
		Lab Report ID:	1011-216
Analytical Methods:	Arsenic, Cadmium, Lead EPA Method 6020		

Other performance information:

	Reported		Results Qualified	
	Yes	No	Yes	No
Field Records		X		X
Chain of Custody	X			X
Holding Times	X			X
Reporting Limits	X			X
Equipment Rinsate		N/A		
Trip Blanks		N/A		
Field Duplicates	X			X

Summary of data qualifiers:

All data are considered quantitative except for the constituents listed below.

Sample ID	Constituent	Qualifier	Reason

Explanation:

Note: No data were qualified on the basis of field duplicate results. The analysis results and relative percent difference (RPD) for each field duplicate pair are listed on the attached page to demonstrate sample variability.

Validator: Dion Valdez Signed & Dated: DionValdez January 10, 2011

Note: Data validation was performed in accordance with EPA National Functional Guidelines (NFG) for Organic and Inorganic Data Review.

Soil Field Duplicates

Field Duplicate Soil Sample Results

Wet Weight Analysis Results (mg/kg):

Sample ID	Arsenic	RPD	Cadmium	RPD	Lead	RPD
1a-S-06-0	210	13%	3.4	3%	390	7%
1a-S-D2	240		3.5		420	
1a-Fd-07	60	21%	2.2	10%	360	31%
1a-FD-D1	74		2		490	
3a-S-22-9	59	7%	1.7	6%	89	9%
3a-S-D1	55		1.6		81	
2c-fd-38	45	0%	0.79	41%	260	17%
2c-fd-D2	45		1.2		220	

Dry Weight Analysis Results (mg/kg):

Sample ID	Arsenic	RPD	Cadmium	RPD	Lead	RPD
1a-S-06-0	280	10%	4.4	2%	510	8%
1a-S-D2	310		4.5		550	
1a-Fd-07	120	22%	4.4	12%	730	28%
1a-FD-D1	150		3.9		970	
3a-S-22-9	75	7%	2.2	10%	110	10%
3a-S-D1	70		2		100	
2c-fd-38	65	18%	1.2	15%	390	40%
2c-fd-D2	54		1.4		260	

OnSite
Environmental Inc.

14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

November 23, 2010

Pam Morrill
CDM
14432 SE Eastgate Way, Suite 100
Bellevue, WA 98007-6493

Re: Analytical Data for Project 19897-79698
Laboratory Reference No. 1011-121

Dear Pam:

Enclosed are the analytical results and associated quality control data for samples submitted on November 12, 2010.

The standard policy of OnSite Environmental Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: November 23, 2010
Samples Submitted: November 12, 2010
Laboratory Reference: 1011-121
Project: 19897-79698

Case Narrative

Samples were collected on November 8 and 9, 2010 and received by the laboratory on November 12, 2010. They were maintained at the laboratory at a temperature of 2^oC to 6^oC.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

Date of Report: November 23, 2010
Samples Submitted: November 12, 2010
Laboratory Reference: 1011-121
Project: 19897-79698

TOTAL METALS
EPA 6020

Matrix: Soil
Units: mg/kg (ppm) Dry weight

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	11-121-01					
Client ID:	**1a-S-06-0**					
Arsenic	**280**	6.5	6020	11-18-10	11-19-10	
Cadmium	**4.4**	0.33	6020	11-18-10	11-19-10	
Lead	**510**	6.5	6020	11-18-10	11-19-10	
Lab ID:	11-121-02					
Client ID:	**1a-FD-D1**					
Arsenic	**150**	9.9	6020	11-18-10	11-19-10	
Cadmium	**3.9**	0.49	6020	11-18-10	11-19-10	
Lead	**970**	9.9	6020	11-18-10	11-19-10	
Lab ID:	11-121-03					
Client ID:	**1a-Fd-07**					
Arsenic	**120**	1.0	6020	11-18-10	11-19-10	
Cadmium	**4.4**	0.51	6020	11-18-10	11-19-10	
Lead	**730**	10	6020	11-18-10	11-19-10	
Lab ID:	11-121-04					
Client ID:	**3a-S-D1**					
Arsenic	**70**	0.64	6020	11-18-10	11-19-10	
Cadmium	**2.0**	0.32	6020	11-18-10	11-19-10	
Lead	**100**	0.64	6020	11-18-10	11-19-10	
Lab ID:	11-121-05					
Client ID:	**3a-S-22-9**					
Arsenic	**75**	0.64	6020	11-18-10	11-19-10	
Cadmium	**2.2**	0.32	6020	11-18-10	11-19-10	
Lead	**110**	0.64	6020	11-18-10	11-19-10	

Date of Report: November 23, 2010
Samples Submitted: November 12, 2010
Laboratory Reference: 1011-121
Project: 19897-79698

TOTAL METALS
EPA 6020

Matrix: Soil
Units: mg/kg (ppm) Dry weight

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	11-121-06					
Client ID:	**1a-S07-0**					
Arsenic	**140**	0.66	6020	11-18-10	11-19-10	
Cadmium	**3.3**	0.33	6020	11-18-10	11-19-10	
Lead	**87**	0.66	6020	11-18-10	11-19-10	
Lab ID:	11-121-07					
Client ID:	**1a-Fd-09**					
Arsenic	**160**	0.95	6020	11-18-10	11-19-10	
Cadmium	**2.1**	0.48	6020	11-18-10	11-19-10	
Lead	**420**	9.5	6020	11-18-10	11-19-10	
Lab ID:	11-121-08					
Client ID:	**1a-S-10-0**					
Arsenic	**320**	7.3	6020	11-18-10	11-19-10	
Cadmium	**8.9**	0.37	6020	11-18-10	11-19-10	
Lead	**350**	7.3	6020	11-18-10	11-19-10	
Lab ID:	11-121-09					
Client ID:	**3a-Fd-12**					
Arsenic	**33**	0.87	6020	11-18-10	11-19-10	
Cadmium	**3.6**	0.44	6020	11-18-10	11-19-10	
Lead	**61**	0.87	6020	11-18-10	11-19-10	
Lab ID:	11-121-10					
Client ID:	**3a-S11-9**					
Arsenic	**43**	0.64	6020	11-18-10	11-19-10	
Cadmium	**1.3**	0.32	6020	11-18-10	11-19-10	
Lead	**87**	0.64	6020	11-18-10	11-19-10	

Date of Report: November 23, 2010
Samples Submitted: November 12, 2010
Laboratory Reference: 1011-121
Project: 19897-79698

TOTAL METALS
EPA 6020

Matrix: Soil
Units: mg/kg (ppm) Dry weight

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	11-121-11					
Client ID:	**3a-S22-18**					
Arsenic	**3.7**	0.59	6020	11-18-10	11-19-10	
Cadmium	**ND**	0.30	6020	11-18-10	11-19-10	
Lead	**5.9**	0.59	6020	11-18-10	11-19-10	
Lab ID:	11-121-12					
Client ID:	**3a-S-19-0**					
Arsenic	**280**	7.0	6020	11-18-10	11-19-10	
Cadmium	**4.9**	0.35	6020	11-18-10	11-19-10	
Lead	**330**	7.0	6020	11-18-10	11-19-10	
Lab ID:	11-121-13					
Client ID:	**1a-S-D2**					
Arsenic	**310**	6.5	6020	11-18-10	11-19-10	
Cadmium	**4.5**	0.32	6020	11-18-10	11-19-10	
Lead	**550**	6.5	6020	11-18-10	11-19-10	

Date of Report: November 23, 2010
Samples Submitted: November 12, 2010
Laboratory Reference: 1011-121
Project: 19897-79698

TOTAL METALS
EPA 6020

Matrix: Soil
Units: mg/kg (ppm) Wet weight

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	11-121-01					
Client ID:	**1a-S-06-0**					
Arsenic	**210**	5.0	6020	11-18-10	11-19-10	
Cadmium	**3.4**	0.25	6020	11-18-10	11-19-10	
Lead	**390**	5.0	6020	11-18-10	11-19-10	
Lab ID:	11-121-02					
Client ID:	**1a-FD-D1**					
Arsenic	**74**	5.0	6020	11-18-10	11-19-10	
Cadmium	**2.0**	0.25	6020	11-18-10	11-19-10	
Lead	**490**	5.0	6020	11-18-10	11-19-10	
Lab ID:	11-121-03					
Client ID:	**1a-Fd-07**					
Arsenic	**60**	0.50	6020	11-18-10	11-19-10	
Cadmium	**2.2**	0.25	6020	11-18-10	11-19-10	
Lead	**360**	5.0	6020	11-18-10	11-19-10	
Lab ID:	11-121-04					
Client ID:	**3a-S-D1**					
Arsenic	**55**	0.50	6020	11-18-10	11-19-10	
Cadmium	**1.6**	0.25	6020	11-18-10	11-19-10	
Lead	**81**	0.50	6020	11-18-10	11-19-10	
Lab ID:	11-121-05					
Client ID:	**3a-S-22-9**					
Arsenic	**59**	0.50	6020	11-18-10	11-19-10	
Cadmium	**1.7**	0.25	6020	11-18-10	11-19-10	
Lead	**89**	0.50	6020	11-18-10	11-19-10	

Date of Report: November 23, 2010
Samples Submitted: November 12, 2010
Laboratory Reference: 1011-121
Project: 19897-79698

TOTAL METALS
EPA 6020

Matrix: Soil
Units: mg/kg (ppm) Wet weight

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	11-121-06					
Client ID:	**1a-S07-0**					
Arsenic	**100**	0.50	6020	11-18-10	11-19-10	
Cadmium	**2.5**	0.25	6020	11-18-10	11-19-10	
Lead	**66**	0.50	6020	11-18-10	11-19-10	
Lab ID:	11-121-07					
Client ID:	**1a-Fd-09**					
Arsenic	**82**	0.50	6020	11-18-10	11-19-10	
Cadmium	**1.1**	0.25	6020	11-18-10	11-19-10	
Lead	**220**	5.0	6020	11-18-10	11-19-10	
Lab ID:	11-121-08					
Client ID:	**1a-S-10-0**					
Arsenic	**220**	5.0	6020	11-18-10	11-19-10	
Cadmium	**6.1**	0.25	6020	11-18-10	11-19-10	
Lead	**240**	5.0	6020	11-18-10	11-19-10	
Lab ID:	11-121-09					
Client ID:	**3a-Fd-12**					
Arsenic	**19**	0.50	6020	11-18-10	11-19-10	
Cadmium	**2.1**	0.25	6020	11-18-10	11-19-10	
Lead	**35**	0.50	6020	11-18-10	11-19-10	
Lab ID:	11-121-10					
Client ID:	**3a-S11-9**					
Arsenic	**34**	0.50	6020	11-18-10	11-19-10	
Cadmium	**1.0**	0.25	6020	11-18-10	11-19-10	
Lead	**68**	0.50	6020	11-18-10	11-19-10	

Date of Report: November 23, 2010
Samples Submitted: November 12, 2010
Laboratory Reference: 1011-121
Project: 19897-79698

TOTAL METALS
EPA 6020

Matrix: Soil
Units: mg/kg (ppm) Wet weight

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	11-121-11					
Client ID:	**3a-S22-18**					
Arsenic	**3.1**	0.50	6020	11-18-10	11-19-10	
Cadmium	**ND**	0.25	6020	11-18-10	11-19-10	
Lead	**4.9**	0.50	6020	11-18-10	11-19-10	
Lab ID:	11-121-12					
Client ID:	**3a-S-19-0**					
Arsenic	**200**	5.00	6020	11-18-10	11-19-10	
Cadmium	**3.5**	0.25	6020	11-18-10	11-19-10	
Lead	**240**	5.00	6020	11-18-10	11-19-10	
Lab ID:	11-121-13					
Client ID:	**1a-S-D2**					
Arsenic	**240**	5.0	6020	11-18-10	11-19-10	
Cadmium	**3.5**	0.25	6020	11-18-10	11-19-10	
Lead	**420**	5.0	6020	11-18-10	11-19-10	

Date of Report: November 23, 2010
Samples Submitted: November 12, 2010
Laboratory Reference: 1011-121
Project: 19897-79698

TOTAL METALS
EPA 6020
METHOD BLANK QUALITY CONTROL

Date Extracted: 11-18-10
Date Analyzed: 11-19-10

Matrix: Soil
Units: mg/kg (ppm)

Lab ID: MB1118S2&MB1118S3

Analyte	Method	Result	PQL
Arsenic	6020	**ND**	0.50
Cadmium	6020	**ND**	0.25
Lead	6020	**ND**	0.50

Date of Report: November 23, 2010
Samples Submitted: November 12, 2010
Laboratory Reference: 1011-121
Project: 19897-79698

TOTAL METALS
EPA 6020
DUPLICATE QUALITY CONTROL

Date Extracted: 11-18-10
Date Analyzed: 11-19-10

Matrix: Soil
Units: mg/kg (ppm)

Lab ID: 11-163-01

Analyte	Sample Result	Duplicate Result	RPD	PQL	Flags
Arsenic	**ND**	**ND**	NA	0.50	
Cadmium	**ND**	**ND**	NA	0.25	
Lead	**ND**	**ND**	NA	0.50	

Date of Report: November 23, 2010
Samples Submitted: November 12, 2010
Laboratory Reference: 1011-121
Project: 19897-79698

TOTAL METALS
EPA 6020
MS/MSD QUALITY CONTROL

Date Extracted: 11-18-10
Date Analyzed: 11-19-10

Matrix: Soil
Units: mg/kg (ppm)

Lab ID: 11-163-01

Analyte	Spike Level	MS	Percent Recovery	MSD	Percent Recovery	RPD	Flags
Arsenic	100	**99.2**	99	**98.0**	98	1	
Cadmium	50	**47.9**	96	**47.3**	95	1	
Lead	250	**242**	97	**239**	96	1	

Date of Report: November 23, 2010
Samples Submitted: November 12, 2010
Laboratory Reference: 1011-121
Project: 19897-79698

% MOISTURE

Date Analyzed: 11-18-10

Client ID	Lab ID	% Moisture
1a-S-06-0	11-121-01	23
1a-FD-D1	11-121-02	49
1a-Fd-07	11-121-03	51
3a-S-D1	11-121-04	22
3a-S-22-9	11-121-05	22
1a-S-07-0	11-121-06	24
1a-Fd-09	11-121-07	48
1a-S-10-0	11-121-08	32
3a-Fd-12	11-121-09	43
3a-S-11-9	11-121-10	22
3a-S-22-18	11-121-11	16
3a-S-19-0	11-121-12	29
1a-S-D2	11-121-13	23

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-napthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical ____________.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a mercury cleanup procedure.

Y - Sample extract treated with an acid/silica gel cleanup procedure.

Z -

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

CDM

CHAIN-OF-CUSTODY

Date 11/12/10 Page 1 of 2

PROJECT INFORMATION

Project Manager: Pam Morrill

Project Name: Maury Island

Project Number: 19897-79698

Site Location: Maury Isl. Sampled By: AL/KL

DISPOSAL INFORMATION

☒ Lab Disposal (return if not indicated)

Disposal Method:

Disposed by: Disposal Date:

QC INFORMATION (check one)

☐ SW-846 ☐ CLP ☐ Screening ☐ CDM Std. ☐ Special

Laboratory Number: 11-121

ANALYSIS REQUEST

PETROLEUM HYDROCARBONS: TPH-HCID State: ; TPH-G State: ; TPH-D State: ; TPH-418.1 State: ; 8015M Fuel Hydrocarbon; TPH-Special Instructions

ORGANIC COMPOUNDS: 8010 Halogenated VOCs; 8020 Aromatic VOCs; 8020M - BETX only; 8240 GC/MS Volatiles; 8270 GC/MS Semivolatiles; 8310 PAHs; 8040 Phenols; DWS - Volatiles and Semivolatiles

PESTS/PCBs: 8080 OC Pest/PCBs; 8080M PCBs only; 8140 OP Pesticides; 8150 OC Herbicides; DWS - Herb/Pest

METALS: Selected Metals: list As, Cd, Pb; Organic Lead (Ca); TCL Metals (23); Priority Poll. Metals (13); DWS - Metals; MFSP - Metals (Wa)

LEACHING TESTS: TCLP - Volatiles (ZHE); TCLP - Semivolatiles; TCLP - Pesticides; TCLP - Metals

OTHER: % moisture

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Selected Metals: As, Cd, Pb	% moisture	NUMBER OF CONTAINERS
1a-S-06-0	11/8/10	1340	Soil	1	X	X	1
1a-FD-D1	11/8/10		FD	2	X	X	1
1a-Fd-07	11/8/10	1433	FD	3	X	X	1
3a-S-D1	11/9/10		Soil	4	X	X	1
3a-S-22-9	11/10/10	940	Soil	5	X	X	1
1a-S-07-0	11/8/10	1440	Soil	6	X	X	1
1a-Fd-09	11/8/10	1535	FD	7	X	X	1
1a-S-10-0	11/8/10	1555	Soil	8	X	X	1

LAB INFORMATION

Lab Name: Onsite

Lab Address: Redmond

Via: Courier

SAMPLE RECEIPT

Total Number of Containers:

Chain of Custody Seals: Y/N/NA

Intact?: Y/N/NA

Received in Good Condition/Cold::

Turn Around Time: ☒ Standard ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 1 wk.

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA

Special Instructions: FD = Forest Duff
Analyze material in sample cups. You may use material in plastic bags for dry weight if you wish

	RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature / Time	[signature] 800		
Printed Name / Date	Pamela J Morrill 11/12/10		
Company	CDM		

	RECEIVED BY: 1.	RECEIVED BY: 2.	RECEIVED BY: 3.
Signature / Time	[signature] 11/12/10		
Printed Name / Date	MVOW 1300		
Company	OSE		

CDM Offices: Bellevue: (425) 519-8300
Seattle: (206) 336-4900

DISTRIBUTION: White, Canary to Analytical Laboratory; Pink to CDM Project Files; Gold to CDM Disposal Files

form/field/chain of custody; p65

CDM

CHAIN-OF-CUSTODY

Date 11/12/10 Page 2 of 2

Laboratory Number: 11-121

PROJECT INFORMATION

Project Manager: Pam Morrill

Project Name: Maury Island

Project Number: 19897-79698

Site Location: Maury Island Sampled By: AL/KL

DISPOSAL INFORMATION

[✓ Lab Disposal] (return if not indicated)

Disposal Method:

Disposed by: Disposal Date:

QC INFORMATION (check one)

☐ SW-846 ☐ CLP ☐ Screening ☐ CDM Std. ☐ Special

ANALYSIS REQUEST

PETROLEUM HYDROCARBONS: TPH-HCID State:; TPH-G State:; TPH-D State:; TPH-418.1 State:; 8015M Fuel Hydrocarbon; TPH-Special Instructions

ORGANIC COMPOUNDS: 8010 Halogenated VOCs; 8020 Aromatic VOCs; 8020M - BETX only; 8240 GC/MS Volatiles; 8270 GC/MS Semivolatiles; 8310 PAHs; 8040 Phenols; DWS - Volatiles and Semivolatiles

PESTS/PCBs: 8080 OC Pest/PCBs; 8080M PCBs only; 8140 OP Pesticides; 8150 OC Herbicides; DWS - Herb/Pest

METALS: Selected Metals: list As, Cd, Pb; Organic Lead (Ca); TCL Metals (23); Priority Poll. Metals (13); DWS - Metals; MFSP - Metals (Wa)

LEACHING TESTS: TCLP - Volatiles (ZHE); TCLP - Semivolatiles; TCLP - Pesticides; TCLP - Metals

OTHER: % moisture

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Selected Metals: list As, Cd, Pb	% moisture	NUMBER OF CONTAINERS
3a-Fd-12	11/9/10	1010	FD	9	X	X	1
3a-S-11-9	11/9/10	0908	Soil	10	X		1
3a-S-22-18	11/10/10	955	Soil	11	X		1
3a-S-19-0	11/9/10	1610	Soil	12	X		1
1a-S-02	11/8/10		Soil	13	X		1

LAB INFORMATION

Lab Name: Onsite

Lab Address: Redmond

Via: Courier

SAMPLE RECEIPT

Total Number of Containers:

Chain of Custody Seals: Y/N/NA

Intact?: Y/N/NA

Received in Good Condition/Cold::

Turn Around Time: [✓ Standard] ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 1 wk.

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA

Special Instructions:

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: [illegible] Time: 800	Signature: Time:	Signature: Time:
Printed Name: Pamela J Morrill Date: 11/12/10	Printed Name: Date:	Printed Name: Date:
Company: CDM	Company:	Company:

RECEIVED BY: 1.	RECEIVED BY: 2.	RECEIVED BY: 3.
Signature: [illegible] Time: 11/12/10	Signature: Time:	Signature: Time:
Printed Name: M Voun Date: 1300	Printed Name: Date:	Printed Name: Date:
Company: OSE	Company:	Company:

OnSite Environmental Inc.
14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

December 3, 2010

Pam Morrill
CDM
14432 SE Eastgate Way, Suite 100
Bellevue, WA 98007-6493

Re: Analytical Data for Project 19897-79698
Laboratory Reference No. 1011-216

Dear Pam:

Enclosed are the analytical results and associated quality control data for samples submitted on November 24, 2010.

The standard policy of OnSite Environmental Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: December 3, 2010
Samples Submitted: November 24, 2010
Laboratory Reference: 1011-216
Project: 19897-79698

Case Narrative

Samples were collected on November 11,15, 16, 17, 18, and 19, 2010 and received by the laboratory on November 24, 2010. They were maintained at the laboratory at a temperature of 2^oC to 6^oC.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

Date of Report: December 3, 2010
Samples Submitted: November 24, 2010
Laboratory Reference: 1011-216
Project: 19897-79698

TOTAL METALS
(Wet Weight Values)
EPA 6020

Matrix: Soil
Units: mg/kg (ppm) wet weight

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	11-216-01					
Client ID:	**2c-fd-38**					
Arsenic	**45**	0.50	6020	12-1-10	12-2-10	
Cadmium	**0.79**	0.15	6020	12-1-10	12-2-10	
Lead	**260**	0.50	6020	12-1-10	12-2-10	
Lab ID:	11-216-02					
Client ID:	**2c-fd-D2**					
Arsenic	**45**	0.50	6020	12-1-10	12-2-10	
Cadmium	**1.2**	0.15	6020	12-1-10	12-2-10	
Lead	**220**	0.50	6020	12-1-10	12-2-10	
Lab ID:	11-216-03					
Client ID:	**4c-S-40-0**					
Arsenic	**9.4**	0.50	6020	12-1-10	12-2-10	
Cadmium	**0.18**	0.15	6020	12-1-10	12-2-10	
Lead	**9.6**	0.50	6020	12-1-10	12-2-10	
Lab ID:	11-216-04					
Client ID:	**3d-S-44-0**					
Arsenic	**58**	0.50	6020	12-1-10	12-2-10	
Cadmium	**2.3**	0.15	6020	12-1-10	12-2-10	
Lead	**240**	0.50	6020	12-1-10	12-2-10	
Lab ID:	11-216-05					
Client ID:	**3e-TP14-Black layer**					
Arsenic	**65**	0.50	6020	12-1-10	12-2-10	
Cadmium	**1.7**	0.15	6020	12-1-10	12-2-10	
Lead	**260**	0.50	6020	12-1-10	12-2-10	

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Project: 19897-79698

TOTAL METALS
(Wet Weight Values)
EPA 6020

Matrix: Soil
Units: mg/kg (ppm) wet weight

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	11-216-06					
Client ID:	**1a-S-76-0**					
Arsenic	**140**	0.50	6020	12-1-10	12-2-10	
Cadmium	**1.4**	0.15	6020	12-1-10	12-2-10	
Lead	**150**	0.50	6020	12-1-10	12-2-10	
Lab ID:	11-216-07					
Client ID:	**1a-FD-74-0**					
Arsenic	**45**	0.50	6020	12-1-10	12-2-10	
Cadmium	**2.3**	0.15	6020	12-1-10	12-2-10	
Lead	**220**	0.50	6020	12-1-10	12-2-10	
Lab ID:	11-216-08					
Client ID:	**2a-s-70-0**					
Arsenic	**2.8**	0.50	6020	12-1-10	12-2-10	
Cadmium	**ND**	0.15	6020	12-1-10	12-2-10	
Lead	**2.4**	0.50	6020	12-1-10	12-2-10	
Lab ID:	11-216-09					
Client ID:	**1a-S-74-0**					
Arsenic	**77**	0.50	6020	12-1-10	12-2-10	
Cadmium	**1.8**	0.15	6020	12-1-10	12-2-10	
Lead	**71**	0.50	6020	12-1-10	12-2-10	
Lab ID:	11-216-10					
Client ID:	**3e-TP10-FD**					
Arsenic	**2.7**	0.50	6020	12-1-10	12-2-10	
Cadmium	**0.22**	0.15	6020	12-1-10	12-2-10	
Lead	**6.6**	0.50	6020	12-1-10	12-2-10	

Date of Report: December 3, 2010
Samples Submitted: November 24, 2010
Laboratory Reference: 1011-216
Project: 19897-79698

TOTAL METALS
(Wet Weight Values)
EPA 6020

Matrix: Soil
Units: mg/kg (ppm) wet weight

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	11-216-11					
Client ID:	**3c-TP2-18**					
Arsenic	**3.7**	0.50	6020	12-1-10	12-2-10	
Cadmium	**ND**	0.15	6020	12-1-10	12-2-10	
Lead	**3.9**	0.50	6020	12-1-10	12-2-10	
Lab ID:	11-216-12					
Client ID:	**3c-TP3-24**					
Arsenic	**2.4**	0.50	6020	12-1-10	12-2-10	
Cadmium	**ND**	0.15	6020	12-1-10	12-2-10	
Lead	**3.7**	0.50	6020	12-1-10	12-2-10	
Lab ID:	11-216-13					
Client ID:	**1a-S-77-0**					
Arsenic	**130**	0.50	6020	12-1-10	12-2-10	
Cadmium	**3.0**	0.15	6020	12-1-10	12-2-10	
Lead	**52**	0.50	6020	12-1-10	12-2-10	
Lab ID:	11-216-14					
Client ID:	**3e-TP13-24**					
Arsenic	**25**	0.50	6020	12-1-10	12-2-10	
Cadmium	**0.60**	0.15	6020	12-1-10	12-2-10	
Lead	**40**	0.50	6020	12-1-10	12-2-10	
Lab ID:	11-216-15					
Client ID:	**1a-S-79-0**					
Arsenic	**230**	0.50	6020	12-1-10	12-2-10	
Cadmium	**8.9**	0.15	6020	12-1-10	12-2-10	
Lead	**350**	0.50	6020	12-1-10	12-2-10	

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Samples Submitted: November 24, 2010
Laboratory Reference: 1011-216
Project: 19897-79698

TOTAL METALS
(Wet Weight Values)
EPA 6020

Matrix: Soil
Units: mg/kg (ppm) wet weight

Analyte	**Result**	**PQL**	**EPA Method**	**Date Prepared**	**Date Analyzed**	**Flags**
Lab ID:	11-216-16					
Client ID:	**3d-S-100-0**					
Arsenic	**24**	0.50	6020	12-1-10	12-2-10	
Cadmium	**1.2**	0.15	6020	12-1-10	12-2-10	
Lead	**35**	0.50	6020	12-1-10	12-2-10	
Lab ID:	11-216-17					
Client ID:	**1b-S-94-0**					
Arsenic	**59**	0.50	6020	12-1-10	12-2-10	
Cadmium	**1.2**	0.15	6020	12-1-10	12-2-10	
Lead	**43**	0.50	6020	12-1-10	12-2-10	
Lab ID:	11-216-18					
Client ID:	**1a-FD-76-0**					
Arsenic	**8.1**	0.50	6020	12-1-10	12-2-10	
Cadmium	**0.61**	0.15	6020	12-1-10	12-2-10	
Lead	**57**	0.50	6020	12-1-10	12-2-10	

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TOTAL METALS
(Wet Weight Values)
EPA 6020

Matrix: Soil
Units: mg/kg (ppm) wet weight

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	11-216-19					
Client ID:	**3e-S-80-0**					
Arsenic	**12**	0.50	6020	12-1-10	12-2-10	
Cadmium	**0.36**	0.15	6020	12-1-10	12-2-10	
Lead	**18**	0.50	6020	12-1-10	12-2-10	
Lab ID:	11-216-20					
Client ID:	**2a-S-73-0**					
Arsenic	**4.2**	0.50	6020	12-1-10	12-2-10	
Cadmium	**0.17**	0.15	6020	12-1-10	12-2-10	
Lead	**8.6**	0.50	6020	12-1-10	12-2-10	
Lab ID:	11-216-21					
Client ID:	**3e-P1-0**					
Arsenic	**31**	0.50	6020	12-1-10	12-2-10	
Cadmium	**0.83**	0.15	6020	12-1-10	12-2-10	
Lead	**53**	0.50	6020	12-1-10	12-2-10	
Lab ID:	11-216-22					
Client ID:	**1a-S-82-9**					
Arsenic	**9.8**	0.50	6020	12-1-10	12-2-10	
Cadmium	**0.89**	0.15	6020	12-1-10	12-2-10	
Lead	**7.4**	0.50	6020	12-1-10	12-2-10	
Lab ID:	11-216-23					
Client ID:	**3e-TP13-0**					
Arsenic	**7.1**	0.50	6020	12-1-10	12-2-10	
Cadmium	**0.45**	0.15	6020	12-1-10	12-2-10	
Lead	**130**	0.50	6020	12-1-10	12-2-10	

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TOTAL METALS
(Wet Weight Values)
EPA 6020

Matrix: Soil
Units: mg/kg (ppm) wet weight

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	11-216-24					
Client ID:	**1b-Fd-94-0**					
Arsenic	**26**	0.50	6020	12-1-10	12-2-10	
Cadmium	**0.57**	0.15	6020	12-1-10	12-2-10	
Lead	**67**	0.50	6020	12-1-10	12-2-10	
Lab ID:	11-216-25					
Client ID:	**1a-FD-75**					
Arsenic	**72**	0.50	6020	12-1-10	12-2-10	
Cadmium	**2.3**	0.15	6020	12-1-10	12-2-10	
Lead	**210**	0.50	6020	12-1-10	12-2-10	
Lab ID:	11-216-26					
Client ID:	**1A-FD-84**					
Arsenic	**64**	0.50	6020	12-1-10	12-2-10	
Cadmium	**2.2**	0.15	6020	12-1-10	12-2-10	
Lead	**150**	0.50	6020	12-1-10	12-2-10	
Lab ID:	11-216-27					
Client ID:	**1b-S-95-0**					
Arsenic	**85**	0.50	6020	12-1-10	12-2-10	
Cadmium	**3.8**	0.15	6020	12-1-10	12-2-10	
Lead	**530**	0.50	6020	12-1-10	12-2-10	

Date of Report: December 3, 2010
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Laboratory Reference: 1011-216
Project: 19897-79698

TOTAL METALS
(Dry Weight Values)
EPA 6020

Matrix: Soil
Units: mg/kg (ppm) dry weight

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	11-216-01					
Client ID:	**2c-fd-38**					
Arsenic	**65**	0.74	6020	12-1-10	12-2-10	
Cadmium	**1.2**	0.22	6020	12-1-10	12-2-10	
Lead	**390**	0.74	6020	12-1-10	12-2-10	
Lab ID:	11-216-02					
Client ID:	**2c-fd-D2**					
Arsenic	**54**	0.60	6020	12-1-10	12-2-10	
Cadmium	**1.4**	0.18	6020	12-1-10	12-2-10	
Lead	**260**	0.60	6020	12-1-10	12-2-10	
Lab ID:	11-216-03					
Client ID:	**4c-S-40-0**					
Arsenic	**10**	0.55	6020	12-1-10	12-2-10	
Cadmium	**0.20**	0.17	6020	12-1-10	12-2-10	
Lead	**11**	0.55	6020	12-1-10	12-2-10	
Lab ID:	11-216-04					
Client ID:	**3d-S-44-0**					
Arsenic	**90**	0.78	6020	12-1-10	12-2-10	
Cadmium	**3.6**	0.23	6020	12-1-10	12-2-10	
Lead	**370**	0.78	6020	12-1-10	12-2-10	
Lab ID:	11-216-05					
Client ID:	**3e-TP14-Black layer**					
Arsenic	**95**	0.73	6020	12-1-10	12-2-10	
Cadmium	**2.5**	0.22	6020	12-1-10	12-2-10	
Lead	**380**	0.73	6020	12-1-10	12-2-10	

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TOTAL METALS
(Dry Weight Values)
EPA 6020

Matrix: Soil
Units: mg/kg (ppm) dry weight

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	11-216-06					
Client ID:	**1a-S-76-0**					
Arsenic	**190**	0.65	6020	12-1-10	12-2-10	
Cadmium	**1.8**	0.20	6020	12-1-10	12-2-10	
Lead	**190**	0.65	6020	12-1-10	12-2-10	
Lab ID:	11-216-07					
Client ID:	**1a-FD-74-0**					
Arsenic	**110**	1.2	6020	12-1-10	12-2-10	
Cadmium	**5.4**	0.36	6020	12-1-10	12-2-10	
Lead	**510**	1.2	6020	12-1-10	12-2-10	
Lab ID:	11-216-08					
Client ID:	**2a-s-70-0**					
Arsenic	**3.0**	0.53	6020	12-1-10	12-2-10	
Cadmium	**ND**	0.16	6020	12-1-10	12-2-10	
Lead	**2.6**	0.53	6020	12-1-10	12-2-10	
Lab ID:	11-216-09					
Client ID:	**1a-S-74-0**					
Arsenic	**100**	0.65	6020	12-1-10	12-2-10	
Cadmium	**2.3**	0.20	6020	12-1-10	12-2-10	
Lead	**93**	0.65	6020	12-1-10	12-2-10	
Lab ID:	11-216-10					
Client ID:	**3e-TP10-FD**					
Arsenic	**8.0**	1.5	6020	12-1-10	12-2-10	
Cadmium	**0.66**	0.46	6020	12-1-10	12-2-10	
Lead	**20**	1.5	6020	12-1-10	12-2-10	

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TOTAL METALS
(Dry Weight Values)
EPA 6020

Matrix: Soil
Units: mg/kg (ppm) dry weight

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	11-216-11					
Client ID:	**3c-TP2-18**					
Arsenic	**4.6**	0.63	6020	12-1-10	12-2-10	
Cadmium	**ND**	0.19	6020	12-1-10	12-2-10	
Lead	**4.8**	0.63	6020	12-1-10	12-2-10	
Lab ID:	11-216-12					
Client ID:	**3c-TP3-24**					
Arsenic	**2.5**	0.52	6020	12-1-10	12-2-10	
Cadmium	**ND**	0.16	6020	12-1-10	12-2-10	
Lead	**3.9**	0.52	6020	12-1-10	12-2-10	
Lab ID:	11-216-13					
Client ID:	**1a-S-77-0**					
Arsenic	**150**	0.55	6020	12-1-10	12-2-10	
Cadmium	**3.3**	0.17	6020	12-1-10	12-2-10	
Lead	**57**	0.55	6020	12-1-10	12-2-10	
Lab ID:	11-216-14					
Client ID:	**3e-TP13-24**					
Arsenic	**27**	0.54	6020	12-1-10	12-2-10	
Cadmium	**0.64**	0.16	6020	12-1-10	12-2-10	
Lead	**43**	0.54	6020	12-1-10	12-2-10	
Lab ID:	11-216-15					
Client ID:	**1a-S-79-0**					
Arsenic	**270**	0.59	6020	12-1-10	12-2-10	
Cadmium	**11**	0.18	6020	12-1-10	12-2-10	
Lead	**420**	0.59	6020	12-1-10	12-2-10	

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TOTAL METALS
(Dry Weight Values)
EPA 6020

Matrix: Soil
Units: mg/kg (ppm) dry weight

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	11-216-16					
Client ID:	**3d-S-100-0**					
Arsenic	**32**	0.68	6020	12-1-10	12-2-10	
Cadmium	**1.6**	0.20	6020	12-1-10	12-2-10	
Lead	**48**	0.68	6020	12-1-10	12-2-10	
Lab ID:	11-216-17					
Client ID:	**1b-S-94-0**					
Arsenic	**75**	0.64	6020	12-1-10	12-2-10	
Cadmium	**1.5**	0.19	6020	12-1-10	12-2-10	
Lead	**54**	0.64	6020	12-1-10	12-2-10	
Lab ID:	11-216-18					
Client ID:	**1a-FD-76-0**					
Arsenic	**33**	2.0	6020	12-1-10	12-2-10	
Cadmium	**2.5**	0.61	6020	12-1-10	12-2-10	
Lead	**230**	2.0	6020	12-1-10	12-2-10	

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TOTAL METALS
(Dry Weight Values)
EPA 6020

Matrix: Soil
Units: mg/kg (ppm) dry weight

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	11-216-19					
Client ID:	**3e-S-80-0**					
Arsenic	**14**	0.59	6020	12-1-10	12-2-10	
Cadmium	**0.43**	0.18	6020	12-1-10	12-2-10	
Lead	**21**	0.59	6020	12-1-10	12-2-10	
Lab ID:	11-216-20					
Client ID:	**2a-S-73-0**					
Arsenic	**4.3**	0.51	6020	12-1-10	12-2-10	
Cadmium	**0.18**	0.15	6020	12-1-10	12-2-10	
Lead	**8.8**	0.51	6020	12-1-10	12-2-10	
Lab ID:	11-216-21					
Client ID:	**3e-P1-0**					
Arsenic	**39**	0.63	6020	12-1-10	12-2-10	
Cadmium	**1.0**	0.19	6020	12-1-10	12-2-10	
Lead	**66**	0.63	6020	12-1-10	12-2-10	
Lab ID:	11-216-22					
Client ID:	**1a-S-82-9**					
Arsenic	**12**	0.60	6020	12-1-10	12-2-10	
Cadmium	**1.1**	0.18	6020	12-1-10	12-2-10	
Lead	**8.9**	0.60	6020	12-1-10	12-2-10	
Lab ID:	11-216-23					
Client ID:	**3e-TP13-0**					
Arsenic	**7.2**	0.51	6020	12-1-10	12-2-10	
Cadmium	**0.46**	0.15	6020	12-1-10	12-2-10	
Lead	**130**	0.51	6020	12-1-10	12-2-10	

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TOTAL METALS
(Dry Weight Values)
EPA 6020

Matrix: Soil
Units: mg/kg (ppm) dry weight

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	11-216-24					
Client ID:	**1b-Fd-94-0**					
Arsenic	**80**	1.6	6020	12-1-10	12-2-10	
Cadmium	**1.8**	0.47	6020	12-1-10	12-2-10	
Lead	**210**	1.6	6020	12-1-10	12-2-10	
Lab ID:	11-216-25					
Client ID:	**1a-FD-75**					
Arsenic	**150**	1.0	6020	12-1-10	12-2-10	
Cadmium	**4.7**	0.31	6020	12-1-10	12-2-10	
Lead	**440**	1.0	6020	12-1-10	12-2-10	
Lab ID:	11-216-26					
Client ID:	**1A-FD-84**					
Arsenic	**110**	0.85	6020	12-1-10	12-2-10	
Cadmium	**3.8**	0.26	6020	12-1-10	12-2-10	
Lead	**260**	0.85	6020	12-1-10	12-2-10	
Lab ID:	11-216-27					
Client ID:	**1b-S-95-0**					
Arsenic	**150**	0.88	6020	12-1-10	12-2-10	
Cadmium	**6.7**	0.26	6020	12-1-10	12-2-10	
Lead	**930**	0.88	6020	12-1-10	12-2-10	

Date of Report: December 3, 2010
Samples Submitted: November 24, 2010
Laboratory Reference: 1011-216
Project: 19897-79698

TOTAL METALS
EPA 6020
METHOD BLANK QUALITY CONTROL

Date Extracted:	12-1-10
Date Analyzed:	12-2-10
Matrix:	Soil
Units:	mg/kg (ppm)
Lab ID:	MB1201S3

Analyte	Method	Result	PQL
Arsenic	6020	**ND**	0.50
Cadmium	6020	**ND**	0.15
Lead	6020	**ND**	0.50

Date of Report: December 3, 2010
Samples Submitted: November 24, 2010
Laboratory Reference: 1011-216
Project: 19897-79698

TOTAL METALS
EPA 6020
METHOD BLANK QUALITY CONTROL

Date Extracted: 12-1-10
Date Analyzed: 12-2-10

Matrix: Soil
Units: mg/kg (ppm)

Lab ID: MB1201S5

Analyte	Method	Result	PQL
Arsenic	6020	**ND**	0.50
Cadmium	6020	**ND**	0.15
Lead	6020	**ND**	0.50

Date of Report: December 3, 2010
Samples Submitted: November 24, 2010
Laboratory Reference: 1011-216
Project: 19897-79698

TOTAL METALS
EPA 6020
DUPLICATE QUALITY CONTROL

Date Extracted: 12-1-10
Date Analyzed: 12-2-10

Matrix: Soil
Units: mg/kg (ppm)

Lab ID: 12-001-01

Analyte	Sample Result	Duplicate Result	RPD	PQL	Flags
Arsenic	**2.03**	**2.06**	2	0.5	
Cadmium	**ND**	**ND**	NA	0.15	
Lead	**8.44**	**8.16**	3	0.5	

Date of Report: December 3, 2010
Samples Submitted: November 24, 2010
Laboratory Reference: 1011-216
Project: 19897-79698

TOTAL METALS
EPA 6020
DUPLICATE QUALITY CONTROL

Date Extracted: 12-1-10
Date Analyzed: 12-2-10

Matrix: Soil
Units: mg/kg (ppm)

Lab ID: 12-001-03

Analyte	Sample Result	Duplicate Result	RPD	PQL	Flags
Arsenic	**2.24**	**2.17**	3	0.50	
Cadmium	**ND**	**ND**	NA	0.15	
Lead	**8.48**	**8.42**	1	0.50	

Date of Report: December 3, 2010
Samples Submitted: November 24, 2010
Laboratory Reference: 1011-216
Project: 19897-79698

TOTAL METALS
EPA 6020
MS/MSD QUALITY CONTROL

Date Extracted: 12-1-10
Date Analyzed: 12-2-10

Matrix: Soil
Units: mg/kg (ppm)

Lab ID: 12-001-01

Analyte	Spike Level	MS	Percent Recovery	MSD	Percent Recovery	RPD	Flags
Arsenic	100	**84.2**	82	**84.6**	83	0	
Cadmium	50	**49.7**	99	**48.6**	97	2	
Lead	250	**257**	99	**254**	98	1	

Date of Report: December 3, 2010
Samples Submitted: November 24, 2010
Laboratory Reference: 1011-216
Project: 19897-79698

TOTAL METALS
EPA 6020
MS/MSD QUALITY CONTROL

Date Extracted: 12-1-10
Date Analyzed: 12-2-10

Matrix: Soil
Units: mg/kg (ppm)

Lab ID: 12-001-03

Analyte	Spike Level	MS	Percent Recovery	MSD	Percent Recovery	RPD	Flags
Arsenic	100	**77.6**	75	**79.0**	77	2	
Cadmium	50	**45.7**	91	**46.0**	92	1	
Lead	250	**234**	90	**228**	88	2	

Date of Report: December 3, 2010
Samples Submitted: November 24, 2010
Laboratory Reference: 1011-216
Project: 19897-79698

% MOISTURE

Date Analyzed: 12-1-10

Client ID	Lab ID	% Moisture
2c-Fd-38	11-216-01	32
2c-Fd-D2	11-216-02	16
4c-S-40-0	11-216-03	10
3d-S-44-0	11-216-04	36
3e-TP14-Black layer	11-216-05	31
1a-S-76-0	11-216-06	23
1a-FD-74-0	11-216-07	58
2a-S-70-0	11-216-08	6
1a-S-74-0	11-216-09	23
3e-TP1D-FD	11-216-10	67
3c-TP2-18	11-216-11	20
3c-TP3-24	11-216-12	5
1a-S-77-0	11-216-13	10
3e-TP13-24	11-216-14	7
1a-S-79-0	11-216-15	16
3d-S-100-0	11-216-16	26
1b-S-94-0	11-216-17	21
1a-FD-76-0	11-216-18	75
3e-S-80-0	11-216-19	16
2a-S-73-0	11-216-20	2
3e-Pl-0	11-216-21	20
1a-S-82-9	11-216-22	17
3e-TP13-0	11-216-23	2
1b-Fd-94-0	11-216-24	68
1a-FD-75	11-216-25	52
1A-FD-84	11-216-26	42
1b-S-95-0	11-216-27	43

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-napthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical ____________.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a mercury cleanup procedure.

Y - Sample extract treated with an acid/silica gel cleanup procedure.

Z -

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

CDM

CHAIN-OF-CUSTODY

Date ~~11/15/10~~ 11/22/10 ay Page 1 of ~~3~~ 4 DB

PROJECT INFORMATION	
Project Manager:	PAM MORRILL
Project Name:	MAURY ISLAND
Project Number:	19897 - 71628
Site Location:	MAURY ISLAND
Sampled By:	AL/KL

DISPOSAL INFORMATION

☑ Lab Disposal (return if not indicated)

Disposal Method:

Disposed by: Disposal Date:

QC INFORMATION (check one)

☐ SW-846 ☐ CLP ☐ Screening ☐ CDM Std. ☐ Special

Laboratory Number: 11-216

ANALYSIS REQUEST

PETROLEUM HYDROCARBONS: TPH-HCID State:; TPH-G State:; TPH-D State:; TPH-418.1 State:; 8015M Fuel Hydrocarbon; TPH Special Instructions

ORGANIC COMPOUNDS: 8010 Halogenated VOCs; 8020 Aromatic VOCs; 8020M - BETX only; 8240 GC/MS Volatiles; 8270 GC/MS Semivolatiles; 8310 PAHs; 8040 Phenols; DWS - Volatiles and Semivolatiles

PESTS/PCBs: 8080 OC Pest/PCBs; 8080M PCBs only; 8140 OP Pesticides; 8150 OC Herbicides; DWS - Herb/Pest

METALS: Selected Metals: list As, Cd, Pb; Organic Lead (Ca); TCL Metals (23); Priority Poll. Metals (13); DWS - Metals; MFSP - Metals (Wa)

LEACHING TESTS: TCLP - Volatiles (ZHE); TCLP - Semivolatiles; TCLP - Pesticides; TCLP - Metals

OTHER: % moisture

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Selected Metals: As, Cd, Pb	% moisture	NUMBER OF CONTAINERS
2a-fd-38	11/11/10	11:40	FD	1	X	X	1
2c-fd-D2	11/11/10	11:40	FD	2	X	X	1
4c-S-40-0	11/11/10	12:24	Soil	3	X	X	1
3d-S-44-0	11/11/10	15:05	Soil	4	X	X	1
3e-TP14-Black layer	11/16/10	1552	S/FD	5	X	X	1
1a-S-76-0	11/17/10	1520	Soil	6	X	X	1
1a-FD-74-0	11/17/10	1430	FD	7	X	X	1
2a-S-70-0	11/17/10	1255	Soil	8	X	X	1

LAB INFORMATION	
Lab Name:	OnSite
Lab Address:	
Via:	Courier

SAMPLE RECEIPT	
Total Number of Containers:	
Chain-of-Custody Seals: Y/N/NA	
Intact?: Y/N/NA	
Received in Good Condition/Cold:	

Turn Around Time: ☐ Standard ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☑ 1 wk.

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA

Special Instructions: Detection Limits: As - 1.0 ppm Cd - 0.5 ppm Pb - 1.0 ppm
Analyze from the cups
Report Wet and Dry Weight Values.

	RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature:	[signature]		
Time:	1700		
Printed Name:	Alexis Lopez		
Date:	11/22/10		
Company:	CDM		

	RECEIVED BY: 1.	RECEIVED BY: 2.	RECEIVED BY: 3.
Signature:	[signature]		
Time:	1010		
Printed Name:	Blair Goodrow		
Date:	11/24/10		
Company:	OnSite Env.		

CDM

CHAIN-OF-CUSTODY

Date 11/22/10 Page 2 of 4 DB

PROJECT INFORMATION

Project Manager: Pam Morrill

Project Name: Maury Island

Project Number: 19897-79698

Site Location: Maury Island Sampled By: [illegible] / KL

Laboratory Number: 11-216

DISPOSAL INFORMATION

☒ Lab Disposal (return if not indicated)

Disposal Method:

Disposed by: Disposal Date:

QC INFORMATION (check one)

☐ SW-846 ☐ CLP ☐ Screening ☐ CDM Std. ☐ Special

ANALYSIS REQUEST

PETROLEUM HYDROCARBONS: TPH-HCID State: | TPH-G State: | TPH-D State: | TPH-418.1 State: | 8015M Fuel Hydrocarbon | TPH Special Instructions

ORGANIC COMPOUNDS: 8010 Halogenated VOCs | 8020 Aromatic VOCs | 8020M - BETX only | 8240 GC/MS Volatiles | 8270 GC/MS Semivolatiles | 8310 PAHs | 8040 Phenols | DWS - Volatiles and Semivolatiles

PESTS/PCBs: 8080 OC Pest/PCBs | 8080M PCBs only | 8140 OP Pesticides | 8150 OC Herbicides | DWS - Herb/Pest

METALS: Selected Metals: list As Cd Pb | Organic Lead (Ca) | TCL Metals (23) | Priority Poll. Metals (13) | DWS - Metals | MFSP - Metals (Wa)

LEACHING TESTS: TCLP - Volatiles (ZHE) | TCLP - Semivolatiles | TCLP - Pesticides | TCLP - Metals

OTHER: % Moisture

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Selected Metals: list As Cd Pb	% Moisture	NUMBER OF CONTAINERS
1a-S-74-0	11/17/10	1413	Soil	9	X	X	1
3e-TP1D-FD	11/16/10	1042	FD	10	X	X	1
3c-TP2-18	11/15/10	1032	Soil	11	X	X	1
3c-TP3-24	11/15/10	1122	soil	12	X	X	1
1a-S-77-0	11/17/10	1530	soil	13	X	X	1
3e-TP13-24	11/16/10	1456	soil	14	X	X	1
1a-S-79-0	11/18/10	0938	soil	15	X	X	1
3d-S-100-0	11/19/10	1333		16	X	X	

LAB INFORMATION

Lab Name: Onsite

Lab Address:

Via: Courier

SAMPLE RECEIPT

Total Number of Containers:

Chain-of-Custody Seals: Y/N/NA

Intact?: Y/N/NA

Received in Good Condition/Cold: ✓

Turn Around Time: ☐ Standard ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☒ 1 wk.

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA

Special Instructions:

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: [signature] Time: 1700	Signature: Time:	Signature: Time:
Printed Name: Alexis López Date: 11/22/10	Printed Name: Date:	Printed Name: Date:
Company:	Company:	Company:

RECEIVED BY: 1.	RECEIVED BY: 2.	RECEIVED BY: 3.
Signature: [signature] Time: 1700	Signature: Time:	Signature: Time:
Printed Name: Blair Goodrow Date: 11/22/10	Printed Name: Date:	Printed Name: Date:
Company: On Site Env	Company:	Company:

CDM OFFICES: Bellevue: (206) 453-8383
Portland: (503) 232-1800

rev. 2/02

DISTRIBUTION: White, Canary to Analytical Laboratory; Pink to CDM Project Files; Gold to CDM Disposal Files

forms\field\chainofcustody.p65

CDM

CHAIN-OF-CUSTODY

Date 11/22/10 Page 3 of ~~34~~ 108

PROJECT INFORMATION	
Project Manager:	Pam Morrill
Project Name:	Maury Island
Project Number:	19894-79698
Site Location:	Maury Island — Sampled By: AL/KL

DISPOSAL INFORMATION

☑ Lab Disposal (return if not indicated)

Disposal Method: ______

Disposed by: ______ Disposal Date: ______

QC INFORMATION (check one)

☐ SW-846 ☐ CLP ☐ Screening ☐ CDM Std. ☐ Special

Laboratory Number: 11-216

ANALYSIS REQUEST

- PETROLEUM HYDROCARBONS: TPH-HCID State:; TPH-G State:; TPH-D State:; TPH-418.1 State:; 8015M Fuel Hydrocarbon; TPH-Special Instructions
- ORGANIC COMPOUNDS: 8010 Halogenated VOCs; 8020 Aromatic VOCs; 8020M - BETX only; 8240 GC/MS Volatiles; 8270 GC/MS Semivolatiles; 8310 PAHs; 8040 Phenols; DWS - Volatiles and Semivolatiles
- PESTS/PCBs: 8080 OC Pest/PCBs; 8080M PCBs only; 8140 OP Pesticides; 8150 OC Herbicides; DWS - Herb/Pest
- METALS: Selected Metals: list As, Cd, Pb; Organic Lead (Ca); TCL Metals (23); Priority Poll. Metals (13); DWS - Metals; MFSP - Metals (Wa)
- LEACHING TESTS: TCLP - Volatiles (ZHE); TCLP - Semivolatiles; TCLP - Pesticides; TCLP - Metals
- OTHER: % Moisture
- NUMBER OF CONTAINERS

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Selected Metals: list As, Cd, Pb	% Moisture	NUMBER OF CONTAINERS
1b-S-94-0	11/19/10	1015	S	17	X	X	1
1a-FD-76-0	11/17/10	1520	S	18	X	X	1
3e-S-80-0	11/18/10	0950	S	19	X	X	1
2a-S-73-0	11/17/10	1325	S	20	X	X	1
3e-P1-0	11/16/10	1325	S	21	X	X	1
1a-S-82-9	11/18/10	1050	S	22	X	X	1
3e-TP13-0	11/16/10	1450	S	23	X	X	1
1b-Fd-94-0	11/19/10	1010	S	24	X	X	

LAB INFORMATION		SAMPLE RECEIPT	
Lab Name:	OnSite	Total Number of Containers:	
Lab Address:		Chain of Custody Seals: Y/N/NA	
		Intact?: Y/N/NA	
Via:	Courier	Received in Good Condition/Cold::	

Turn Around Time: ☐ Standard ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☑ 1 wk.

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA

Special Instructions:

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: [signature] Time: 1700	Signature: Time:	Signature: Time:
Printed Name: Alexis Lopez Date: 11/22/10	Printed Name: Date:	Printed Name: Date:
Company: CDM	Company:	Company:

RECEIVED BY: 1.	RECEIVED BY: 2.	RECEIVED BY: 3.
Signature: [signature] Time: 1700	Signature: Time:	Signature: Time:
Printed Name: [illegible] Date: 11/22/10	Printed Name: Date:	Printed Name: Date:
Company: OnSite Env	Company:	Company:

OnSite Environmental Inc.
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • www.onsite-env.com

Chain of Custody

Laboratory Number: 11-216

Company: CDM
Project Number: 19897-79698
Project Name: MAURY ISLAND
Project Manager:
Sampled by:

Turnaround Request (in working days)
(Check One)
☐ Same Day ☐ 1 Day
☐ 2 Days ☐ 3 Days
☐ Standard (7 Days) (TPH analysis 5 Days)
☐ ________ (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx	Volatiles 8260B	Halogenated Volatiles 8260B	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082	Organochlorine Pesticides 8081A	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA / MTCA Metals (circle one)	TCLP Metals	HEM (oil and grease) 1664		As, Cd, Pb					% Moisture
25	1a-FD-75	11/17/10	1440	S	1																	X					X
26	1A-FD-84	11/18/10	1130	S	1																	X					X
27	1b-S-95-0	11/18/10	1027	S	1																	X					X

	Signature	Company	Date	Time
Relinquished				
Received				
Relinquished				
Received				
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions

Chromatograms with final report ☐

Data Package: Level III ☐ Level IV ☐ Electronic Data Deliverables (EDDs) ☐ ________

Data Validation Summary

Project Name:	Maury Island Glacier Pit	**Sampling Dates:**	October 24, 2010
Project Number:	19897-79698	**Matrices:**	Plant Tissue
Site Location:	Maury Island	**Contract Laboratory:**	OnSite/Kuo Labs
		Lab Report ID:	1010-216
Analytical Methods:	Arsenic, Cadmium, Lead		

Sample Date: 10/24/2010

Sample IDs: A-O
B-O
DF-O
F-O
SL-O
M-O

Quality assurance data reviewed:

	Organic				Inorganic			
	Reported		Results Qualified		Reported		Results Qualified	
	Yes	No	Yes	No	Yes	No	Yes	No
Method Blank		NA			X			X
Matrix Spike and MS Duplicate		NA				NA		
Laboratory Duplicate		NA			X			X
Laboratory Control Sample		NA				NA		
Initial and Continuing Calibration		NA			X			X
Surrogate Spikes		NA				NA		

Notes:
NA = Not applicable or Not analyzed

Comments:

Laboratory quality control analyses were performed on prepared water samples.

Note: Data validation was performed in accordance with EPA National Functional Guidelines (NFG) for Organic and Inorganic Data Review.

Data Validation Summary

Project Name:	Maury Island Glacier Pit	**Sampling Dates:**	October 24, 2010
Project Number:	19897-79698	**Matrices:**	Plant Tissue
Site Location:	Maury Island	**Contract Laboratory:**	OnSite/Kuo Labs
		Lab Report ID:	1010-216
Analytical Methods:	Arsenic, Cadmium, Lead		

Other performance information:

	Reported		Results Qualified	
	Yes	No	Yes	No
Field Records		X		X
Chain of Custody	X			X
Holding Times	X			X
Reporting Limits	X			X
Equipment Rinsate		NA		
Trip Blanks		NA		
Field Duplicates		NA		

Summary of data qualifiers:

All data are considered quantitative except for the constituents listed below.

Sample ID	Constituent	Qualifier	Reason

Explanation:

No data are qualified.

Validator: Dion Valdez Signed & Dated: Dion Valdez January 5, 2011

Note: Data validation was performed in accordance with EPA National Functional Guidelines (NFG) for Organic and Inorganic Data Review.

Data Validation Summary

Project Name:	Maury Island Glacier Pit	**Sampling Dates:**	November 9, 2010
Project Number:	19897-79698	**Matrices:**	Plant Tissue
Site Location:	Maury Island	**Contract Laboratory:**	OnSite/Kuo Labs
		Lab Report ID:	1011-167
Analytical Methods:	Arsenic, Cadmium, Lead		

Sample Date:	11/9/2010	11/9/2010	11/9/2010
Sample IDs:	1a-DF-2	1b-M-1	3a-B-1
	1a-A-1	1b-SL-1	1b-F-1
	3d-B-1	1b-DF-1	3d-A-1
	3a-A-1	1a-F-1	3a-F-1
	1a-SL-1	1a-F-2	2c-DF-1
	1a-M-2	1a-M-1	2c-M-1
	1a-SL-2	1a-B-1	3c-B-1
		1a-DF-1	1b-A-1

Quality assurance data reviewed:

	Organic				Inorganic			
	Reported		Results Qualified		Reported		Results Qualified	
	Yes	No	Yes	No	Yes	No	Yes	No
Method Blank		NA			X			X
Matrix Spike and MS Duplicate		NA				NA		
Laboratory Duplicate		NA			X			X
Laboratory Control Sample		NA				NA		
Initial and Continuing Calibration		NA			X			X
Surrogate Spikes		NA				NA		

Notes:
NA = Not applicable or Not analyzed

Comments:

Laboratory quality control analyses were performed on prepared water samples..

Note: Data validation was performed in accordance with EPA National Functional Guidelines (NFG) for Organic and Inorganic Data Review.

Data Validation Summary

Project Name:	Maury Island Glacier Pit	**Sampling Dates:**	November 9, 2010
Project Number:	19897-79698	**Matrices:**	Plant Tissue
Site Location:	Maury Island	**Contract Laboratory:**	OnSite/Kuo Labs
		Lab Report ID:	1011-167
Analytical Methods:	Arsenic, Cadmium, Lead		

Other performance information:

	Reported		Results Qualified	
	Yes	No	Yes	No
Field Records		X		X
Chain of Custody	X			X
Holding Times	X			X
Reporting Limits	X			X
Equipment Rinsate		NA		
Trip Blanks		NA		
Field Duplicates		NA		

Summary of data qualifiers:

All data are considered quantitative except for the constituents listed below.

Sample ID	Constituent	Qualifier	Reason

Explanation:

No data are qualified.

Validator: Dion Valdez Signed & Dated: Dion Valdez January 5, 2011

Note: Data validation was performed in accordance with EPA National Functional Guidelines (NFG) for Organic and Inorganic Data Review.

OnSite Environmental Inc.

14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

November 8, 2010

Pam Morrill
CDM
14432 SE Eastgate Way, Suite 100
Bellevue, WA 98007-6493

Re: Analytical Data for Project 19897-79698
Laboratory Reference No. 1010-216

Dear Pam:

Enclosed are the analytical results and associated quality control data for samples submitted on October 26, 2010.

The standard policy of OnSite Environmental Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

Kuo Testing Labs, Inc.

http://www.kuotesting.com
387 South 1st Avenue Othello, WA 99344
(509) 488-0112 FAX (509) 488-0118 (800) 828-0112 e-mail: kuotest@atnet.net

Quality Assurance & Quality Control Report

Customer Name: Onsite Environment
Date Received: 10/26/10 **Date Completed:** 11-03-10
Project/Customer ID Maury Island
Analyst(s): EKG
Report Prepared by: **Eugene Kuo, Quality Assurance**

KUO Sample No.	*Date*	*Analyte*		*True value mg/L*	*Found Value mg/L*	*Percent Recovery*	*Relative Percent Difference*
Internal Standard	10/28/10	As		0.02898	0.02950	99.2	0.9%
TM 9040		Cd		0.01545	0.0148	105.6	1.2%
		Pb		0.02932	0.0294	100.6	0.9%
Duplicates							
			Blank, mg/L	1st Run, mg/L	2nd Run, mg/L	Average, mg/L	RSD, %
5903	10/28/10	As	0.000	0.291	0.299	0.295	0.56%
5907	10/28/10	Cd	0.017	0.234	0.238	0.236	0.2%
5908	10/28/10	Pb	0.026	0.292	0.286	0.289	0.42%

RPD: Relative Percent Difference (RD%)
RD% = (Diff / Avg) x 100%, Diff =**Absolute Value** (Value 1 - Value 2), Avg = (Value 1+ Value 2) / 2
Percent Recovery (%RCY)
%RCY = (Recovery / Amount) x 100%
MDL: Method Detection Limit
<MRL: less than **Method Reporting Limit** (less than lower reporting limit (LRL))
mg/L: milligrams per Liter (SI units)
ND: Not Detectable, None Detected, below MRL/LRL
SSR/CCV: Second Source Reference/Continuing Calibration Verification
1 umho/cm = 1 µS/cm = 1 Microsiemen/cm (units for conductivity, SI units mS/m = µS/cm / 10)

DATE:	11/02/10
REPORT:	P10614
PROJECT:	Maury Island
CLIENT:	On Site Environment
SAMPLER:	Pam Morrill
SAMPLE DATE	10/24/10
EMAIL TO:	Pam and David
EMAILS:	Morrillpj@cdm.com dbaumeister@onsite-env.com
FIELD:	A-O,B-O,DF-O,F-O,SL-O & M-O
CROP:	Plant Tissue
PAGE:	1 of 1

Kuo Testing Labs, Inc.

337 South 1st
Othello, Washington 99344
(509) 488-0112; Fax (509) 488-0118
Email: kuotest@atnet.net
Website: www.kuotesting.com

Customer Service Is Our Priority

PLANT TISSUE ANALYSIS REPORT

(1% = 10,000 ppm)

Lab No.	Sample I.D.	Total As mg/kg	Total Cd mg/kg	Total Pb mg/kg
5903	A-O	0.295	0.050	N.D.
5904	B-O	0.090	0.162	0.522
5905	DF-O	0.243	0.089	0.348
5906	F-O	0.306	0.073	0.146
5907	SL-O	0.137	0.219	0.462
5908	M-O	0.200	0.012	N.D.
	Instrument MDL	*0.0009*	*0.00008*	*0.0009*
	Plant Digest MDL	*0.045*	*0.004*	*0.045*

Note: (1) The plant sample was dried in the forced air oven at 105 C overnight. It was then pulverized and sieved.
(2) 0.5 g of dry plant sample was acid-digested and the final digest was diluted with de-ionized water to 25 ml.
(3) An ICP instrument was used to assay As, Cd and Pb in the diluted solution as specified in (2). Appropriate acid digest blank solution and internal reference sample digest were assayed at the same time for quality assurance purpose.
(4) N.D. = None detected above minimum detection limit.

CDM

CHAIN-OF-CUSTODY

Date 10/25/10 Page 1 of 1

Laboratory Number: 10-216

PROJECT INFORMATION

Project Manager: Pam Morrell
Project Name: Mary Island
Project Number:
Site Location: 19891-79698 Sampled By: PJm

DISPOSAL INFORMATION

☒ Lab Disposal (return if not indicated)

Disposal Method:
Disposed by: Disposal Date:

QC INFORMATION (check one)

☐ SW-846 ☐ CLP ☐ Screening ☐ CDM Std. ☐ Special

ANALYSIS REQUEST

PETROLEUM HYDROCARBONS: TPH-HCID State:; TPH-G State:; TPH-D State:; TPH-418.1 State:; 8015M Fuel Hydrocarbon; TPH-Special Instructions

ORGANIC COMPOUNDS: 8010 Halogenated VOCs; 8020 Aromatic VOCs; 8020M - BETX only; 8240 GC/MS Volatiles; 8270 GC/MS Semivolatiles; 8310 PAHs; 8040 Phenols; DWS - Volatiles and Semivolatiles

PESTS/PCBs: 8080 OC Pest/PCBs; 8080M PCBs only; 8140 OP Pesticides; 8150 OC Herbicides; DWS - Herb/Pest

METALS: Selected Metals: list; Organic Lead (Ca); TCL Metals (23); Priority Poll. Metals (13); DWS - Metals; MFSP - Metals (Wa)

LEACHING TESTS: TCLP - Volatiles (ZHE); TCLP - Semivolatiles; TCLP - Pesticides; TCLP - Metals

OTHER: As, Cd, Pb

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	As, Cd, Pb	NUMBER OF CONTAINERS
A-0	10/24/10	1330	plant		X	1
B-0	↓	1600	↓		X	1
DF-0	↓	1430	↓		X	1
F-0	↓	1400	↓		X	1
SL-0	↓	1310	↓		X	1
M-0	↓	1415	↓		X	1

LAB INFORMATION	SAMPLE RECEIPT	
Lab Name: KuoTesting Labs	Total Number of Containers:	
Lab Address: 337 S. 1st Ave	Chain of Custody Seals: Y/N/NA	
Othello WA 99344	Intact?: Y/N/NA	
Via: Fed Ex	Received in Good Condition/Cold::	

Turn Around Time: ☒ Standard ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 1 wk.

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA

Special Instructions:

	1.	2.	3.
RELINQUISHED BY: Signature / Time	[signature] 2:00	Signature: Time:	Signature: Time:
Printed Name / Date	Pamela J. Morrell 10/25/10	Printed Name: Date:	Printed Name: Date:
Company	CDM	Company:	Company:
RECEIVED BY: Signature / Time	[signature] 3PM	Signature: Time:	Signature: Time:
Printed Name / Date	Eugene Kuo 10/26/10	Printed Name: Date:	Printed Name: Date:
Company	KTL	Company:	Company:

CDM Offices: Bellevue: (425) 519-8300
Seattle: (206) 336-4900

DISTRIBUTION: White, Canary to Analytical Laboratory; Pink to CDM Project Files; Gold to CDM Disposal Files

OnSite Environmental Inc.
14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

November 19, 2010

Pam Morrill
CDM
14432 SE Eastgate Way, Suite 100
Bellevue, WA 98007-6493

Re: Analytical Data for Project 19897-79698
Laboratory Reference No. 1011-167

Dear Pam:

Enclosed are the analytical results and associated quality control data for samples submitted on November 11, 2010.

The standard policy of OnSite Environmental Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

PLANT TISSUE ANALYSIS REPORT

Client: **On Site Environment**	**Kuo Testing Labs, Inc.** **337 S. 1st Ave.** **Othello, WA 99344** **Ph: 509-488-0112; Fx: 509-488-0118** **Email: kuotest@atnet.net** **Website: www.kuotesting.com**
Project: **Maury Island**	
Project #: **19897-79698**	
Date: **11-16-2010**	
Sampler: **Pam Morrill**	
Sample Date: **11-9-2010**	
E-Mail To: **Pam Morrill & David Baumeister**	

Kuo Sample No.	Sample I.D.	Total As *(mg/kg)*	Total Cd *(mg/kg)*	Total Pb *(mg/kg)*
05909	**1a-DF-2**	**45.9**	**0.515**	**0.909**
05910	**1a-A-1**	**2.61**	**0.255**	**1.22**
05911	**3e-B-1**	**0.804**	**0.164**	**0.782**
05912	**3a-A-1**	**0.507**	**0.044**	**0.412**
05913	**1a-SL-1**	**0.590**	**0.642**	**1.26**
05914	**1a-M-2**	**0.755**	**0.050**	**0.675**
05915	**1a-SL-2**	**0.522**	**0.565**	**0.887**
05916	**1b-M-1**	**0.683**	**0.036**	**0.428**
05917	**1b-SL-1**	0.570	**0.389**	**1.17**
05918	**1b-DF-1**	44.0	**0.449**	**0.796**
05919	**1a-F-1**	3.22	**0.788**	**1.68**
05920	**1a-F-2**	1.44	**0.833**	**2.66**
05921	**1a-M-1**	0.824	**0.069**	**0.713**
05922	**1a-B-1**	0.822	**0.702**	**1.44**
05923	**1a-DF-1**	52.8	**0.604**	**0.741**
05924	**3a-B-1**	2.65	**0.172**	**0.623**
05925	**1b-F-1**	1.13	**0.746**	**1.94**
05926	**3d-A-1**	0.712	**0.077**	**0.622**
05927	**3a-F-1**	0.952	**0.714**	**1.32**
05928	**2c-DF-1**	2.80	**0.199**	**0.765**
05929	**2c-M-1**	0.781	**0.042**	**0.421**
05930	**3c-B-1**	0.732	**0.316**	**0.833**
05931	**1b-A-1**	0.897	**0.093**	**0.739**
	Instrument MDL *Plant Digest MDL*	*0.0009* *0.045*	*0.00008* *0.004*	*0.0009* *0.045*

NOTES:

(1) The plant sample was dried in the forced air oven at 105 C overnight. It was then pulverized and sieved.

(2) 0.5 g of dry plant sample was acid-digested and the final digest was diluted with de-ionized water to 25 ml.

(3) An ICP instrument was used to assay As, Cd, and Pb in the diluted solution as specified in (2). Appropriate acid digest blank solution and internal reference sample digest were assayed at the same time for quality assurance purpose.

(4) N.D. = None detected above minimum detection limit.

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Quality Assurance & Quality Control Report

Customer Name: On Site Environment
Date Received: 11/11/10   **Date Completed:** 11/16/10
Project/Customer ID Maury Island
Analyst(s): EGR
Report Prepared by: **Elizabeth Goebel-Rohde, Quality Assurance**

KUO Sample No. 5909-31	*Date*	*Analyte QC*	*True value mg/L*	*Found Value mg/L*	*Percent Recovery*	*Relative Percent Difference*
SSR	11/15/10	Total Arsenic, As	0.0295	0.0299/0.0300	101.2/101.7%	0.5%
CCV	11/15/10	Total Arsenic, As	1.000	0.982/0.975	98.2/97.5%	0.7%
SSR	11/15/10	Total Cadmium, Cd	0.0148	0.0151/0.0152	102.2/102.4%	0.1%
CCV	11/15/10	Total Cadmium, Cd	0.500	0.498/0.493	99.7/98.6%	1.1%
SSR	11/15/10	Total Lead, Pb	0.0294	0.0288/0.0289	98.0/98.3%	0.3%
CCV	11/15/10	Total Lead, Pb	1.000	0.981/0.976	98.1/97.6%	0.6%

RPD: Relative Percent Difference (RD%)
RD% **= (**Diff / Avg**)** x 100%, Diff **=Absolute Value** (Value 1 - Value 2), Avg **= (**Value 1+ Value 2**)** / 2
Percent Recovery (%RCY)
%RCY = (Recovery / Amount) x 100%
MDL: Method Detection Limit
<MRL: less than **Method Reporting Limit** (less than lower reporting limit (LRL))
mg/L: milligrams per Liter (SI units)
ND: Not Detectable, None Detected, below MRL/LRL
SSR/CCV: Second Source Reference/Continuing Calibration Verification
1 µmho/cm = 1 µS/cm = 1 Microsiemen/cm (units for conductivity, SI units mS/m = µS/cm / 10)

CDM

CHAIN-OF-CUSTODY

Date 11-10-10 Page 1 of 3

Laboratory Number: 11-167

PROJECT INFORMATION

Project Manager: Pam Morrell

Project Name: Maury Island

Project Number: 19897-79698

Site Location: Maury Island Sampled By: PJM

DISPOSAL INFORMATION

☒ Lab Disposal (return if not indicated)

Disposal Method:

Disposed by: Disposal Date:

QC INFORMATION (check one)

☐ SW-846 ☐ CLP ☐ Screening ☐ CDM Std. ☐ Special

ANALYSIS REQUEST

PETROLEUM HYDROCARBONS: TPH-HCID State: | TPH-G State: | TPH-D State: | TPH-418.1 State: | 8015M Fuel Hydrocarbon | TPH-Special Instructions

ORGANIC COMPOUNDS: 8010 Halogenated VOCs | 8020 Aromatic VOCs | 8020M - BETX only | 8240 GC/MS Volatiles | 8270 GC/MS Semivolatiles | 8310 PAHs | 8040 Phenols | DWS - Volatiles and Semivolatiles

PESTS/PCBs: 8080 OC Pest/PCBs | 8080M PCBs only | 8140 OP Pesticides | 8150 OC Herbicides | DWS - Herb/Pest

METALS: Selected Metals: list | Organic Lead (Ca) | TCL Metals (23) | Priority Poll. Metals (13) | DWS - Metals | MFSP - Metals (Wa)

LEACHING TESTS: TCLP - Volatiles (ZHE) | TCLP - Semivolatiles | TCLP - Pesticides | TCLP - Metals

OTHER: As, Pb, Cd

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	OTHER: As, Pb, Cd	NUMBER OF CONTAINERS
1a-DF-2	11-9-10	1130	Plant	05909	X	1
1a-A-1	↓	10:10	↓	05910	X	1
3e-B-1	↓	1150	↓	05911	X	1
3a-A-1	↓	1545	↓	05912	X	1
1a-SL-1	↓	925	↓	05913	X	1
1a-M-2	↓	1145	↓	05914	X	1
1a-SL-2	↓	1100	↓	05915	X	1

LAB INFORMATION

Lab Name: Kuo Lab

Lab Address:

Via: Fed Ex

Turn Around Time: ☒ Standard ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 1 wk.

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA

Special Instructions:
Make sure plant samples don't have any foreign
[illegible] all as necess[illegible]

SAMPLE RECEIPT

Total Number of Containers:

Chain of Custody Seals: Y/N/NA

Intact?: Y/N/NA

Received in Good Condition/Cold::

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: [signature] Time: 1200	Signature: Time:	Signature: Time:
Printed Name: Pamela Morrell Date: 11-10-10	Printed Name: Date:	Printed Name: Date:
Company: CDM	Company:	Company:

RECEIVED BY: 1.	RECEIVED BY: 2.	RECEIVED BY: 3.
Signature: [signature] 11/11/10 Time: 10:52AM	Signature: Time:	Signature: Time:
Printed Name: [signature] Date: 11/11/10	Printed Name: Date:	Printed Name: Date:
Company: [illegible]	Company:	Company:

CDM

CHAIN-OF-CUSTODY

Date 11-10-10 Page 2 of 3

Laboratory Number: 11-167

PROJECT INFORMATION

Project Manager: Pam Morrill

Project Name: Maury Island

Project Number: 19897-79698

Site Location: Maury Island Sampled By: PJM

DISPOSAL INFORMATION

☑ Lab Disposal (return if not indicated)

Disposal Method: ______

Disposed by: ______ Disposal Date: ______

QC INFORMATION (check one)

☐ SW-846 ☐ CLP ☐ Screening ☐ CDM Std. ☐ Special

ANALYSIS REQUEST

PETROLEUM HYDROCARBONS: TPH-HCID State: | TPH-G State: | TPH-D State: | TPH-418.1 State: | 8015M Fuel Hydrocarbon | TPH-Special Instructions

ORGANIC COMPOUNDS: 8010 Halogenated VOCs | 8020 Aromatic VOCs | 8020M - BETX only | 8240 GC/MS Volatiles | 8270 GC/MS Semivolatiles | 8310 PAHs | 8040 Phenols | DWS - Volatiles and Semivolatiles

PESTS/PCBs: 8080 OC Pest/PCBs | 8080M PCBs only | 8140 OP Pesticides | 8150 OC Herbicides | DWS - Herb/Pest

METALS: Selected Metals: list | Organic Lead (Ca) | TCL Metals (23) | Priority Poll. Metals (13) | DWS - Metals | MFSP - Metals (Wa)

LEACHING TESTS: TCLP - Volatiles (ZHE) | TCLP - Semivolatiles | TCLP - Pesticides | TCLP - Metals

OTHER: As, Cd, Pb

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	OTHER: As, Cd, Pb	NUMBER OF CONTAINERS
1b-M-1	11-9-10	1420	Plant	05916	X	1
1b-SL-1	11-9-10	1430	Plant	05917	X	1
1b-DF-1	11-9-10	1400	Plant	05918	X	1
1a-F-1	11-9-10	1000	Plant	05919	X	1
1a-F2	11-9-10	1120	Plant	05920	X	1
1a-M-1	11-9-10	955	Plant	05921	X	1
1a-B-1	11-9-10	930	Plant	05922	X	1
1a-DF-1	11-9-10	950	Plant	05923	X	1

LAB INFORMATION

Lab Name: Kuo Lab

Lab Address:

Via: Fed EX

SAMPLE RECEIPT

Total Number of Containers:

Chain of Custody Seals: Y/N/NA

Intact?: Y/N/NA

Received in Good Condition/Cold::

Turn Around Time: ☑ Standard ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 1 wk.

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA

Special Instructions:

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: Pam Morrill Time: 1200	Signature: Time:	Signature: Time:
Printed Name: Pamela J. Morrill Date: 11/10/10	Printed Name: Date:	Printed Name: Date:
Company: CDM	Company:	Company:

RECEIVED BY: 1.	RECEIVED BY: 2.	RECEIVED BY: 3.
Signature: [illegible] 11/11/10 Time: 10:52 AM	Signature: Time:	Signature: Time:
Printed Name: Eugene Kuo Date: 11/11/10	Printed Name: Date:	Printed Name: Date:
Company: [illegible]	Company:	Company:

CDM

CHAIN-OF-CUSTODY

Date 11-10-10 Page 3 of 3

Laboratory Number: 11-167

PROJECT INFORMATION

Project Manager: Pam Morrell

Project Name: Maury Island

Project Number: 19891-76698

Site Location: Maury Island Sampled By: PJM

DISPOSAL INFORMATION

☑ Lab Disposal (return if not indicated)

Disposal Method:

Disposed by: Disposal Date:

QC INFORMATION (check one)

☐ SW-846 ☐ CLP ☐ Screening ☐ CDM Std. ☐ Special

ANALYSIS REQUEST

Petroleum Hydrocarbons: TPH-HCID State:; TPH-G State:; TPH-D State:; TPH-418.1 State:; 8015M Fuel Hydrocarbon; TPH-Special Instructions

Organic Compounds: 8010 Halogenated VOCs; 8020 Aromatic VOCs; 8020M - BETX only; 8240 GC/MS Volatiles; 8270 GC/MS Semivolatiles; 8310 PAHs; 8040 Phenols; DWS - Volatiles and Semivolatiles

Pests/PCBs: 8080 OC Pest/PCBs; 8080M PCBs only; 8140 OP Pesticides; 8150 OC Herbicides; DWS - Herb/Pest

Metals: Selected Metals: list; Organic Lead (Ca); TCL Metals (23); Priority Poll. Metals (13); DWS - Metals; MFSP - Metals (Wa)

Leaching Tests: TCLP - Volatiles (ZHE); TCLP - Semivolatiles; TCLP - Pesticides; TCLP - Metals

Other: As, Cd, Pb

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	As, Cd, Pb	NUMBER OF CONTAINERS
3a-B-1	11-9-10	1245	Plant	05924	X	1
1b-F-1	↓	1445	↓	05925	X	1
3d-A-1	↓	1510	↓	05926	X	1
3a-F-1	↓	1530	↓	05927	X	1
2c-DF-1	↓	1315	↓	05928	X	1
2c-M-1	↓	1325	↓	05929	X	1
3c-B-1	↓	1350	↓	05930	X	1
1b-A-1	↓	1500	↓	05931	X	1

LAB INFORMATION

Lab Name: Kuo Lab

Lab Address:

Via: Fed Ex

Turn Around Time: ☑ Standard ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 1 wk.

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA

Special Instructions:

SAMPLE RECEIPT

Total Number of Containers:

Chain of Custody Seals: Y/N/NA

Intact?: Y/N/NA

Received in Good Condition/Cold::

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: Pam Morrell Time: 1200	Signature: Time:	Signature: Time:
Printed Name: Pamela Morrell Date: 11/10/10	Printed Name: Date:	Printed Name: Date:
Company: CDM	Company:	Company:

RECEIVED BY: 1.	RECEIVED BY: 2.	RECEIVED BY: 3.
Signature: [illegible] Time: 10:52 AM	Signature: Time:	Signature: Time:
Printed Name: Frank [illegible] Date:	Printed Name: Date:	Printed Name: Date:

Appendix G

2013 Laboratory Analytical and Data Validation Reports

Data Validation Summary

Project Name:	KC Maury Island	**Sampling Dates:**	6/24-27/13 and 7/2-3/13
Project Number:		**Matrices:**	Soil, Water, Forest Duff
Site Location:	Maury Island	**Contract Laboratory:**	KC Environmental Lab
		Lab Report ID:	Project 421422-100

Analytical Methods:
Arsenic (solids Method 6010C, water Method 1640)
Lead (solids Method 6010C, water Method 6020A)
Cadmium (water samples only, Method 6020A)

Sample ID/Date:

BLUFF-6	6/24/2013 14:55
SLOUGH-4	6/24/2013 15:00
BLUFF-4	6/24/2013 14:15
SLOUGH-1	6/24/2013 12:15
BLUFF-2	6/24/2013 12:50
SLOUGH-3	6/24/2013 14:00
BLUFF-1	6/24/2013 12:30
BLUFF-3	6/24/2013 13:10
SLOUGH-2	6/24/2013 13:30
BLUFF-5	6/24/2013 14:30
Spring-D	6/25/2013 9:50
Spring-E	6/25/2013 11:05
Spring-F	6/25/2013 10:45
Spring-A	6/25/2013 12:20
Spring-B	6/25/2013 13:00
1a-S-138-0	6/25/2013 14:20
1a-S-138-9	6/25/2013 14:30
1a-S-138-18	6/25/2013 14:32
1a-S-139-0	6/25/2013 14:40
1a-S-140-0	6/25/2013 14:55
1a-S-141-0	6/25/2013 15:10
1a-S-142-0	6/26/2013 10:20
1a-S-143-0	6/26/2013 10:40
1a-S-143-9	6/26/2013 10:45
1a-S-143-18	6/26/2013 10:47
1a-S-144-0	6/26/2013 11:00
1a-S-145-0	6/26/2013 12:00
1a-S-146-0	6/26/2013 12:20
1a-S-146-9	6/26/2013 12:25
1a-S-147-0	6/26/2013 12:45
1a-S-147-9	6/26/2013 12:50
1a-S-148-0	6/26/2013 13:50
1a-S-148-9	6/26/2013 13:55
1a-S-149-0	6/26/2013 14:05
1a-S-149-9	6/26/2013 14:10
1a-S-150-0	6/26/2013 14:20
1a-S-150-9	6/26/2013 14:25
1a-S-150-18	6/26/2013 14:27
1a-S-149-18	6/26/2013 14:12
1a-S-151-0	6/26/2013 14:45
1a-S-151-9	6/26/2013 14:50
1a-S-151-18	6/26/2013 14:52
1a-S-152-0	6/26/2013 15:05
1a-S-152-D1	6/26/2013 15:10
1a-S-153-0	6/26/2013 15:15
1a-S-153-9	6/26/2013 15:20
1a-S-154-0	6/26/2013 15:45
3a-S-158-0	6/27/2013 12:00
3a-S-158-9	6/27/2013 12:05
3a-S-159-0	6/27/2013 12:25
3a-S-159-D2	6/27/2013 12:28
3a-S-160-0	6/27/2013 13:05
3a-S-160-9	6/27/2013 13:10
1a-S-155-0	6/27/2013 10:10
3a-S-159-D3	6/27/2013 12:37
1b-S-163-0	6/27/2013 14:55
1b-S-163-D4	6/27/2013 14:57
1a-S-156-0	6/27/2013 10:25
1a-S-156-9	6/27/2013 10:25

1a-S-156-18	6/27/2013 10:27
1a-S-165-0	6/27/2013 15:35
1a-S-157-0	6/27/2013 10:45
1a-S-165-9	6/27/2013 15:40
3a-S-159-9	6/27/2013 12:35
1b-S-161-0	6/27/2013 14:25
1b-S-164-0	6/27/2013 15:15
1b-S-164-9	6/27/2013 15:20
1b-S-164-18	6/27/2013 15:22
1b-S-162-0	6/27/2013 14:40
1b-S-162-9	6/27/2013 14:45
1b-S-162-18	6/27/2013 14:47
3b-S-166-0	7/2/2013 8:30
3b-S-166-D5	7/2/2013 8:35
3b-S-167-0	7/2/2013 8:45
3b-S-167-9	7/2/2013 8:50
3b-S-167-18	7/2/2013 8:52
3b-S-168-0	7/2/2013 9:10
3b-S-169-0	7/2/2013 9:20
3b-S-169-9	7/2/2013 9:25
5-S-170-0	7/2/2013 10:20
5-S-171-0	7/2/2013 10:25
5-S-171-9	7/2/2013 10:30
5-S-171-18	7/2/2013 10:32
5-S-172-0	7/2/2013 10:40
5-S-173-0	7/2/2013 10:50
5-S-173-9	7/2/2013 10:55
5-S-173-18	7/2/2013 10:57
5-S-174-0	7/2/2013 11:00
5-S-175-0	7/2/2013 11:10
5-S-176-0	7/2/2013 11:15
5-S-176-9	7/2/2013 11:20
5-S-176-18	7/2/2013 11:22
5-S-177-0	7/2/2013 11:30
5-S-178-0	7/2/2013 12:40
5-FD-179-0	7/2/2013 13:00
5-FD-178-0	7/2/2013 12:35
5-S-179-0	7/2/2013 13:05
5-FD-180-0	7/2/2013 13:25
5-S-180-0	7/2/2013 13:30
5-S-180-D6	7/2/2013 13:32
5-FD-181-0	7/2/2013 14:00
5-S-181-0	7/2/2013 14:05
5-FD-182-0	7/3/2013 9:55
5-S-182-0	7/3/2013 10:00
5-FD-183-0	7/3/2013 10:15
5-S-183-0	7/3/2013 10:20

Note: Samples ending in -D# are a duplicate of a sample with the same ID ending in -0.

Data Validation Summary

Project Name:	KC Maury Island	**Sampling Dates:**	6/24-27/13 and 7/2-3/13
Project Number:		**Matrices:**	Soil, Water, Forest Duff
Site Location:	Maury Island	**Contract Laboratory:**	KC Environmental Lab
		Lab Report ID:	Project 421422-100
Analytical Methods:	Arsenic (solids Method 6010C, water Method 1640)		
	Lead (solids Method 6010C, water Method 6020A)		
	Cadmium (water samples only, Method 6020A)		

Quality assurance data reviewed:

	Organic				Inorganic			
	Reported		Results Qualified		Reported		Results Qualified	
	Yes	No	Yes	No	Yes	No	Yes	No
Method Blank		NA			X			X
Matrix Spike		NA			X			X
Laboratory Duplicate		NA			X			X
Laboratory Control Sample/LCS Duplicate		NA			X			X
Initial and Continuing Calibration		NA				X		X
Surrogate Spikes		NA				NA		

Notes:
NA = Not applicable or Not analyzed

Comments:

Laboratory quality control analyses were performed on batch-specific samples.

Other performance information:

	Reported		Results Qualified	
	Yes	No	Yes	No
Field Records		X		X
Chain of Custody	X			X
Holding Times	X			X
Reporting Limits	X			X
Equipment Rinsate		NA		
Trip Blanks		NA		
Field Duplicates	X			X

Data Validation Summary

Project Name:	KC Maury Island	**Sampling Dates:**	6/24-27/13 and 7/2-3/13
Project Number:		**Matrices:**	Soil, Water, Forest Duff
Site Location:	Maury Island	**Contract Laboratory:**	KC Environmental Lab
		Lab Report ID:	Project 421422-100
Analytical Methods:	Arsenic (solids Method 6010C, water Method 1640) Lead (solids Method 6010C, water Method 6020A) Cadmium (water samples only, Method 6020A)		

Summary of data qualifiers:

All data are considered quantitative except for the constituents listed below.

Sample ID	Constituent	Qualifier	Reason

Explanation:

(1) Some samples were analyzed one day past the recommended holding time for Total Solids analysis, which is necessary to report results on a dry weight basis. Based on the short time period exceeded, it is unlikely to have a significant effect on sample results. Therefore, no data are qualified on this basis.
(2) The analysis results and RPD for each field duplicate pair are listed on the attached page to demonstrate sample variability. No data are qualified on the basis of field duplicate results.
(3) Results reported above the method detection limit but below the reporting/quantitation limit may be used with a J qualifier to indicate that they are estimated values.
(4) No sample results are qualified.

Validator: Dion Valdez Signed & Dated: September 10, 2013

Note: Data validation was performed in accordance with EPA National Functional Guidelines for Organic and Inorganic Data Review

Data Validation Summary

Project Name:	KC Maury Island	**Sampling Dates:**	7/3/2013
Project Number:	19897-99064	**Matrices:**	Soil and Forest Duff
Site Location:	Maury Island	**Contract Laboratory:**	KC Environmental Lab
		Lab Report ID:	Project 421422-100
Analytical Methods:	Polycyclic Aromatic Hydrocarbons (PAHs) (Method 8270D)		

Sample Date:	7/2/2013	7/2/2013	7/3/2013	7/3/2013
Sample IDs:	5-S-172-0	5-FD-181-0	5-FD-184-0	5-FD-182-0
	5-S-173-0	5-S-181-0	5-S-184-0	5-S-182-0
	5-S-174-0		5-FD-185-0	5-FD-183-0
	5-S-177-0		5-S-185-0	5-S-183-0
	5-S-178-0		5-FD-186-0	
	5-FD-179-0		5-S-186-0	
	5-FD-178-0		5-S-186-D7	
	5-S-179-0		5-FD-187-0	
	5-FD-180-0		5-S-187-0	
	5-S-180-0		5-FD-188-0	
	5-S-180-D6		5-S-188-0	

Note: Samples ending in -D# are a duplicate of a sample with the same ID ending in -0.

Quality assurance data reviewed:

	Organic				Inorganic			
	Reported		Results Qualified		Reported		Results Qualified	
	Yes	No	Yes	No	Yes	No	Yes	No
Method Blank	X			X		NA		
Matrix Spike and MS Duplicate	X			X		NA		
Laboratory Duplicate	X		X			NA		
Laboratory Control Sample	X			X		NA		
Initial and Continuing Calibration		X				NA		
Surrogate Spikes	X			X		NA		

Notes:
NA = Not applicable or Not analyzed

Comments:

(1) The Relative Percent Difference (RPD) for analysis of acenaphthene, fluorene, and phenanthrene in a laboratory duplicate exceeded the laboratory's control limit.

Data Validation Summary

Project Name:	KC Maury Island	**Sampling Dates:**	7/3/2013
Project Number:	19897-99064	**Matrices:**	Soil and Forest Duff
Site Location:	Maury Island	**Contract Laboratory:**	KC Environmental Lab
		Lab Report ID:	Project 421422-100
Analytical Methods:	Polycyclic Aromatic Hydrocarbons (PAHs) (Method 8270D)		

Other performance information:

	Reported		Results Qualified	
	Yes	No	Yes	No
Field Records		X		X
Chain of Custody	X			X
Holding Times	X		X	
Reporting Limits	X			X
Equipment Rinsate		N/A		
Trip Blanks		N/A		
Field Duplicates	X			X

Summary of data qualifiers:

All data are considered quantitative except for the constituents listed below.

Sample ID	Constituent	Qualifier	Reason
5-S-187-0	Acenaphthene	J	Laboratory Duplicate (1)
5-S-187-0	Fluorene	J	Laboratory Duplicate (1)
5-S-187-0	Phenanthrene	J	Laboratory Duplicate (1)
5-S-172-0	All PAHs	J/UJ	Holding Time (2)
5-S-173-0	All PAHs	J/UJ	Holding Time (2)
5-S-174-0	All PAHs	J/UJ	Holding Time (2)
5-S-177-0	All PAHs	J/UJ	Holding Time (2)
5-S-178-0	All PAHs	J/UJ	Holding Time (2)
5-FD-179-0	All PAHs	J/UJ	Holding Time (2)
5-FD-178-0	All PAHs	J/UJ	Holding Time (2)
5-S-179-0	All PAHs	J/UJ	Holding Time (2)
5-FD-180-0	All PAHs	J/UJ	Holding Time (2)
5-S-180-0	All PAHs	J/UJ	Holding Time (2)
5-S-180-D6	All PAHs	J/UJ	Holding Time (2)
5-FD-181-0	All PAHs	J/UJ	Holding Time (2)
5-S-181-0	All PAHs	J/UJ	Holding Time (2)
5-FD-182-0	All PAHs	UJ	Holding Time (2)
5-S-182-0	All PAHs	J/UJ	Holding Time (2)
5-FD-183-0	All PAHs	UJ	Holding Time (2)
5-S-183-0	All PAHs	J/UJ	Holding Time (2)

Data Validation Summary

Project Name:	KC Maury Island	**Sampling Dates:**	7/3/2013
Project Number:	19897-99064	**Matrices:**	Soil and Forest Duff
Site Location:	Maury Island	**Contract Laboratory:**	KC Environmental Lab
		Lab Report ID:	Project 421422-100
Analytical Methods:	Polycyclic Aromatic Hydrocarbons (PAHs) (Method 8270D)		

Explanation:

(1) The RPD for analysis of acenaphthene, fluorene, and phenanthrene in the laboratory duplicate exceeded the laboratory's control limit. The duplicate was prepared from Sample 5-S-187-0; therefore, the results of these analyses in this sample are qualified as estimated values (J).
(2) Sample was analyzed past the recommended holding time. Therefore, all results greater than the method detection limit are qualified as estimated values (J); all results less than the method detection limit are qualified as estimated to be undetected at that limit (UJ).
(3) Some samples were analyzed one day past the recommended holding time for Total Solids analysis, which is necessary to report results on a dry weight basis. Based on the short time period exceeded, it is unlikely to have a significant effect on sample results. Therefore, no data are qualified on this basis.
(4) The analysis results and RPD for each field duplicate pair are listed on the attached page to demonstrate sample variability. No data are qualified on the basis of field duplicate results.
(5) Results reported above the method detection limit but below the reporting/quantitation limit may be used with a J qualifier to indicate that they are estimated values.

Validator: Dion Valdez Signed & Dated: Dion Valdez September 10, 2013

Note: Data validation was performed in accordance with EPA National Functional Guidelines for Organic and Inorganic Data Review

Field Duplicate Soil Sample Results

Metals Dry Weight Analysis Results (mg/kg):

Sample ID	Arsenic	RPD	Lead	RPD
1a-S-152-0	102	20%	86.6	42%
1a-S-152-D1	125		56.5	
3a-S-159-0	87.7	8%	109	18%
3a-S-159-D2	81.2		91.2	
3a-S-159-0	87.7	26%	109	18%
3a-S-159-03	67.8		130	
1b-S-163-0	119	4%	200	14%
1b-S-163-D4	124		229	
3b-S-166-0	125	9%	128	10%
3b-S-166-D5	114		142	
5-S-180-0	101	9%	203	12%
5-S-180-D6	111		228	

PAHs Dry Weight Analysis Results (μg/kg):

Sample ID:	5-S-186-0	5-S-186-D7	RPD	5-S-180	5-S-180-D6	RPD
1-Methylnaphthalene	ND	ND	N/A	ND	ND	N/A
2-Methylnaphthalene	9	9	0%	ND	ND	N/A
Acenaphthene	44.1	41.9	5%	ND	ND	N/A
Anthracene	70.5	66.9	5%	ND	ND	N/A
Benzo(a)anthracene	1810	1970	8%	ND	ND	N/A
Benzo(a)pyrene	2920	3240	10%	ND	ND	N/A
Benzo(b,j,k)fluoranthene	5500	6430	16%	14	14.1	1%
Benzo(g,h,i)perylene	801	836	4%	ND	ND	N/A
Chrysene	2190	2380	8%	ND	ND	N/A
Dibenzo(a,h)anthracene	248	260	5%	ND	ND	N/A
Fluoranthene	2250	2440	8%	ND	ND	N/A
Fluorene	27.8	27.1	3%	ND	ND	N/A
Indeno(1,2,3-Cd)Pyrene	1120	1190	6%	ND	ND	N/A
Naphthalene	13	12	8%	ND	ND	N/A
Phenanthrene	384	371	3%	ND	ND	N/A
Pyrene	2490	2710	8%	ND	ND	N/A

King County

Water and Land Resources Division
Environmental Laboratory
Department of Natural Resources and Parks
322 West Ewing Street
Seattle, WA 98119-1507
206-684-2300 Fax 206-684-2395
TTY Relay: 711

September 5, 2013

Pam Morrill
CDM Smith
14432 SE Eastgate Way, Suite 100
Bellevue, WA 98007

Dear Ms. Morrill:

Enclosed are the revised and updated results for the soil samples received on the dates indicated in the sample table below. An additional 17 samples were analyzed for PAH compounds and the water samples were re-prepared and re-analyzed for total and dissolved arsenic using a method that prevents interference by chloride and bromide in the sample.

The enclosed comprehensive report includes all the results along with data qualifier flags, MDL, RDL and concentration units. The enclosed matrix report contains only the amounts detected for the listed analytes. Blank cells in the spreadsheet generally indicate that the analyte was not detected. The notation NT has been added to the spreadsheet to indicate analyztes that were not tested on that sample. All results are reported on a dry weight basis.

The associated QC results are included with the report. Each analysis QC information includes a batch report (the samples associated with the batch) and an analytical QC report.

The following samples were analyzed one day past the recommended holding time for Total Solids; L58295-1 to 26. The samples were flagged with an "H" qualifier. The samples were maintained at the correct storage temperature from time of receipt until analysis, therefore, no significant degradation of the sample is anticipated.

Acenaphthene, Fluorene and Phenanthrene were outside the upper control limit for RPD in the laboratory duplicate for PAH analysis (Workgroup WG127809). The results were flagged with an "*" in the QC report and a "J" qualifier for the sample, L58295-94 to indicate an estimated result.

Please feel free to call me at 206-684-2327 should you have questions regarding the results.

Sincerely,

Fritz Grothkopp

Fritz Grothkopp
Laboratory Project Manager

Enclosures

L58206_295 Vashon Maury Soils - Water Rev2.doc

1202M

Sample Table

Lab ID	Customer ID	Collect Date & Time	Lab ID	Customer ID	Collect Date & Time
L58206-1	BLUFF-6	6/24/2013 14:55	L58295-39	1a-S-156-18	6/27/2013 10:27
L58206-2	SLOUGH-4	6/24/2013 15:00	L58295-40	1a-S-165-0	6/27/2013 15:35
L58206-3	BLUFF-4	6/24/2013 14:15	L58295-41	1a-S-157-0	6/27/2013 10:45
L58206-4	SLOUGH-1	6/24/2013 12:15	L58295-42	1a-S-165-9	6/27/2013 15:40
L58206-5	BLUFF-2	6/24/2013 12:50	L58295-43	3a-S-159-9	6/27/2013 12:35
L58206-6	SLOUGH-3	6/24/2013 14:00	L58295-44	1b-S-161-0	6/27/2013 14:25
L58206-7	BLUFF-1	6/24/2013 12:30	L58295-45	1b-S-164-0	6/27/2013 15:15
L58206-8	BLUFF-3	6/24/2013 13:10	L58295-46	1b-S-164-9	6/27/2013 15:20
L58206-9	SLOUGH-2	6/24/2013 13:30	L58295-47	1b-S-164-18	6/27/2013 15:22
L58206-10	BLUFF-5	6/24/2013 14:30	L58295-48	1b-S-162-0	6/27/2013 14:40
L58206-11	Spring-D	6/25/2013 9:50	L58295-49	1b-S-162-9	6/27/2013 14:45
L58206-12	Spring-E	6/25/2013 11:05	L58295-50	1b-S-162-18	6/27/2013 14:47
L58206-13	Spring-F	6/25/2013 10:45	L58295-51	3b-S-166-0	7/2/2013 8:30
L58206-14	Spring-A	6/25/2013 12:20	L58295-52	3b-S-166-D5	7/2/2013 8:35
L58206-15	Spring-B	6/25/2013 13:00	L58295-53	3b-S-167-0	7/2/2013 8:45
L58206-16	1a-S-138-0	6/25/2013 14:20	L58295-54	3b-S-167-9	7/2/2013 8:50
L58206-17	1a-S-138-9	6/25/2013 14:30	L58295-55	3b-S-167-18	7/2/2013 8:52
L58206-18	1a-S-138-18	6/25/2013 14:32	L58295-56	3b-S-168-0	7/2/2013 9:10
L58206-19	1a-S-139-0	6/25/2013 14:40	L58295-57	3b-S-169-0	7/2/2013 9:20
L58206-20	1a-S-140-0	6/25/2013 14:55	L58295-58	3b-S-169-9	7/2/2013 9:25
L58206-21	1a-S-141-0	6/25/2013 15:10	L58295-59	5-S-170-0	7/2/2013 10:20
L58295-1	1a-S-142-0	6/26/2013 10:20	L58295-60	5-S-171-0	7/2/2013 10:25
L58295-2	1a-S-143-0	6/26/2013 10:40	L58295-61	5-S-171-9	7/2/2013 10:30
L58295-3	1a-S-143-9	6/26/2013 10:45	L58295-62	5-S-171-18	7/2/2013 10:32
L58295-4	1a-S-143-18	6/26/2013 10:47	L58295-63	5-S-172-0	7/2/2013 10:40
L58295-5	1a-S-144-0	6/26/2013 11:00	L58295-64	5-S-173-0	7/2/2013 10:50
L58295-6	1a-S-145-0	6/26/2013 12:00	L58295-65	5-S-173-9	7/2/2013 10:55
L58295-7	1a-S-146-0	6/26/2013 12:20	L58295-66	5-S-173-18	7/2/2013 10:57
L58295-8	1a-S-146-9	6/26/2013 12:25	L58295-67	5-S-174-0	7/2/2013 11:00
L58295-9	1a-S-147-0	6/26/2013 12:45	L58295-68	5-S-175-0	7/2/2013 11:10
L58295-10	1a-S-147-9	6/26/2013 12:50	L58295-69	5-S-176-0	7/2/2013 11:15
L58295-11	1a-S-148-0	6/26/2013 13:50	L58295-70	5-S-176-9	7/2/2013 11:20
L58295-12	1a-S-148-9	6/26/2013 13:55	L58295-71	5-S-176-18	7/2/2013 11:22
L58295-13	1a-S-149-0	6/26/2013 14:05	L58295-72	5-S-177-0	7/2/2013 11:30
L58295-14	1a-S-149-9	6/26/2013 14:10	L58295-73	5-S-178-0	7/2/2013 12:40
L58295-15	1a-S-150-0	6/26/2013 14:20	L58295-74	5-FD-179-0	7/2/2013 13:00
L58295-16	1a-S-150-9	6/26/2013 14:25	L58295-75	5-FD-178-0	7/2/2013 12:35
L58295-17	1a-S-150-18	6/26/2013 14:27	L58295-76	5-S-179-0	7/2/2013 13:05
L58295-18	1a-S-149-18	6/26/2013 14:12	L58295-77	5-FD-180-0	7/2/2013 13:25
L58295-19	1a-S-151-0	6/26/2013 14:45	L58295-78	5-S-180-0	7/2/2013 13:30
L58295-20	1a-S-151-9	6/26/2013 14:50	L58295-79	5-S-180-D6	7/2/2013 13:32
L58295-21	1a-S-151-18	6/26/2013 14:52	L58295-80	5-FD-181-0	7/2/2013 14:00
L58295-22	1a-S-152-0	6/26/2013 15:05	L58295-81	5-S-181-0	7/2/2013 14:05
L58295-23	1a-S-152-D1	6/26/2013 15:10	L58295-82	5-FD-182-0	7/3/2013 9:55
L58295-24	1a-S-153-0	6/26/2013 15:15	L58295-83	5-S-182-0	7/3/2013 10:00
L58295-25	1a-S-153-9	6/26/2013 15:20	L58295-84	5-FD-183-0	7/3/2013 10:15
L58295-26	1a-S-154-0	6/26/2013 15:45	L58295-85	5-S-183-0	7/3/2013 10:20
L58295-27	3a-S-158-0	6/27/2013 12:00	L58295-86	5-FD-184-0	7/3/2013 11:35
L58295-28	3a-S-158-9	6/27/2013 12:05	L58295-87	5-S-184-0	7/3/2013 11:40
L58295-29	3a-S-159-0	6/27/2013 12:25	L58295-88	5-FD-185-0	7/3/2013 11:48
L58295-30	3a-S-159-D2	6/27/2013 12:28	L58295-89	5-S-185-0	7/3/2013 11:50
L58295-31	3a-S-160-0	6/27/2013 13:05	L58295-90	5-FD-186-0	7/3/2013 12:00
L58295-32	3a-S-160-9	6/27/2013 13:10	L58295-91	5-S-186-0	7/3/2013 12:05
L58295-33	1a-S-155-0	6/27/2013 10:10	L58295-92	5-S-186-D7	7/3/2013 12:07
L58295-34	3a-S-159-D3	6/27/2013 12:37	L58295-93	5-FD-187-0	7/3/2013 12:15
L58295-35	1b-S-163-0	6/27/2013 14:55	L58295-94	5-S-187-0	7/3/2013 12:20
L58295-36	1b-S-163-D4	6/27/2013 14:57	L58295-95	5-FD-188-0	7/3/2013 12:30
L58295-37	1a-S-156-0	6/27/2013 10:25	L58295-96	5-S-188-0	7/3/2013 12:35
L58295-38	1a-S-156-9	6/27/2013 10:25			

King County Environmental Lab Analytical Report

	Sample 1	Sample 2	Sample 3
Project:	421422-100	421422-100	421422-100
Locator:	NONE	NONE	NONE
Descrip:	UNKNOWN LOCATOR	UNKNOWN LOCATOR	UNKNOWN LOCATOR
Sample:	L58206-1	L58206-2	L58206-3
Matrix:	SB SOIL	SB SOIL	SB SOIL
ColDate:	6/24/13 14:55	6/24/13 15:00	6/24/13 14:15
TimeSpan:			
TotalSolid:	96.1	95.5	96.5
ClientLoc:	BLUFF-6	SLOUGH-4	BLUFF-4
SampDepth:			
	WET Weight Basis	**WET Weight Basis**	**WET Weight Basis**

Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
CV SM2540-G															
Total Solids	96.1		0.005	0.01	%	95.5		0.005	0.01	%	96.5		0.005	0.01	%
ES NONE															
Client Locator	BLUFF-6				none	SLOUGH-4				none	BLUFF-4				none
MT EPA 1640															
Arsenic, Dissolved, ICP-MS															
Arsenic, Total, ICP-MS															
MT EPA 200.8*SW846 6020A															
Cadmium, Dissolved, ICP-MS															
Cadmium, Total, ICP-MS															
Lead, Dissolved, ICP-MS															
Lead, Total, ICP-MS															
MT SW846 3050B*SW846 6010C															
Arsenic, Total, ICP	1.7	<RDL	1.2	6.12	mg/Kg	2.1	<RDL	1.2	6.19	mg/Kg	26		1.2	6.15	mg/Kg
Lead, Total, ICP	1.5	<RDL	0.98	4.9	mg/Kg	1.4	<RDL	0.99	4.95	mg/Kg	30		0.98	4.92	mg/Kg
OR SW846 3550B*SW846 8270D															
1-Methylnaphthalene															
2-Methylnaphthalene															
Acenaphthene															
Acenaphthylene															
Anthracene															
Benzo(a)anthracene															
Benzo(a)pyrene															
Benzo(b,j,k)fluoranthene															
Benzo(g,h,i)perylene															
Chrysene															
Dibenzo(a,h)anthracene															
Fluoranthene															
Fluorene															
Indeno(1,2,3-Cd)Pyrene															
Naphthalene															
Phenanthrene															
Pyrene															

King County Environmental Lab Analytical Report

Project:	421422-100	421422-100	421422-100
Locator:	NONE	NONE	NONE
Descrip:	UNKNOWN LOCATOR	UNKNOWN LOCATOR	UNKNOWN LOCATOR
Sample:	L58206-4	L58206-5	L58206-6
Matrix:	SB SOIL	SB SOIL	SB SOIL
ColDate:	6/24/13 12:15	6/24/13 12:50	6/24/13 14:00
TimeSpan:			
TotalSolid:	95	94.9	96.9
ClientLoc:	SLOUGH-1	BLUFF-2	SLOUGH-3
SampDepth:			
	WET Weight Basis	**WET Weight Basis**	**WET Weight Basis**

Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
CV SM2540-G															
Total Solids	95		0.005	0.01	%	94.9		0.005	0.01	%	96.9		0.005	0.01	%
ES NONE															
Client Locator	SLOUGH-1				none	BLUFF-2				none	SLOUGH-3				none
MT EPA 1640															
Arsenic, Dissolved, ICP-MS															
Arsenic, Total, ICP-MS															
MT EPA 200.8*SW846 6020A															
Cadmium, Dissolved, ICP-MS															
Cadmium, Total, ICP-MS															
Lead, Dissolved, ICP-MS															
Lead, Total, ICP-MS															
MT SW846 3050B*SW846 6010C															
Arsenic, Total, ICP	2.2	<RDL	1.2	6.09	mg/Kg	4.8	<RDL	1.2	6.1	mg/Kg	5.6	<RDL	1.2	6.23	mg/Kg
Lead, Total, ICP	1.7	<RDL	0.97	4.87	mg/Kg	4.7	<RDL	0.98	4.88	mg/Kg	5.33		1	4.99	mg/Kg
OR SW846 3550B*SW846 8270D															
1-Methylnaphthalene															
2-Methylnaphthalene															
Acenaphthene															
Acenaphthylene															
Anthracene															
Benzo(a)anthracene															
Benzo(a)pyrene															
Benzo(b,j,k)fluoranthene															
Benzo(g,h,i)perylene															
Chrysene															
Dibenzo(a,h)anthracene															
Fluoranthene															
Fluorene															
Indeno(1,2,3-Cd)Pyrene															
Naphthalene															
Phenanthrene															
Pyrene															

King County Environmental Lab Analytical Report

	Sample L58206-7	Sample L58206-8	Sample L58206-9
Project:	421422-100	421422-100	421422-100
Locator:	NONE	NONE	NONE
Descrip:	UNKNOWN LOCATOR	UNKNOWN LOCATOR	UNKNOWN LOCATOR
Sample:	L58206-7	L58206-8	L58206-9
Matrix:	SB SOIL	SB SOIL	SB SOIL
ColDate:	6/24/13 12:30	6/24/13 13:10	6/24/13 13:30
TimeSpan:			
TotalSolid:	94.3	96.6	91.1
ClientLoc:	BLUFF-1	BLUFF-3	SLOUGH-2
SampDepth:			
	WET Weight Basis	**WET Weight Basis**	**WET Weight Basis**

Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
CV SM2540-G															
Total Solids	94.3		0.005	0.01	%	96.6		0.005	0.01	%	91.1		0.005	0.01	%
ES NONE															
Client Locator	BLUFF-1				none	BLUFF-3				none	SLOUGH-2				none
MT EPA 1640															
Arsenic, Dissolved, ICP-MS															
Arsenic, Total, ICP-MS															
MT EPA 200.8*SW846 6020A															
Cadmium, Dissolved, ICP-MS															
Cadmium, Total, ICP-MS															
Lead, Dissolved, ICP-MS															
Lead, Total, ICP-MS															
MT SW846 3050B*SW846 6010C															
Arsenic, Total, ICP	2.2	<RDL	1.2	6.12	mg/Kg	6.48		1.2	6.18	mg/Kg	6.14		1.2	6.01	mg/Kg
Lead, Total, ICP	1.5	<RDL	0.98	4.9	mg/Kg	5.67		0.99	4.94	mg/Kg	7.12		0.96	4.81	mg/Kg
OR SW846 3550B*SW846 8270D															
1-Methylnaphthalene															
2-Methylnaphthalene															
Acenaphthene															
Acenaphthylene															
Anthracene															
Benzo(a)anthracene															
Benzo(a)pyrene															
Benzo(b,j,k)fluoranthene															
Benzo(g,h,i)perylene															
Chrysene															
Dibenzo(a,h)anthracene															
Fluoranthene															
Fluorene															
Indeno(1,2,3-Cd)Pyrene															
Naphthalene															
Phenanthrene															
Pyrene															

King County Environmental Lab Analytical Report

	Sample 1	Sample 2	Sample 3
Project:	421422-100	421422-100	421422-100
Locator:	NONE	NONE	NONE
Descrip:	UNKNOWN LOCATOR	UNKNOWN LOCATOR	UNKNOWN LOCATOR
Sample:	L58206-10	L58206-11	L58206-12
Matrix:	SB SOIL	LK FRESH WTR	LK FRESH WTR
ColDate:	6/24/13 14:30	6/25/13 9:50	6/25/13 11:05
TimeSpan:			
TotalSolid:	98.4		
ClientLoc:	BLUFF-5	Spring-D	Spring-E
SampDepth:			
	WET Weight Basis	**WET Weight Basis**	**WET Weight Basis**

Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
CV SM2540-G															
Total Solids	98.4		0.005	0.01	%										
ES NONE															
Client Locator	BLUFF-5				none	Spring-D				none	Spring-E				none
MT EPA 1640															
Arsenic, Dissolved, ICP-MS						3.02		0.1	0.5	ug/L	1.24		0.1	0.5	ug/L
Arsenic, Total, ICP-MS						3.06		0.2	1	ug/L	1.54		0.1	0.5	ug/L
MT EPA 200.8*SW846 6020A															
Cadmium, Dissolved, ICP-MS						0.06	<RDL	0.05	0.25	ug/L		<MDL	0.05	0.25	ug/L
Cadmium, Total, ICP-MS						0.062	<RDL	0.05	0.25	ug/L		<MDL	0.05	0.25	ug/L
Lead, Dissolved, ICP-MS							<MDL	0.1	0.5	ug/L		<MDL	0.1	0.5	ug/L
Lead, Total, ICP-MS							<MDL	0.1	0.5	ug/L	0.22	<RDL	0.1	0.5	ug/L
MT SW846 3050B*SW846 6010C															
Arsenic, Total, ICP	11.5		1.2	6.23	mg/Kg										
Lead, Total, ICP	8.65		1	4.99	mg/Kg										
OR SW846 3550B*SW846 8270D															
1-Methylnaphthalene															
2-Methylnaphthalene															
Acenaphthene															
Acenaphthylene															
Anthracene															
Benzo(a)anthracene															
Benzo(a)pyrene															
Benzo(b,j,k)fluoranthene															
Benzo(g,h,i)perylene															
Chrysene															
Dibenzo(a,h)anthracene															
Fluoranthene															
Fluorene															
Indeno(1,2,3-Cd)Pyrene															
Naphthalene															
Phenanthrene															
Pyrene															

King County Environmental Lab Analytical Report

	Sample 1	Sample 2	Sample 3
Project:	421422-100	421422-100	421422-100
Locator:	NONE	NONE	NONE
Descrip:	UNKNOWN LOCATOR	UNKNOWN LOCATOR	UNKNOWN LOCATOR
Sample:	L58206-13	L58206-14	L58206-15
Matrix:	LK FRESH WTR	LK FRESH WTR	LK FRESH WTR
ColDate:	6/25/13 10:45	6/25/13 12:20	6/25/13 13:00
TimeSpan:			
TotalSolid:			
ClientLoc:	Spring-F	Spring-A	Spring-B
SampDepth:			
	WET Weight Basis	**WET Weight Basis**	**WET Weight Basis**

Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**
CV SM2540-G															
Total Solids															
ES NONE															
Client Locator	Spring-F				none	Spring-A				none	Spring-B				none
MT EPA 1640															
Arsenic, Dissolved, ICP-MS	2.01		0.1	0.5	ug/L	2.03		0.1	0.5	ug/L	4.03		0.1	0.5	ug/L
Arsenic, Total, ICP-MS	2.14		0.1	0.5	ug/L	2.21		0.1	0.5	ug/L	4.59		0.1	0.5	ug/L
MT EPA 200.8*SW846 6020A															
Cadmium, Dissolved, ICP-MS		<MDL	0.05	0.25	ug/L		<MDL	0.05	0.25	ug/L		<MDL	0.1	0.5	ug/L
Cadmium, Total, ICP-MS		<MDL	0.05	0.25	ug/L		<MDL	0.05	0.25	ug/L	0.065	<RDL	0.05	0.25	ug/L
Lead, Dissolved, ICP-MS		<MDL	0.1	0.5	ug/L		<MDL	0.1	0.5	ug/L		<MDL	0.2	1	ug/L
Lead, Total, ICP-MS		<MDL	0.1	0.5	ug/L		<MDL	0.1	0.5	ug/L	0.26	<RDL	0.1	0.5	ug/L
MT SW846 3050B*SW846 6010C															
Arsenic, Total, ICP															
Lead, Total, ICP															
OR SW846 3550B*SW846 8270D															
1-Methylnaphthalene															
2-Methylnaphthalene															
Acenaphthene															
Acenaphthylene															
Anthracene															
Benzo(a)anthracene															
Benzo(a)pyrene															
Benzo(b,j,k)fluoranthene															
Benzo(g,h,i)perylene															
Chrysene															
Dibenzo(a,h)anthracene															
Fluoranthene															
Fluorene															
Indeno(1,2,3-Cd)Pyrene															
Naphthalene															
Phenanthrene															
Pyrene															

King County Environmental Lab Analytical Report

	Sample 1	Sample 2	Sample 3
Project:	421422-100	421422-100	421422-100
Locator:	NONE	NONE	NONE
Descrip:	UNKNOWN LOCATOR	UNKNOWN LOCATOR	UNKNOWN LOCATOR
Sample:	L58206-16	L58206-17	L58206-18
Matrix:	SB SOIL	SB SOIL	SB SOIL
ColDate:	6/25/13 14:20	6/25/13 14:30	6/25/13 14:32
TimeSpan:			
TotalSolid:	69.9	92	93
ClientLoc:	1a-S-138-0	1a-S-138-9	1a-S-138-18
SampDepth:			
	WET Weight Basis	**WET Weight Basis**	**WET Weight Basis**

Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**
CV SM2540-G															
Total Solids	69.9		0.005	0.01	%	92		0.005	0.01	%	93		0.005	0.01	%
ES NONE															
Client Locator	1a-S-138-0				none	1a-S-138-9				none	1a-S-138-18				none
MT EPA 1640															
Arsenic, Dissolved, ICP-MS															
Arsenic, Total, ICP-MS															
MT EPA 200.8*SW846 6020A															
Cadmium, Dissolved, ICP-MS															
Cadmium, Total, ICP-MS															
Lead, Dissolved, ICP-MS															
Lead, Total, ICP-MS															
MT SW846 3050B*SW846 6010C															
Arsenic, Total, ICP	62.9		1.2	6.18	mg/Kg	3.9	<RDL	1.2	6.16	mg/Kg	2.3	<RDL	1.2	6.19	mg/Kg
Lead, Total, ICP	136		0.99	4.94	mg/Kg	3.7	<RDL	0.99	4.93	mg/Kg	1.9	<RDL	0.99	4.95	mg/Kg
OR SW846 3550B*SW846 8270D															
1-Methylnaphthalene															
2-Methylnaphthalene															
Acenaphthene															
Acenaphthylene															
Anthracene															
Benzo(a)anthracene															
Benzo(a)pyrene															
Benzo(b,j,k)fluoranthene															
Benzo(g,h,i)perylene															
Chrysene															
Dibenzo(a,h)anthracene															
Fluoranthene															
Fluorene															
Indeno(1,2,3-Cd)Pyrene															
Naphthalene															
Phenanthrene															
Pyrene															

King County Environmental Lab Analytical Report

Project:	421422-100	Project:	421422-100	Project:	421422-100
Locator:	NONE	Locator:	NONE	Locator:	NONE
Descrip:	UNKNOWN LOCATOR	Descrip:	UNKNOWN LOCATOR	Descrip:	UNKNOWN LOCATOR
Sample:	L58206-19	Sample:	L58206-20	Sample:	L58206-21
Matrix:	SB SOIL	Matrix:	SB SOIL	Matrix:	SB SOIL
ColDate:	6/25/13 14:40	ColDate:	6/25/13 14:55	ColDate:	6/25/13 15:10
TimeSpan:		TimeSpan:		TimeSpan:	
TotalSolid:	59.5	TotalSolid:	71.5	TotalSolid:	76
ClientLoc:	1a-S-139-0	ClientLoc:	1a-S-140-0	ClientLoc:	1a-S-141-0
SampDepth:		SampDepth:		SampDepth:	
WET Weight Basis		**WET Weight Basis**		**WET Weight Basis**	

Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
CV SM2540-G															
Total Solids	59.5		0.005	0.01	%	71.5		0.005	0.01	%	76		0.005	0.01	%
ES NONE															
Client Locator	1a-S-139-0				none	1a-S-140-0				none	1a-S-141-0				none
MT EPA 1640															
Arsenic, Dissolved, ICP-MS															
Arsenic, Total, ICP-MS															
MT EPA 200.8*SW846 6020A															
Cadmium, Dissolved, ICP-MS															
Cadmium, Total, ICP-MS															
Lead, Dissolved, ICP-MS															
Lead, Total, ICP-MS															
MT SW846 3050B*SW846 6010C															
Arsenic, Total, ICP	21.1		1.2	6.15	mg/Kg	103		1.2	6.09	mg/Kg	166		1.2	6.19	mg/Kg
Lead, Total, ICP	76.8		0.98	4.92	mg/Kg	235		0.97	4.87	mg/Kg	275		0.99	4.95	mg/Kg
OR SW846 3550B*SW846 8270D															
1-Methylnaphthalene															
2-Methylnaphthalene															
Acenaphthene															
Acenaphthylene															
Anthracene															
Benzo(a)anthracene															
Benzo(a)pyrene															
Benzo(b,j,k)fluoranthene															
Benzo(g,h,i)perylene															
Chrysene															
Dibenzo(a,h)anthracene															
Fluoranthene															
Fluorene															
Indeno(1,2,3-Cd)Pyrene															
Naphthalene															
Phenanthrene															
Pyrene															

King County Environmental Lab Analytical Report

	Sample 1	Sample 2	Sample 3
Project:	421422-100	421422-100	421422-100
Locator:	NONE	NONE	NONE
Descrip:	UNKNOWN LOCATOR	UNKNOWN LOCATOR	UNKNOWN LOCATOR
Sample:	L58295-1	L58295-2	L58295-3
Matrix:	SB SOIL	SB SOIL	SB SOIL
ColDate:	6/26/13 10:20	6/26/13 10:40	6/26/13 10:45
TimeSpan:			
TotalSolid:	69.6	87.1	92.5
ClientLoc:	1a-S-142-0	1a-S-143-0	1a-S-143-9
SampDepth:			
	WET Weight Basis	**WET Weight Basis**	**WET Weight Basis**

L58295-1

Parameters	Value	Qual	MDL	RDL	Units
CV SM2540-G					
Total Solids	69.6	H	0.005	0.01	%
ES NONE					
Client Locator	1a-S-142-0				none
MT EPA 1640					
Arsenic, Dissolved, ICP-MS					
Arsenic, Total, ICP-MS					
MT EPA 200.8*SW846 6020A					
Cadmium, Dissolved, ICP-MS					
Cadmium, Total, ICP-MS					
Lead, Dissolved, ICP-MS					
Lead, Total, ICP-MS					
MT SW846 3050B*SW846 6010C					
Arsenic, Total, ICP	78.5		1.2	6.23	mg/Kg
Lead, Total, ICP	92.6		1	4.99	mg/Kg
OR SW846 3550B*SW846 8270D					
1-Methylnaphthalene					
2-Methylnaphthalene					
Acenaphthene					
Acenaphthylene					
Anthracene					
Benzo(a)anthracene					
Benzo(a)pyrene					
Benzo(b,j,k)fluoranthene					
Benzo(g,h,i)perylene					
Chrysene					
Dibenzo(a,h)anthracene					
Fluoranthene					
Fluorene					
Indeno(1,2,3-Cd)Pyrene					
Naphthalene					
Phenanthrene					
Pyrene					

L58295-2

Parameters	Value	Qual	MDL	RDL	Units
CV SM2540-G					
Total Solids	87.1	H	0.005	0.01	%
ES NONE					
Client Locator	1a-S-143-0				none
MT EPA 1640					
Arsenic, Dissolved, ICP-MS					
Arsenic, Total, ICP-MS					
MT EPA 200.8*SW846 6020A					
Cadmium, Dissolved, ICP-MS					
Cadmium, Total, ICP-MS					
Lead, Dissolved, ICP-MS					
Lead, Total, ICP-MS					
MT SW846 3050B*SW846 6010C					
Arsenic, Total, ICP	24.9		1.2	6.25	mg/Kg
Lead, Total, ICP	15		1	5	mg/Kg
OR SW846 3550B*SW846 8270D					
1-Methylnaphthalene					
2-Methylnaphthalene					
Acenaphthene					
Acenaphthylene					
Anthracene					
Benzo(a)anthracene					
Benzo(a)pyrene					
Benzo(b,j,k)fluoranthene					
Benzo(g,h,i)perylene					
Chrysene					
Dibenzo(a,h)anthracene					
Fluoranthene					
Fluorene					
Indeno(1,2,3-Cd)Pyrene					
Naphthalene					
Phenanthrene					
Pyrene					

L58295-3

Parameters	Value	Qual	MDL	RDL	Units
CV SM2540-G					
Total Solids	92.5	H	0.005	0.01	%
ES NONE					
Client Locator	1a-S-143-9				none
MT EPA 1640					
Arsenic, Dissolved, ICP-MS					
Arsenic, Total, ICP-MS					
MT EPA 200.8*SW846 6020A					
Cadmium, Dissolved, ICP-MS					
Cadmium, Total, ICP-MS					
Lead, Dissolved, ICP-MS					
Lead, Total, ICP-MS					
MT SW846 3050B*SW846 6010C					
Arsenic, Total, ICP	3.2	<RDL	1.2	6.23	mg/Kg
Lead, Total, ICP	2.8	<RDL	1	4.99	mg/Kg
OR SW846 3550B*SW846 8270D					
1-Methylnaphthalene					
2-Methylnaphthalene					
Acenaphthene					
Acenaphthylene					
Anthracene					
Benzo(a)anthracene					
Benzo(a)pyrene					
Benzo(b,j,k)fluoranthene					
Benzo(g,h,i)perylene					
Chrysene					
Dibenzo(a,h)anthracene					
Fluoranthene					
Fluorene					
Indeno(1,2,3-Cd)Pyrene					
Naphthalene					
Phenanthrene					
Pyrene					

King County Environmental Lab Analytical Report

	L58295-4	L58295-5	L58295-6
Project:	421422-100	421422-100	421422-100
Locator:	NONE	NONE	NONE
Descrip:	UNKNOWN LOCATOR	UNKNOWN LOCATOR	UNKNOWN LOCATOR
Sample:	L58295-4	L58295-5	L58295-6
Matrix:	SB SOIL	SB SOIL	SB SOIL
ColDate:	6/26/13 10:47	6/26/13 11:00	6/26/13 12:00
TimeSpan:			
TotalSolid:	93.9	81.5	62.2
ClientLoc:	1a-S-143-18	1a-S-144-0	1a-S-145-0
SampDepth:			
	WET Weight Basis	**WET Weight Basis**	**WET Weight Basis**

Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
CV SM2540-G															
Total Solids	93.9	H	0.005	0.01	%	81.5	H	0.005	0.01	%	62.2	H	0.005	0.01	%
ES NONE															
Client Locator	1a-S-143-18				none	1a-S-144-0				none	1a-S-145-0				none
MT EPA 1640															
Arsenic, Dissolved, ICP-MS															
Arsenic, Total, ICP-MS															
MT EPA 200.8*SW846 6020A															
Cadmium, Dissolved, ICP-MS															
Cadmium, Total, ICP-MS															
Lead, Dissolved, ICP-MS															
Lead, Total, ICP-MS															
MT SW846 3050B*SW846 6010C															
Arsenic, Total, ICP	3.1	<RDL	1.2	6.23	mg/Kg	8.31		1.2	6.23	mg/Kg	63.5		1.3	6.25	mg/Kg
Lead, Total, ICP	1.8	<RDL	1	4.99	mg/Kg	9.08		1	4.98	mg/Kg	93.3		1	5	mg/Kg
OR SW846 3550B*SW846 8270D															
1-Methylnaphthalene															
2-Methylnaphthalene															
Acenaphthene															
Acenaphthylene															
Anthracene															
Benzo(a)anthracene															
Benzo(a)pyrene															
Benzo(b,j,k)fluoranthene															
Benzo(g,h,i)perylene															
Chrysene															
Dibenzo(a,h)anthracene															
Fluoranthene															
Fluorene															
Indeno(1,2,3-Cd)Pyrene															
Naphthalene															
Phenanthrene															
Pyrene															

King County Environmental Lab Analytical Report

	Sample 1		Sample 2		Sample 3
Project:	421422-100	Project:	421422-100	Project:	421422-100
Locator:	NONE	Locator:	NONE	Locator:	NONE
Descrip:	UNKNOWN LOCATOR	Descrip:	UNKNOWN LOCATOR	Descrip:	UNKNOWN LOCATOR
Sample:	L58295-7	Sample:	L58295-8	Sample:	L58295-9
Matrix:	SB SOIL	Matrix:	SB SOIL	Matrix:	SB SOIL
ColDate:	6/26/13 12:20	ColDate:	6/26/13 12:25	ColDate:	6/26/13 12:45
TimeSpan:		TimeSpan:		TimeSpan:	
TotalSolid:	69.6	TotalSolid:	83.9	TotalSolid:	73.2
ClientLoc:	1a-S-146-0	ClientLoc:	1a-S-146-9	ClientLoc:	1a-S-147-0
SampDepth:		SampDepth:		SampDepth:	
WET Weight Basis		**WET Weight Basis**		**WET Weight Basis**	

Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
CV SM2540-G															
Total Solids	69.6	H	0.005	0.01	%	83.9	H	0.005	0.01	%	73.2	H	0.005	0.01	%
ES NONE															
Client Locator	1a-S-146-0				none	1a-S-146-9				none	1a-S-147-0				none
MT EPA 1640															
Arsenic, Dissolved, ICP-MS															
Arsenic, Total, ICP-MS															
MT EPA 200.8*SW846 6020A															
Cadmium, Dissolved, ICP-MS															
Cadmium, Total, ICP-MS															
Lead, Dissolved, ICP-MS															
Lead, Total, ICP-MS															
MT SW846 3050B*SW846 6010C															
Arsenic, Total, ICP	105		1.2	6.24	mg/Kg	7.36		1.2	6.25	mg/Kg	179		1.2	6.24	mg/Kg
Lead, Total, ICP	180		1	4.99	mg/Kg	4.7	<RDL	1	5	mg/Kg	320		1	4.99	mg/Kg
OR SW846 3550B*SW846 8270D															
1-Methylnaphthalene															
2-Methylnaphthalene															
Acenaphthene															
Acenaphthylene															
Anthracene															
Benzo(a)anthracene															
Benzo(a)pyrene															
Benzo(b,j,k)fluoranthene															
Benzo(g,h,i)perylene															
Chrysene															
Dibenzo(a,h)anthracene															
Fluoranthene															
Fluorene															
Indeno(1,2,3-Cd)Pyrene															
Naphthalene															
Phenanthrene															
Pyrene															

King County Environmental Lab Analytical Report

	Sample 1	Sample 2	Sample 3
Project:	421422-100	421422-100	421422-100
Locator:	NONE	NONE	NONE
Descrip:	UNKNOWN LOCATOR	UNKNOWN LOCATOR	UNKNOWN LOCATOR
Sample:	L58295-10	L58295-11	L58295-12
Matrix:	SB SOIL	SB SOIL	SB SOIL
ColDate:	6/26/13 12:50	6/26/13 13:50	6/26/13 13:55
TimeSpan:			
TotalSolid:	84.5	82.6	87.6
ClientLoc:	1a-S-147-9	1a-S-148-0	1a-S-148-9
SampDepth:			
	WET Weight Basis	**WET Weight Basis**	**WET Weight Basis**

Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
CV SM2540-G															
Total Solids	84.5	H	0.005	0.01	%	82.6	H	0.005	0.01	%	87.6	H	0.005	0.01	%
ES NONE															
Client Locator	1a-S-147-9				none	1a-S-148-0				none	1a-S-148-9				none
MT EPA 1640															
Arsenic, Dissolved, ICP-MS															
Arsenic, Total, ICP-MS															
MT EPA 200.8*SW846 6020A															
Cadmium, Dissolved, ICP-MS															
Cadmium, Total, ICP-MS															
Lead, Dissolved, ICP-MS															
Lead, Total, ICP-MS															
MT SW846 3050B*SW846 6010C															
Arsenic, Total, ICP	9.23		1.2	6.25	mg/Kg	57		1.2	6.24	mg/Kg	58.9		1.3	6.25	mg/Kg
Lead, Total, ICP	5	<RDL	1	5	mg/Kg	88.2		1	4.99	mg/Kg	27.9		1	5	mg/Kg
OR SW846 3550B*SW846 8270D															
1-Methylnaphthalene															
2-Methylnaphthalene															
Acenaphthene															
Acenaphthylene															
Anthracene															
Benzo(a)anthracene															
Benzo(a)pyrene															
Benzo(b,j,k)fluoranthene															
Benzo(g,h,i)perylene															
Chrysene															
Dibenzo(a,h)anthracene															
Fluoranthene															
Fluorene															
Indeno(1,2,3-Cd)Pyrene															
Naphthalene															
Phenanthrene															
Pyrene															

King County Environmental Lab Analytical Report

	Sample 1	Sample 2	Sample 3
Project:	421422-100	421422-100	421422-100
Locator:	NONE	NONE	NONE
Descrip:	UNKNOWN LOCATOR	UNKNOWN LOCATOR	UNKNOWN LOCATOR
Sample:	L58295-13	L58295-14	L58295-15
Matrix:	SB SOIL	SB SOIL	SB SOIL
ColDate:	6/26/13 14:05	6/26/13 14:10	6/26/13 14:20
TimeSpan:			
TotalSolid:	65.8	90.7	78.1
ClientLoc:	1a-S-149-0	1a-S-149-9	1a-S-150-0
SampDepth:			
	WET Weight Basis	**WET Weight Basis**	**WET Weight Basis**

Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
CV SM2540-G															
Total Solids	65.8	H	0.005	0.01	%	90.7	H	0.005	0.01	%	78.1	H	0.005	0.01	%
ES NONE															
Client Locator	1a-S-149-0				none	1a-S-149-9				none	1a-S-150-0				none
MT EPA 1640															
Arsenic, Dissolved, ICP-MS															
Arsenic, Total, ICP-MS															
MT EPA 200.8*SW846 6020A															
Cadmium, Dissolved, ICP-MS															
Cadmium, Total, ICP-MS															
Lead, Dissolved, ICP-MS															
Lead, Total, ICP-MS															
MT SW846 3050B*SW846 6010C															
Arsenic, Total, ICP	28.4		1.2	6.25	mg/Kg	6.97		1.2	6.24	mg/Kg	170		1.2	6.23	mg/Kg
Lead, Total, ICP	32.5		1	5	mg/Kg	5.58		1	4.99	mg/Kg	137		1	4.99	mg/Kg
OR SW846 3550B*SW846 8270D															
1-Methylnaphthalene															
2-Methylnaphthalene															
Acenaphthene															
Acenaphthylene															
Anthracene															
Benzo(a)anthracene															
Benzo(a)pyrene															
Benzo(b,j,k)fluoranthene															
Benzo(g,h,i)perylene															
Chrysene															
Dibenzo(a,h)anthracene															
Fluoranthene															
Fluorene															
Indeno(1,2,3-Cd)Pyrene															
Naphthalene															
Phenanthrene															
Pyrene															

King County Environmental Lab Analytical Report

	Sample 1	Sample 2	Sample 3
Project:	421422-100	421422-100	421422-100
Locator:	NONE	NONE	NONE
Descrip:	UNKNOWN LOCATOR	UNKNOWN LOCATOR	UNKNOWN LOCATOR
Sample:	L58295-16	L58295-17	L58295-18
Matrix:	SB SOIL	SB SOIL	SB SOIL
ColDate:	6/26/13 14:25	6/26/13 14:27	6/26/13 14:12
TimeSpan:			
TotalSolid:	90.8	94.1	92
ClientLoc:	1a-S-150-9	1a-S-150-18	1a-S-149-18
SampDepth:			
	WET Weight Basis	**WET Weight Basis**	**WET Weight Basis**

Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**
CV SM2540-G															
Total Solids	90.8	H	0.005	0.01	%	94.1	H	0.005	0.01	%	92	H	0.005	0.01	%
ES NONE															
Client Locator	1a-S-150-9				none	1a-S-150-18				none	1a-S-149-18				none
MT EPA 1640															
Arsenic, Dissolved, ICP-MS															
Arsenic, Total, ICP-MS															
MT EPA 200.8*SW846 6020A															
Cadmium, Dissolved, ICP-MS															
Cadmium, Total, ICP-MS															
Lead, Dissolved, ICP-MS															
Lead, Total, ICP-MS															
MT SW846 3050B*SW846 6010C															
Arsenic, Total, ICP	12.2		1.2	6.25	mg/Kg	6.37		1.2	6.23	mg/Kg	2.2	<RDL	1.2	6.24	mg/Kg
Lead, Total, ICP	4.8	<RDL	1	5	mg/Kg	4	<RDL	1	4.99	mg/Kg	2	<RDL	1	4.99	mg/Kg
OR SW846 3550B*SW846 8270D															
1-Methylnaphthalene															
2-Methylnaphthalene															
Acenaphthene															
Acenaphthylene															
Anthracene															
Benzo(a)anthracene															
Benzo(a)pyrene															
Benzo(b,j,k)fluoranthene															
Benzo(g,h,i)perylene															
Chrysene															
Dibenzo(a,h)anthracene															
Fluoranthene															
Fluorene															
Indeno(1,2,3-Cd)Pyrene															
Naphthalene															
Phenanthrene															
Pyrene															

King County Environmental Lab Analytical Report

	Sample 1	Sample 2	Sample 3
Project:	421422-100	421422-100	421422-100
Locator:	NONE	NONE	NONE
Descrip:	UNKNOWN LOCATOR	UNKNOWN LOCATOR	UNKNOWN LOCATOR
Sample:	L58295-19	L58295-20	L58295-21
Matrix:	SB SOIL	SB SOIL	SB SOIL
ColDate:	6/26/13 14:45	6/26/13 14:50	6/26/13 14:52
TimeSpan:			
TotalSolid:	66.9	91.3	93.9
ClientLoc:	1a-S-151-0	1a-S-151-9	1a-S-151-18
SampDepth:			
	WET Weight Basis	**WET Weight Basis**	**WET Weight Basis**

Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
CV SM2540-G															
Total Solids	66.9	H	0.005	0.01	%	91.3	H	0.005	0.01	%	93.9	H	0.005	0.01	%
ES NONE															
Client Locator	1a-S-151-0				none	1a-S-151-9				none	1a-S-151-18				none
MT EPA 1640															
Arsenic, Dissolved, ICP-MS															
Arsenic, Total, ICP-MS															
MT EPA 200.8*SW846 6020A															
Cadmium, Dissolved, ICP-MS															
Cadmium, Total, ICP-MS															
Lead, Dissolved, ICP-MS															
Lead, Total, ICP-MS															
MT SW846 3050B*SW846 6010C															
Arsenic, Total, ICP	171		1.2	6.24	mg/Kg	23.4		1.2	6.24	mg/Kg	3.7	<RDL	1.2	6.24	mg/Kg
Lead, Total, ICP	519		1	4.99	mg/Kg	11.4		1	4.99	mg/Kg	5.07		1	4.99	mg/Kg
OR SW846 3550B*SW846 8270D															
1-Methylnaphthalene															
2-Methylnaphthalene															
Acenaphthene															
Acenaphthylene															
Anthracene															
Benzo(a)anthracene															
Benzo(a)pyrene															
Benzo(b,j,k)fluoranthene															
Benzo(g,h,i)perylene															
Chrysene															
Dibenzo(a,h)anthracene															
Fluoranthene															
Fluorene															
Indeno(1,2,3-Cd)Pyrene															
Naphthalene															
Phenanthrene															
Pyrene															

King County Environmental Lab Analytical Report

	Sample 1	Sample 2	Sample 3
Project:	421422-100	421422-100	421422-100
Locator:	NONE	NONE	NONE
Descrip:	UNKNOWN LOCATOR	UNKNOWN LOCATOR	UNKNOWN LOCATOR
Sample:	L58295-22	L58295-23	L58295-24
Matrix:	SB SOIL	SB SOIL	SB SOIL
ColDate:	6/26/13 15:05	6/26/13 15:10	6/26/13 15:15
TimeSpan:			
TotalSolid:	74.1	78.2	58.5
ClientLoc:	1a-S-152-0	1a-S-152-D1	1a-S-153-0
SampDepth:			
	WET Weight Basis	**WET Weight Basis**	**WET Weight Basis**

Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**
CV SM2540-G															
Total Solids	74.1	H	0.005	0.01	%	78.2	H	0.005	0.01	%	58.5	H	0.005	0.01	%
ES NONE															
Client Locator	1a-S-152-0				none	1a-S-152-D1				none	1a-S-153-0				none
MT EPA 1640															
Arsenic, Dissolved, ICP-MS															
Arsenic, Total, ICP-MS															
MT EPA 200.8*SW846 6020A															
Cadmium, Dissolved, ICP-MS															
Cadmium, Total, ICP-MS															
Lead, Dissolved, ICP-MS															
Lead, Total, ICP-MS															
MT SW846 3050B*SW846 6010C															
Arsenic, Total, ICP	75.5		1.2	6.23	mg/Kg	97.9		1.2	6.23	mg/Kg	76.6		1.2	6.23	mg/Kg
Lead, Total, ICP	64.2		1	4.99	mg/Kg	44.2		1	4.98	mg/Kg	217		1	4.98	mg/Kg
OR SW846 3550B*SW846 8270D															
1-Methylnaphthalene															
2-Methylnaphthalene															
Acenaphthene															
Acenaphthylene															
Anthracene															
Benzo(a)anthracene															
Benzo(a)pyrene															
Benzo(b,j,k)fluoranthene															
Benzo(g,h,i)perylene															
Chrysene															
Dibenzo(a,h)anthracene															
Fluoranthene															
Fluorene															
Indeno(1,2,3-Cd)Pyrene															
Naphthalene															
Phenanthrene															
Pyrene															

King County Environmental Lab Analytical Report

	Sample 1	Sample 2	Sample 3
Project:	421422-100	421422-100	421422-100
Locator:	NONE	NONE	NONE
Descrip:	UNKNOWN LOCATOR	UNKNOWN LOCATOR	UNKNOWN LOCATOR
Sample:	L58295-25	L58295-26	L58295-27
Matrix:	SB SOIL	SB SOIL	SB SOIL
ColDate:	6/26/13 15:20	6/26/13 15:45	6/27/13 12:00
TimeSpan:			
TotalSolid:	86.6	68.1	77.1
ClientLoc:	1a-S-153-9	1a-S-154-0	3a-S-158-0
SampDepth:			
	WET Weight Basis	**WET Weight Basis**	**WET Weight Basis**

Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**
CV SM2540-G															
Total Solids	86.6	H	0.005	0.01	%	68.1	H	0.005	0.01	%	77.1		0.005	0.01	%
ES NONE															
Client Locator	1a-S-153-9				none	1a-S-154-0				none	3a-S-158-0				none
MT EPA 1640															
Arsenic, Dissolved, ICP-MS															
Arsenic, Total, ICP-MS															
MT EPA 200.8*SW846 6020A															
Cadmium, Dissolved, ICP-MS															
Cadmium, Total, ICP-MS															
Lead, Dissolved, ICP-MS															
Lead, Total, ICP-MS															
MT SW846 3050B*SW846 6010C															
Arsenic, Total, ICP	103		1.3	6.25	mg/Kg	43.9		1.2	6.23	mg/Kg	50.8		1.2	6.23	mg/Kg
Lead, Total, ICP	88.4		1	5	mg/Kg	166		1	4.98	mg/Kg	67.2		1	4.99	mg/Kg
OR SW846 3550B*SW846 8270D															
1-Methylnaphthalene															
2-Methylnaphthalene															
Acenaphthene															
Acenaphthylene															
Anthracene															
Benzo(a)anthracene															
Benzo(a)pyrene															
Benzo(b,j,k)fluoranthene															
Benzo(g,h,i)perylene															
Chrysene															
Dibenzo(a,h)anthracene															
Fluoranthene															
Fluorene															
Indeno(1,2,3-Cd)Pyrene															
Naphthalene															
Phenanthrene															
Pyrene															

King County Environmental Lab Analytical Report

	Sample 1	Sample 2	Sample 3
Project:	421422-100	421422-100	421422-100
Locator:	NONE	NONE	NONE
Descrip:	UNKNOWN LOCATOR	UNKNOWN LOCATOR	UNKNOWN LOCATOR
Sample:	L58295-28	L58295-29	L58295-30
Matrix:	SB SOIL	SB SOIL	SB SOIL
ColDate:	6/27/13 12:05	6/27/13 12:25	6/27/13 12:28
TimeSpan:			
TotalSolid:	88.7	61	63.9
ClientLoc:	3a-S-158-9	3a-S-159-0	3a-S-159-D2
SampDepth:			
	WET Weight Basis	**WET Weight Basis**	**WET Weight Basis**

Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
CV SM2540-G															
Total Solids	88.7		0.005	0.01	%	61		0.005	0.01	%	63.9		0.005	0.01	%
ES NONE															
Client Locator	3a-S-158-9				none	3a-S-159-0				none	3a-S-159-D2				none
MT EPA 1640															
Arsenic, Dissolved, ICP-MS															
Arsenic, Total, ICP-MS															
MT EPA 200.8*SW846 6020A															
Cadmium, Dissolved, ICP-MS															
Cadmium, Total, ICP-MS															
Lead, Dissolved, ICP-MS															
Lead, Total, ICP-MS															
MT SW846 3050B*SW846 6010C															
Arsenic, Total, ICP	3.6	<RDL	1.2	6.24	mg/Kg	53.5		1.3	6.25	mg/Kg	51.9		1.2	6.23	mg/Kg
Lead, Total, ICP	6.16		1	4.99	mg/Kg	66.3		1	5	mg/Kg	58.3		1	4.98	mg/Kg
OR SW846 3550B*SW846 8270D															
1-Methylnaphthalene															
2-Methylnaphthalene															
Acenaphthene															
Acenaphthylene															
Anthracene															
Benzo(a)anthracene															
Benzo(a)pyrene															
Benzo(b,j,k)fluoranthene															
Benzo(g,h,i)perylene															
Chrysene															
Dibenzo(a,h)anthracene															
Fluoranthene															
Fluorene															
Indeno(1,2,3-Cd)Pyrene															
Naphthalene															
Phenanthrene															
Pyrene															

King County Environmental Lab Analytical Report

	Sample 1	Sample 2	Sample 3
Project:	421422-100	421422-100	421422-100
Locator:	NONE	NONE	NONE
Descrip:	UNKNOWN LOCATOR	UNKNOWN LOCATOR	UNKNOWN LOCATOR
Sample:	L58295-31	L58295-32	L58295-33
Matrix:	SB SOIL	SB SOIL	SB SOIL
ColDate:	6/27/13 13:05	6/27/13 13:10	6/27/13 10:10
TimeSpan:			
TotalSolid:	79.8	88.4	79.8
ClientLoc:	3a-S-160-0	3a-S-160-9	1a-S-155-0
SampDepth:			
	WET Weight Basis	**WET Weight Basis**	**WET Weight Basis**

Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
CV SM2540-G															
Total Solids	79.8		0.005	0.01	%	88.4		0.005	0.01	%	79.8		0.005	0.01	%
ES NONE															
Client Locator	3a-S-160-0				none	3a-S-160-9				none	1a-S-155-0				none
MT EPA 1640															
Arsenic, Dissolved, ICP-MS															
Arsenic, Total, ICP-MS															
MT EPA 200.8*SW846 6020A															
Cadmium, Dissolved, ICP-MS															
Cadmium, Total, ICP-MS															
Lead, Dissolved, ICP-MS															
Lead, Total, ICP-MS															
MT SW846 3050B*SW846 6010C															
Arsenic, Total, ICP	39.5		1.2	6.24	mg/Kg	3.1	<RDL	1.2	6.25	mg/Kg	23.9		1.2	6.24	mg/Kg
Lead, Total, ICP	33.6		1	4.99	mg/Kg	5.28		1	5	mg/Kg	21.9		1	4.99	mg/Kg
OR SW846 3550B*SW846 8270D															
1-Methylnaphthalene															
2-Methylnaphthalene															
Acenaphthene															
Acenaphthylene															
Anthracene															
Benzo(a)anthracene															
Benzo(a)pyrene															
Benzo(b,j,k)fluoranthene															
Benzo(g,h,i)perylene															
Chrysene															
Dibenzo(a,h)anthracene															
Fluoranthene															
Fluorene															
Indeno(1,2,3-Cd)Pyrene															
Naphthalene															
Phenanthrene															
Pyrene															

King County Environmental Lab Analytical Report

Project:	421422-100	421422-100	421422-100
Locator:	NONE	NONE	NONE
Descrip:	UNKNOWN LOCATOR	UNKNOWN LOCATOR	UNKNOWN LOCATOR
Sample:	L58295-34	L58295-35	L58295-36
Matrix:	SB SOIL	SB SOIL	SB SOIL
ColDate:	6/27/13 12:37	6/27/13 14:55	6/27/13 14:57
TimeSpan:			
TotalSolid:	79.1	75.4	74.6
ClientLoc:	3a-S-159-D3	1b-S-163-0	1b-S-163-D4
SampDepth:			
	WET Weight Basis	**WET Weight Basis**	**WET Weight Basis**

Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
CV SM2540-G															
Total Solids	79.1		0.005	0.01	%	75.4		0.005	0.01	%	74.6		0.005	0.01	%
ES NONE															
Client Locator	3a-S-159-D3				none	1b-S-163-0				none	1b-S-163-D4				none
MT EPA 1640															
Arsenic, Dissolved, ICP-MS															
Arsenic, Total, ICP-MS															
MT EPA 200.8*SW846 6020A															
Cadmium, Dissolved, ICP-MS															
Cadmium, Total, ICP-MS															
Lead, Dissolved, ICP-MS															
Lead, Total, ICP-MS															
MT SW846 3050B*SW846 6010C															
Arsenic, Total, ICP	53.6		1.2	6.24	mg/Kg	89.5		1.2	6.24	mg/Kg	92.7		1.2	6.23	mg/Kg
Lead, Total, ICP	103		1	4.99	mg/Kg	151		1	4.99	mg/Kg	171		1	4.98	mg/Kg
OR SW846 3550B*SW846 8270D															
1-Methylnaphthalene															
2-Methylnaphthalene															
Acenaphthene															
Acenaphthylene															
Anthracene															
Benzo(a)anthracene															
Benzo(a)pyrene															
Benzo(b,j,k)fluoranthene															
Benzo(g,h,i)perylene															
Chrysene															
Dibenzo(a,h)anthracene															
Fluoranthene															
Fluorene															
Indeno(1,2,3-Cd)Pyrene															
Naphthalene															
Phenanthrene															
Pyrene															

King County Environmental Lab Analytical Report

	Sample L58295-37	Sample L58295-38	Sample L58295-39
Project:	421422-100	421422-100	421422-100
Locator:	NONE	NONE	NONE
Descrip:	UNKNOWN LOCATOR	UNKNOWN LOCATOR	UNKNOWN LOCATOR
Sample:	L58295-37	L58295-38	L58295-39
Matrix:	SB SOIL	SB SOIL	SB SOIL
ColDate:	6/27/13 10:25	6/27/13 10:25	6/27/13 10:27
TimeSpan:			
TotalSolid:	63.6	91.6	92.2
ClientLoc:	1a-S-156-0	1a-S-156-9	1a-S-156-18
SampDepth:			
	WET Weight Basis	**WET Weight Basis**	**WET Weight Basis**

Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**
CV SM2540-G															
Total Solids	63.6		0.005	0.01	%	91.6		0.005	0.01	%	92.2		0.005	0.01	%
ES NONE															
Client Locator	1a-S-156-0				none	1a-S-156-9				none	1a-S-156-18				none
MT EPA 1640															
Arsenic, Dissolved, ICP-MS															
Arsenic, Total, ICP-MS															
MT EPA 200.8*SW846 6020A															
Cadmium, Dissolved, ICP-MS															
Cadmium, Total, ICP-MS															
Lead, Dissolved, ICP-MS															
Lead, Total, ICP-MS															
MT SW846 3050B*SW846 6010C															
Arsenic, Total, ICP	189		1.2	6.24	mg/Kg	2.6	<RDL	1.2	6.24	mg/Kg	2.1	<RDL	1.2	6.23	mg/Kg
Lead, Total, ICP	335		1	4.99	mg/Kg	7.38		1	4.99	mg/Kg	4.1	<RDL	1	4.99	mg/Kg
OR SW846 3550B*SW846 8270D															
1-Methylnaphthalene															
2-Methylnaphthalene															
Acenaphthene															
Acenaphthylene															
Anthracene															
Benzo(a)anthracene															
Benzo(a)pyrene															
Benzo(b,j,k)fluoranthene															
Benzo(g,h,i)perylene															
Chrysene															
Dibenzo(a,h)anthracene															
Fluoranthene															
Fluorene															
Indeno(1,2,3-Cd)Pyrene															
Naphthalene															
Phenanthrene															
Pyrene															

King County Environmental Lab Analytical Report

Project:	421422-100	421422-100	421422-100
Locator:	NONE	NONE	NONE
Descrip:	UNKNOWN LOCATOR	UNKNOWN LOCATOR	UNKNOWN LOCATOR
Sample:	L58295-40	L58295-41	L58295-42
Matrix:	SB SOIL	SB SOIL	SB SOIL
ColDate:	6/27/13 15:35	6/27/13 10:45	6/27/13 15:40
TimeSpan:			
TotalSolid:	70.1	72	83.4
ClientLoc:	1a-S-165-0	1a-S-157-0	1a-S-165-9
SampDepth:			
	WET Weight Basis	**WET Weight Basis**	**WET Weight Basis**

Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
CV SM2540-G															
Total Solids	70.1		0.005	0.01	%	72		0.005	0.01	%	83.4		0.005	0.01	%
ES NONE															
Client Locator	1a-S-165-0				none	1a-S-157-0				none	1a-S-165-9				none
MT EPA 1640															
Arsenic, Dissolved, ICP-MS															
Arsenic, Total, ICP-MS															
MT EPA 200.8*SW846 6020A															
Cadmium, Dissolved, ICP-MS															
Cadmium, Total, ICP-MS															
Lead, Dissolved, ICP-MS															
Lead, Total, ICP-MS															
MT SW846 3050B*SW846 6010C															
Arsenic, Total, ICP	63.9		1.2	6.23	mg/Kg	73.6		1.2	6.24	mg/Kg	40.4		1.2	6.24	mg/Kg
Lead, Total, ICP	178		1	4.98	mg/Kg	92.2		1	4.99	mg/Kg	72.9		1	4.99	mg/Kg
OR SW846 3550B*SW846 8270D															
1-Methylnaphthalene															
2-Methylnaphthalene															
Acenaphthene															
Acenaphthylene															
Anthracene															
Benzo(a)anthracene															
Benzo(a)pyrene															
Benzo(b,j,k)fluoranthene															
Benzo(g,h,i)perylene															
Chrysene															
Dibenzo(a,h)anthracene															
Fluoranthene															
Fluorene															
Indeno(1,2,3-Cd)Pyrene															
Naphthalene															
Phenanthrene															
Pyrene															

King County Environmental Lab Analytical Report

	Sample 1	Sample 2	Sample 3
Project:	421422-100	421422-100	421422-100
Locator:	NONE	NONE	NONE
Descrip:	UNKNOWN LOCATOR	UNKNOWN LOCATOR	UNKNOWN LOCATOR
Sample:	L58295-43	L58295-44	L58295-45
Matrix:	SB SOIL	SB SOIL	SB SOIL
ColDate:	6/27/13 12:35	6/27/13 14:25	6/27/13 15:15
TimeSpan:			
TotalSolid:	80.6	65.7	77.3
ClientLoc:	3a-S-159-9	1b-S-161-0	1b-S-164-0
SampDepth:			
	WET Weight Basis	**WET Weight Basis**	**WET Weight Basis**

Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
CV SM2540-G															
Total Solids	80.6		0.005	0.01	%	65.7		0.005	0.01	%	77.3		0.005	0.01	%
ES NONE															
Client Locator	3a-S-159-9				none	1b-S-161-0				none	1b-S-164-0				none
MT EPA 1640															
Arsenic, Dissolved, ICP-MS															
Arsenic, Total, ICP-MS															
MT EPA 200.8*SW846 6020A															
Cadmium, Dissolved, ICP-MS															
Cadmium, Total, ICP-MS															
Lead, Dissolved, ICP-MS															
Lead, Total, ICP-MS															
MT SW846 3050B*SW846 6010C															
Arsenic, Total, ICP	25.8		1.2	6.23	mg/Kg	259		1.2	6.23	mg/Kg	80.9		1.2	6.25	mg/Kg
Lead, Total, ICP	42.5		1	4.99	mg/Kg	335		1	4.99	mg/Kg	173		1	5	mg/Kg
OR SW846 3550B*SW846 8270D															
1-Methylnaphthalene															
2-Methylnaphthalene															
Acenaphthene															
Acenaphthylene															
Anthracene															
Benzo(a)anthracene															
Benzo(a)pyrene															
Benzo(b,j,k)fluoranthene															
Benzo(g,h,i)perylene															
Chrysene															
Dibenzo(a,h)anthracene															
Fluoranthene															
Fluorene															
Indeno(1,2,3-Cd)Pyrene															
Naphthalene															
Phenanthrene															
Pyrene															

King County Environmental Lab Analytical Report

	Sample 1	Sample 2	Sample 3
Project:	421422-100	421422-100	421422-100
Locator:	NONE	NONE	NONE
Descrip:	UNKNOWN LOCATOR	UNKNOWN LOCATOR	UNKNOWN LOCATOR
Sample:	L58295-46	L58295-47	L58295-48
Matrix:	SB SOIL	SB SOIL	SB SOIL
ColDate:	6/27/13 15:20	6/27/13 15:22	6/27/13 14:40
TimeSpan:			
TotalSolid:	85.4	86.2	63
ClientLoc:	1b-S-164-9	1b-S-164-18	1b-S-162-0
SampDepth:			
	WET Weight Basis	**WET Weight Basis**	**WET Weight Basis**

Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**
CV SM2540-G															
Total Solids	85.4		0.005	0.01	%	86.2		0.005	0.01	%	63		0.005	0.01	%
ES NONE															
Client Locator	1b-S-164-9				none	1b-S-164-18				none	1b-S-162-0				none
MT EPA 1640															
Arsenic, Dissolved, ICP-MS															
Arsenic, Total, ICP-MS															
MT EPA 200.8*SW846 6020A															
Cadmium, Dissolved, ICP-MS															
Cadmium, Total, ICP-MS															
Lead, Dissolved, ICP-MS															
Lead, Total, ICP-MS															
MT SW846 3050B*SW846 6010C															
Arsenic, Total, ICP	3.3	<RDL	1.2	6.24	mg/Kg	2.8	<RDL	1.2	6.24	mg/Kg	129		1.3	6.25	mg/Kg
Lead, Total, ICP	3.9	<RDL	1	4.99	mg/Kg	3.3	<RDL	1	5	mg/Kg	293		1	5	mg/Kg
OR SW846 3550B*SW846 8270D															
1-Methylnaphthalene															
2-Methylnaphthalene															
Acenaphthene															
Acenaphthylene															
Anthracene															
Benzo(a)anthracene															
Benzo(a)pyrene															
Benzo(b,j,k)fluoranthene															
Benzo(g,h,i)perylene															
Chrysene															
Dibenzo(a,h)anthracene															
Fluoranthene															
Fluorene															
Indeno(1,2,3-Cd)Pyrene															
Naphthalene															
Phenanthrene															
Pyrene															

King County Environmental Lab Analytical Report

	Sample L58295-49	Sample L58295-50	Sample L58295-51
Project:	421422-100	421422-100	421422-100
Locator:	NONE	NONE	NONE
Descrip:	UNKNOWN LOCATOR	UNKNOWN LOCATOR	UNKNOWN LOCATOR
Sample:	L58295-49	L58295-50	L58295-51
Matrix:	SB SOIL	SB SOIL	SB SOIL
ColDate:	6/27/13 14:45	6/27/13 14:47	7/2/13 8:30
TimeSpan:			
TotalSolid:	90.3	86.9	75.4
ClientLoc:	1b-S-162-9	1b-S-162-18	3b-S-166-0
SampDepth:			
	WET Weight Basis	**WET Weight Basis**	**WET Weight Basis**

Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**
CV SM2540-G															
Total Solids	90.3		0.005	0.01	%	86.9		0.005	0.01	%	75.4		0.005	0.01	%
ES NONE															
Client Locator	1b-S-162-9				none	1b-S-162-18				none	3b-S-166-0				none
MT EPA 1640															
Arsenic, Dissolved, ICP-MS															
Arsenic, Total, ICP-MS															
MT EPA 200.8*SW846 6020A															
Cadmium, Dissolved, ICP-MS															
Cadmium, Total, ICP-MS															
Lead, Dissolved, ICP-MS															
Lead, Total, ICP-MS															
MT SW846 3050B*SW846 6010C															
Arsenic, Total, ICP	3.5	<RDL	1.2	6.25	mg/Kg	6.1	<RDL	1.2	6.23	mg/Kg	93.9		1.2	6.23	mg/Kg
Lead, Total, ICP	2.4	<RDL	1	5	mg/Kg	4.1	<RDL	1	4.99	mg/Kg	96.8		1	4.99	mg/Kg
OR SW846 3550B*SW846 8270D															
1-Methylnaphthalene															
2-Methylnaphthalene															
Acenaphthene															
Acenaphthylene															
Anthracene															
Benzo(a)anthracene															
Benzo(a)pyrene															
Benzo(b,j,k)fluoranthene															
Benzo(g,h,i)perylene															
Chrysene															
Dibenzo(a,h)anthracene															
Fluoranthene															
Fluorene															
Indeno(1,2,3-Cd)Pyrene															
Naphthalene															
Phenanthrene															
Pyrene															

King County Environmental Lab Analytical Report

	Sample 1	Sample 2	Sample 3
Project:	421422-100	421422-100	421422-100
Locator:	NONE	NONE	NONE
Descrip:	UNKNOWN LOCATOR	UNKNOWN LOCATOR	UNKNOWN LOCATOR
Sample:	L58295-52	L58295-53	L58295-54
Matrix:	SB SOIL	SB SOIL	SB SOIL
ColDate:	7/2/13 8:35	7/2/13 8:45	7/2/13 8:50
TimeSpan:			
TotalSolid:	72.3	74.7	94.7
ClientLoc:	3b-S-166-D5	3b-S-167-0	3b-S-167-9
SampDepth:			
	WET Weight Basis	**WET Weight Basis**	**WET Weight Basis**

Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
CV SM2540-G															
Total Solids	72.3		0.005	0.01	%	74.7		0.005	0.01	%	94.7		0.005	0.01	%
ES NONE															
Client Locator	3b-S-166-D5				none	3b-S-167-0				none	3b-S-167-9				none
MT EPA 1640															
Arsenic, Dissolved, ICP-MS															
Arsenic, Total, ICP-MS															
MT EPA 200.8*SW846 6020A															
Cadmium, Dissolved, ICP-MS															
Cadmium, Total, ICP-MS															
Lead, Dissolved, ICP-MS															
Lead, Total, ICP-MS															
MT SW846 3050B*SW846 6010C															
Arsenic, Total, ICP	82.1		1.2	6.23	mg/Kg	128		1.2	6.25	mg/Kg	5.5	<RDL	1.2	6.24	mg/Kg
Lead, Total, ICP	103		1	4.99	mg/Kg	135		1	5	mg/Kg	7.9		1	4.99	mg/Kg
OR SW846 3550B*SW846 8270D															
1-Methylnaphthalene															
2-Methylnaphthalene															
Acenaphthene															
Acenaphthylene															
Anthracene															
Benzo(a)anthracene															
Benzo(a)pyrene															
Benzo(b,j,k)fluoranthene															
Benzo(g,h,i)perylene															
Chrysene															
Dibenzo(a,h)anthracene															
Fluoranthene															
Fluorene															
Indeno(1,2,3-Cd)Pyrene															
Naphthalene															
Phenanthrene															
Pyrene															

King County Environmental Lab Analytical Report

	Sample 1	Sample 2	Sample 3
Project:	421422-100	421422-100	421422-100
Locator:	NONE	NONE	NONE
Descrip:	UNKNOWN LOCATOR	UNKNOWN LOCATOR	UNKNOWN LOCATOR
Sample:	L58295-55	L58295-56	L58295-57
Matrix:	SB SOIL	SB SOIL	SB SOIL
ColDate:	7/2/13 8:52	7/2/13 9:10	7/2/13 9:20
TimeSpan:			
TotalSolid:	94.7	42.6	92.5
ClientLoc:	3b-S-167-18	3b-S-168-0	3b-S-169-0
SampDepth:			
	WET Weight Basis	**WET Weight Basis**	**WET Weight Basis**

Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
CV SM2540-G															
Total Solids	94.7		0.005	0.01	%	42.6		0.005	0.01	%	92.5		0.005	0.01	%
ES NONE															
Client Locator	3b-S-167-18				none	3b-S-168-0				none	3b-S-169-0				none
MT EPA 1640															
Arsenic, Dissolved, ICP-MS															
Arsenic, Total, ICP-MS															
MT EPA 200.8*SW846 6020A															
Cadmium, Dissolved, ICP-MS															
Cadmium, Total, ICP-MS															
Lead, Dissolved, ICP-MS															
Lead, Total, ICP-MS															
MT SW846 3050B*SW846 6010C															
Arsenic, Total, ICP	4.2	<RDL	1.2	6.23	mg/Kg	15.5		1.2	6.25	mg/Kg	103		1.2	6.23	mg/Kg
Lead, Total, ICP	3.4	<RDL	1	4.99	mg/Kg	84.1		1	5	mg/Kg	103		1	4.99	mg/Kg
OR SW846 3550B*SW846 8270D															
1-Methylnaphthalene															
2-Methylnaphthalene															
Acenaphthene															
Acenaphthylene															
Anthracene															
Benzo(a)anthracene															
Benzo(a)pyrene															
Benzo(b,j,k)fluoranthene															
Benzo(g,h,i)perylene															
Chrysene															
Dibenzo(a,h)anthracene															
Fluoranthene															
Fluorene															
Indeno(1,2,3-Cd)Pyrene															
Naphthalene															
Phenanthrene															
Pyrene															

King County Environmental Lab Analytical Report

Project:	421422-100	Project:	421422-100	Project:	421422-100
Locator:	NONE	Locator:	NONE	Locator:	NONE
Descrip:	UNKNOWN LOCATOR	Descrip:	UNKNOWN LOCATOR	Descrip:	UNKNOWN LOCATOR
Sample:	L58295-58	Sample:	L58295-59	Sample:	L58295-60
Matrix:	SB SOIL	Matrix:	SB SOIL	Matrix:	SB SOIL
ColDate:	7/2/13 9:25	ColDate:	7/2/13 10:20	ColDate:	7/2/13 10:25
TimeSpan:		TimeSpan:		TimeSpan:	
TotalSolid:	91.2	TotalSolid:	84.8	TotalSolid:	88.1
ClientLoc:	3b-S-169-9	ClientLoc:	5-S-170-0	ClientLoc:	5-S-171-0
SampDepth:		SampDepth:		SampDepth:	
WET Weight Basis		**WET Weight Basis**		**WET Weight Basis**	

Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**
CV SM2540-G															
Total Solids	91.2		0.005	0.01	%	84.8		0.005	0.01	%	88.1		0.005	0.01	%
ES NONE															
Client Locator	3b-S-169-9				none	5-S-170-0				none	5-S-171-0				none
MT EPA 1640															
Arsenic, Dissolved, ICP-MS															
Arsenic, Total, ICP-MS															
MT EPA 200.8*SW846 6020A															
Cadmium, Dissolved, ICP-MS															
Cadmium, Total, ICP-MS															
Lead, Dissolved, ICP-MS															
Lead, Total, ICP-MS															
MT SW846 3050B*SW846 6010C															
Arsenic, Total, ICP	7.73		1.2	6.19	mg/Kg	64.5		1.3	6.25	mg/Kg	102		1.3	6.25	mg/Kg
Lead, Total, ICP	7.5		0.99	4.95	mg/Kg	30.6		1	5	mg/Kg	84.6		1	5	mg/Kg
OR SW846 3550B*SW846 8270D															
1-Methylnaphthalene															
2-Methylnaphthalene															
Acenaphthene															
Acenaphthylene															
Anthracene															
Benzo(a)anthracene															
Benzo(a)pyrene															
Benzo(b,j,k)fluoranthene															
Benzo(g,h,i)perylene															
Chrysene															
Dibenzo(a,h)anthracene															
Fluoranthene															
Fluorene															
Indeno(1,2,3-Cd)Pyrene															
Naphthalene															
Phenanthrene															
Pyrene															

King County Environmental Lab Analytical Report

	L58295-61	L58295-62	L58295-63
Project:	421422-100	421422-100	421422-100
Locator:	NONE	NONE	NONE
Descrip:	UNKNOWN LOCATOR	UNKNOWN LOCATOR	UNKNOWN LOCATOR
Sample:	L58295-61	L58295-62	L58295-63
Matrix:	SB SOIL	SB SOIL	SB SOIL
ColDate:	7/2/13 10:30	7/2/13 10:32	7/2/13 10:40
TimeSpan:			
TotalSolid:	93	95.6	72.8
ClientLoc:	5-S-171-9	5-S-171-18	5-S-172-0
SampDepth:			
	WET Weight Basis	**WET Weight Basis**	**WET Weight Basis**

Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
CV SM2540-G															
Total Solids	93		0.005	0.01	%	95.6		0.005	0.01	%	72.8		0.005	0.01	%
ES NONE															
Client Locator	5-S-171-9				none	5-S-171-18				none	5-S-172-0				none
MT EPA 1640															
Arsenic, Dissolved, ICP-MS															
Arsenic, Total, ICP-MS															
MT EPA 200.8*SW846 6020A															
Cadmium, Dissolved, ICP-MS															
Cadmium, Total, ICP-MS															
Lead, Dissolved, ICP-MS															
Lead, Total, ICP-MS															
MT SW846 3050B*SW846 6010C															
Arsenic, Total, ICP	7.6		1.2	6.24	mg/Kg	3.9	<RDL	1.3	6.25	mg/Kg	91.3		1.2	6.24	mg/Kg
Lead, Total, ICP	9.99		1	4.99	mg/Kg	2.8	<RDL	1	5	mg/Kg	253		1	4.99	mg/Kg
OR SW846 3550B*SW846 8270D															
1-Methylnaphthalene												<MDL,H	5.3	10.7	ug/Kg
2-Methylnaphthalene												<MDL,H	5.3	10.7	ug/Kg
Acenaphthene												<MDL,H	5.3	10.7	ug/Kg
Acenaphthylene												<MDL,H	5.3	10.7	ug/Kg
Anthracene												<MDL,H	5.3	10.7	ug/Kg
Benzo(a)anthracene												<MDL,H	5.3	10.7	ug/Kg
Benzo(a)pyrene												<MDL,H	5.3	10.7	ug/Kg
Benzo(b,j,k)fluoranthene											19.1	H	5.3	10.7	ug/Kg
Benzo(g,h,i)perylene												<MDL,H	5.3	10.7	ug/Kg
Chrysene												<MDL,H	5.3	10.7	ug/Kg
Dibenzo(a,h)anthracene												<MDL,H	5.3	10.7	ug/Kg
Fluoranthene											12.9	H	5.3	10.7	ug/Kg
Fluorene												<MDL,H	5.3	10.7	ug/Kg
Indeno(1,2,3-Cd)Pyrene												<MDL,H	5.3	10.7	ug/Kg
Naphthalene												<MDL,H	5.3	10.7	ug/Kg
Phenanthrene												<MDL,H	5.3	10.7	ug/Kg
Pyrene											7.8	<RDL,H	5.3	10.7	ug/Kg

King County Environmental Lab Analytical Report

Project:	421422-100	421422-100	421422-100
Locator:	NONE	NONE	NONE
Descrip:	UNKNOWN LOCATOR	UNKNOWN LOCATOR	UNKNOWN LOCATOR
Sample:	L58295-64	L58295-65	L58295-66
Matrix:	SB SOIL	SB SOIL	SB SOIL
ColDate:	7/2/13 10:50	7/2/13 10:55	7/2/13 10:57
TimeSpan:			
TotalSolid:	72.3	86.8	85.8
ClientLoc:	5-S-173-0	5-S-173-9	5-S-173-18
SampDepth:			
	WET Weight Basis	**WET Weight Basis**	**WET Weight Basis**

Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
CV SM2540-G															
Total Solids	72.3		0.005	0.01	%	86.8		0.005	0.01	%	85.8		0.005	0.01	%
ES NONE															
Client Locator	5-S-173-0				none	5-S-173-9				none	5-S-173-18				none
MT EPA 1640															
Arsenic, Dissolved, ICP-MS															
Arsenic, Total, ICP-MS															
MT EPA 200.8*SW846 6020A															
Cadmium, Dissolved, ICP-MS															
Cadmium, Total, ICP-MS															
Lead, Dissolved, ICP-MS															
Lead, Total, ICP-MS															
MT SW846 3050B*SW846 6010C															
Arsenic, Total, ICP	109		1.2	6.24	mg/Kg	6.68		1.2	6.24	mg/Kg	3	<RDL	1.2	6.23	mg/Kg
Lead, Total, ICP	1150		1	4.99	mg/Kg	14.3		1	5	mg/Kg	4.2	<RDL	1	4.98	mg/Kg
OR SW846 3550B*SW846 8270D															
1-Methylnaphthalene		<MDL,H	5.3	10.7	ug/Kg										
2-Methylnaphthalene		<MDL,H	5.3	10.7	ug/Kg										
Acenaphthene		<MDL,H	5.3	10.7	ug/Kg										
Acenaphthylene		<MDL,H	5.3	10.7	ug/Kg										
Anthracene		<MDL,H	5.3	10.7	ug/Kg										
Benzo(a)anthracene		<MDL,H	5.3	10.7	ug/Kg										
Benzo(a)pyrene		<MDL,H	5.3	10.7	ug/Kg										
Benzo(b,j,k)fluoranthene	42.7	H	5.3	10.7	ug/Kg										
Benzo(g,h,i)perylene		<MDL,H	5.3	10.7	ug/Kg										
Chrysene		<MDL,H	5.3	10.7	ug/Kg										
Dibenzo(a,h)anthracene		<MDL,H	5.3	10.7	ug/Kg										
Fluoranthene	20	H	5.3	10.7	ug/Kg										
Fluorene		<MDL,H	5.3	10.7	ug/Kg										
Indeno(1,2,3-Cd)Pyrene		<MDL,H	5.3	10.7	ug/Kg										
Naphthalene		<MDL,H	5.3	10.7	ug/Kg										
Phenanthrene	7.4	<RDL,H	5.3	10.7	ug/Kg										
Pyrene	11.9	H	5.3	10.7	ug/Kg										

King County Environmental Lab Analytical Report

	Sample L58295-67	Sample L58295-68	Sample L58295-69
Project:	421422-100	421422-100	421422-100
Locator:	NONE	NONE	NONE
Descrip:	UNKNOWN LOCATOR	UNKNOWN LOCATOR	UNKNOWN LOCATOR
Sample:	L58295-67	L58295-68	L58295-69
Matrix:	SB SOIL	SB SOIL	SB SOIL
ColDate:	7/2/13 11:00	7/2/13 11:10	7/2/13 11:15
TimeSpan:			
TotalSolid:	59.6	73.7	82.3
ClientLoc:	5-S-174-0	5-S-175-0	5-S-176-0
SampDepth:			
	WET Weight Basis	**WET Weight Basis**	**WET Weight Basis**

Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**
CV SM2540-G															
Total Solids	59.6		0.005	0.01	%	73.7		0.005	0.01	%	82.3		0.005	0.01	%
ES NONE															
Client Locator	5-S-174-0				none	5-S-175-0				none	5-S-176-0				none
MT EPA 1640															
Arsenic, Dissolved, ICP-MS															
Arsenic, Total, ICP-MS															
MT EPA 200.8*SW846 6020A															
Cadmium, Dissolved, ICP-MS															
Cadmium, Total, ICP-MS															
Lead, Dissolved, ICP-MS															
Lead, Total, ICP-MS															
MT SW846 3050B*SW846 6010C															
Arsenic, Total, ICP	50.8		1.2	6.25	mg/Kg	134		1.2	6.23	mg/Kg	76.2		1.2	6.24	mg/Kg
Lead, Total, ICP	278		1	5	mg/Kg	142		1	4.99	mg/Kg	97.2		1	4.99	mg/Kg
OR SW846 3550B*SW846 8270D															
1-Methylnaphthalene		<MDL,H	5.3	10.7	ug/Kg										
2-Methylnaphthalene		<MDL,H	5.3	10.7	ug/Kg										
Acenaphthene		<MDL,H	5.3	10.7	ug/Kg										
Acenaphthylene		<MDL,H	5.3	10.7	ug/Kg										
Anthracene		<MDL,H	5.3	10.7	ug/Kg										
Benzo(a)anthracene		<MDL,H	5.3	10.7	ug/Kg										
Benzo(a)pyrene		<MDL,H	5.3	10.7	ug/Kg										
Benzo(b,j,k)fluoranthene	41.4	H	5.3	10.7	ug/Kg										
Benzo(g,h,i)perylene		<MDL,H	5.3	10.7	ug/Kg										
Chrysene		<MDL,H	5.3	10.7	ug/Kg										
Dibenzo(a,h)anthracene		<MDL,H	5.3	10.7	ug/Kg										
Fluoranthene	21.9	H	5.3	10.7	ug/Kg										
Fluorene		<MDL,H	5.3	10.7	ug/Kg										
Indeno(1,2,3-Cd)Pyrene		<MDL,H	5.3	10.7	ug/Kg										
Naphthalene		<MDL,H	5.3	10.7	ug/Kg										
Phenanthrene	9	<RDL,H	5.3	10.7	ug/Kg										
Pyrene	11	H	5.3	10.7	ug/Kg										

King County Environmental Lab Analytical Report

	Sample 1	Sample 2	Sample 3
Project:	421422-100	421422-100	421422-100
Locator:	NONE	NONE	NONE
Descrip:	UNKNOWN LOCATOR	UNKNOWN LOCATOR	UNKNOWN LOCATOR
Sample:	L58295-70	L58295-71	L58295-72
Matrix:	SB SOIL	SB SOIL	SB SOIL
ColDate:	7/2/13 11:20	7/2/13 11:22	7/2/13 11:30
TimeSpan:			
TotalSolid:	88.3	91.5	82.5
ClientLoc:	5-S-176-9	5-S-176-18	5-S-177-0
SampDepth:			
	WET Weight Basis	**WET Weight Basis**	**WET Weight Basis**

Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
CV SM2540-G															
Total Solids	88.3		0.005	0.01	%	91.5		0.005	0.01	%	82.5		0.005	0.01	%
ES NONE															
Client Locator	5-S-176-9				none	5-S-176-18				none	5-S-177-0				none
MT EPA 1640															
Arsenic, Dissolved, ICP-MS															
Arsenic, Total, ICP-MS															
MT EPA 200.8*SW846 6020A															
Cadmium, Dissolved, ICP-MS															
Cadmium, Total, ICP-MS															
Lead, Dissolved, ICP-MS															
Lead, Total, ICP-MS															
MT SW846 3050B*SW846 6010C															
Arsenic, Total, ICP	13.4		1.2	6.25	mg/Kg	2.8	<RDL	1.2	6.24	mg/Kg	141		1.2	6.23	mg/Kg
Lead, Total, ICP	9.93		1	5	mg/Kg	3.3	<RDL	1	5	mg/Kg	391		1	4.98	mg/Kg
OR SW846 3550B*SW846 8270D															
1-Methylnaphthalene												<MDL,H	5.3	10.7	ug/Kg
2-Methylnaphthalene												<MDL,H	5.3	10.7	ug/Kg
Acenaphthene												<MDL,H	5.3	10.7	ug/Kg
Acenaphthylene												<MDL,H	5.3	10.7	ug/Kg
Anthracene												<MDL,H	5.3	10.7	ug/Kg
Benzo(a)anthracene												<MDL,H	5.3	10.7	ug/Kg
Benzo(a)pyrene												<MDL,H	5.3	10.7	ug/Kg
Benzo(b,j,k)fluoranthene											9.5	<RDL,H	5.3	10.7	ug/Kg
Benzo(g,h,i)perylene												<MDL,H	5.3	10.7	ug/Kg
Chrysene												<MDL,H	5.3	10.7	ug/Kg
Dibenzo(a,h)anthracene												<MDL,H	5.3	10.7	ug/Kg
Fluoranthene												<MDL,H	5.3	10.7	ug/Kg
Fluorene												<MDL,H	5.3	10.7	ug/Kg
Indeno(1,2,3-Cd)Pyrene												<MDL,H	5.3	10.7	ug/Kg
Naphthalene												<MDL,H	5.3	10.7	ug/Kg
Phenanthrene												<MDL,H	5.3	10.7	ug/Kg
Pyrene												<MDL,H	5.3	10.7	ug/Kg

King County Environmental Lab Analytical Report

	Sample 1	Sample 2	Sample 3
Project:	421422-100	421422-100	421422-100
Locator:	NONE	NONE	NONE
Descrip:	UNKNOWN LOCATOR	UNKNOWN LOCATOR	UNKNOWN LOCATOR
Sample:	L58295-73	L58295-74	L58295-75
Matrix:	SB SOIL	SB SOIL	SB SOIL
ColDate:	7/2/13 12:40	7/2/13 13:00	7/2/13 12:35
TimeSpan:			
TotalSolid:	73.4	43.4	63.1
ClientLoc:	5-S-178-0	5-FD-179-0	5-FD-178-0
SampDepth:			
WET Weight Basis	**WET Weight Basis**	**WET Weight Basis**	**WET Weight Basis**

Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**
CV SM2540-G															
Total Solids	73.4		0.005	0.01	%	43.4		0.005	0.01	%	63.1		0.005	0.01	%
ES NONE															
Client Locator	5-S-178-0				none	5-FD-179-0				none	5-FD-178-0				none
MT EPA 1640															
Arsenic, Dissolved, ICP-MS															
Arsenic, Total, ICP-MS															
MT EPA 200.8*SW846 6020A															
Cadmium, Dissolved, ICP-MS															
Cadmium, Total, ICP-MS															
Lead, Dissolved, ICP-MS															
Lead, Total, ICP-MS															
MT SW846 3050B*SW846 6010C															
Arsenic, Total, ICP	135		1.2	6.24	mg/Kg	14.6		1.2	6.24	mg/Kg	94.9		1.2	6.22	mg/Kg
Lead, Total, ICP	249		1	4.99	mg/Kg	31		1	4.99	mg/Kg	221		1	4.98	mg/Kg
OR SW846 3550B*SW846 8270D															
1-Methylnaphthalene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
2-Methylnaphthalene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Acenaphthene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Acenaphthylene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Anthracene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Benzo(a)anthracene	5.4	<RDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Benzo(a)pyrene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Benzo(b,j,k)fluoranthene	26.7	H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Benzo(g,h,i)perylene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Chrysene	12.3	H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Dibenzo(a,h)anthracene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Fluoranthene	14.1	H	5.3	10.7	ug/Kg	8.1	<RDL,H	5.3	10.7	ug/Kg	13.9	H	5.3	10.7	ug/Kg
Fluorene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Indeno(1,2,3-Cd)Pyrene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Naphthalene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Phenanthrene	5.5	<RDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg	8.5	<RDL,H	5.3	10.7	ug/Kg
Pyrene	11	H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg	12.6	H	5.3	10.7	ug/Kg

King County Environmental Lab Analytical Report

Project:	421422-100	Project:	421422-100	Project:	421422-100
Locator:	NONE	Locator:	NONE	Locator:	NONE
Descrip:	UNKNOWN LOCATOR	Descrip:	UNKNOWN LOCATOR	Descrip:	UNKNOWN LOCATOR
Sample:	L58295-76	Sample:	L58295-77	Sample:	L58295-78
Matrix:	SB SOIL	Matrix:	SB SOIL	Matrix:	SB SOIL
ColDate:	7/2/13 13:05	ColDate:	7/2/13 13:25	ColDate:	7/2/13 13:30
TimeSpan:		TimeSpan:		TimeSpan:	
TotalSolid:	74	TotalSolid:	47.9	TotalSolid:	78.4
ClientLoc:	5-S-179-0	ClientLoc:	5-FD-180-0	ClientLoc:	5-S-180-0
SampDepth:		SampDepth:		SampDepth:	
WET Weight Basis		**WET Weight Basis**		**WET Weight Basis**	

Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
CV SM2540-G															
Total Solids	74		0.005	0.01	%	47.9		0.005	0.01	%	78.4		0.005	0.01	%
ES NONE															
Client Locator	5-S-179-0				none	5-FD-180-0				none	5-S-180-0				none
MT EPA 1640															
Arsenic, Dissolved, ICP-MS															
Arsenic, Total, ICP-MS															
MT EPA 200.8*SW846 6020A															
Cadmium, Dissolved, ICP-MS															
Cadmium, Total, ICP-MS															
Lead, Dissolved, ICP-MS															
Lead, Total, ICP-MS															
MT SW846 3050B*SW846 6010C															
Arsenic, Total, ICP	126		1.2	6.25	mg/Kg	22		1.2	6.25	mg/Kg	78.8		1.2	6.24	mg/Kg
Lead, Total, ICP	182		1	5	mg/Kg	103		1	5	mg/Kg	159		1	4.99	mg/Kg
OR SW846 3550B*SW846 8270D															
1-Methylnaphthalene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
2-Methylnaphthalene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Acenaphthene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Acenaphthylene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Anthracene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Benzo(a)anthracene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Benzo(a)pyrene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Benzo(b,j,k)fluoranthene	52.1	H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg	14	H	5.3	10.7	ug/Kg
Benzo(g,h,i)perylene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Chrysene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Dibenzo(a,h)anthracene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Fluoranthene	18.2	H	5.3	10.7	ug/Kg	7.9	<RDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Fluorene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Indeno(1,2,3-Cd)Pyrene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Naphthalene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Phenanthrene	6.2	<RDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Pyrene	12	H	5.3	10.7	ug/Kg	5.5	<RDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg

King County Environmental Lab Analytical Report

	Sample 1	Sample 2	Sample 3
Project:	421422-100	421422-100	421422-100
Locator:	NONE	NONE	NONE
Descrip:	UNKNOWN LOCATOR	UNKNOWN LOCATOR	UNKNOWN LOCATOR
Sample:	L58295-79	L58295-80	L58295-81
Matrix:	SB SOIL	SB SOIL	SB SOIL
ColDate:	7/2/13 13:32	7/2/13 14:00	7/2/13 14:05
TimeSpan:			
TotalSolid:	79.1	53.9	80.2
ClientLoc:	5-S-180-D6	5-FD-181-0	5-S-181-0
SampDepth:			
	WET Weight Basis	**WET Weight Basis**	**WET Weight Basis**

Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
CV SM2540-G															
Total Solids	79.1		0.005	0.01	%	53.9		0.005	0.01	%	80.2		0.005	0.01	%
ES NONE															
Client Locator	5-S-180-D6				none	5-FD-181-0				none	5-S-181-0				none
MT EPA 1640															
Arsenic, Dissolved, ICP-MS															
Arsenic, Total, ICP-MS															
MT EPA 200.8*SW846 6020A															
Cadmium, Dissolved, ICP-MS															
Cadmium, Total, ICP-MS															
Lead, Dissolved, ICP-MS															
Lead, Total, ICP-MS															
MT SW846 3050B*SW846 6010C															
Arsenic, Total, ICP	87.8		1.2	6.23	mg/Kg	30.3		1.2	6.24	mg/Kg	91.7		1.2	6.24	mg/Kg
Lead, Total, ICP	180		1	4.99	mg/Kg	152		1	5	mg/Kg	200		1	4.99	mg/Kg
OR SW846 3550B*SW846 8270D															
1-Methylnaphthalene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
2-Methylnaphthalene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Acenaphthene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Acenaphthylene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Anthracene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Benzo(a)anthracene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Benzo(a)pyrene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Benzo(b,j,k)fluoranthene	14.1	H	5.3	10.7	ug/Kg	21.1	H	5.3	10.7	ug/Kg	14	H	5.3	10.7	ug/Kg
Benzo(g,h,i)perylene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Chrysene		<MDL,H	5.3	10.7	ug/Kg	18.1	H	5.3	10.7	ug/Kg	6.3	<RDL,H	5.3	10.7	ug/Kg
Dibenzo(a,h)anthracene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Fluoranthene		<MDL,H	5.3	10.7	ug/Kg	10	<RDL,H	5.3	10.7	ug/Kg	6.8	<RDL,H	5.3	10.7	ug/Kg
Fluorene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Indeno(1,2,3-Cd)Pyrene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Naphthalene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Phenanthrene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Pyrene		<MDL,H	5.3	10.7	ug/Kg	7.1	<RDL,H	5.3	10.7	ug/Kg	5.7	<RDL,H	5.3	10.7	ug/Kg

King County Environmental Lab Analytical Report

Project:	421422-100	421422-100	421422-100
Locator:	NONE	NONE	NONE
Descrip:	UNKNOWN LOCATOR	UNKNOWN LOCATOR	UNKNOWN LOCATOR
Sample:	L58295-82	L58295-83	L58295-84
Matrix:	SB SOIL	SB SOIL	SB SOIL
ColDate:	7/3/13 9:55	7/3/13 10:00	7/3/13 10:15
TimeSpan:			
TotalSolid:	29.2	44.9	45.9
ClientLoc:	5-FD-182-0	5-S-182-0	5-FD-183-0
SampDepth:			
	WET Weight Basis	**WET Weight Basis**	**WET Weight Basis**

Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**
CV SM2540-G															
Total Solids	29.2		0.005	0.01	%	44.9		0.005	0.01	%	45.9		0.005	0.01	%
ES NONE															
Client Locator	5-FD-182-0				none	5-S-182-0				none	5-FD-183-0				none
MT EPA 1640															
Arsenic, Dissolved, ICP-MS															
Arsenic, Total, ICP-MS															
MT EPA 200.8*SW846 6020A															
Cadmium, Dissolved, ICP-MS															
Cadmium, Total, ICP-MS															
Lead, Dissolved, ICP-MS															
Lead, Total, ICP-MS															
MT SW846 3050B*SW846 6010C															
Arsenic, Total, ICP	5.6	<RDL	1.2	6.22	mg/Kg	67.6		1.2	6.23	mg/Kg	5.1	<RDL	1.2	6.23	mg/Kg
Lead, Total, ICP	134		1	4.98	mg/Kg	1130		1	4.98	mg/Kg	22.1		1	4.99	mg/Kg
OR SW846 3550B*SW846 8270D															
1-Methylnaphthalene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
2-Methylnaphthalene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Acenaphthene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Acenaphthylene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Anthracene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Benzo(a)anthracene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Benzo(a)pyrene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Benzo(b,j,k)fluoranthene		<MDL,H	5.3	10.7	ug/Kg	57.2	H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Benzo(g,h,i)perylene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Chrysene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Dibenzo(a,h)anthracene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Fluoranthene		<MDL,H	5.3	10.7	ug/Kg	12.9	H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Fluorene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Indeno(1,2,3-Cd)Pyrene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Naphthalene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Phenanthrene		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg
Pyrene		<MDL,H	5.3	10.7	ug/Kg	11	H	5.3	10.7	ug/Kg		<MDL,H	5.3	10.7	ug/Kg

King County Environmental Lab Analytical Report

Project:	421422-100	421422-100	421422-100
Locator:	NONE	NONE	NONE
Descrip:	UNKNOWN LOCATOR	UNKNOWN LOCATOR	UNKNOWN LOCATOR
Sample:	L58295-85	L58295-86	L58295-87
Matrix:	SB SOIL	SB SOIL	SB SOIL
ColDate:	7/3/13 10:20	7/3/13 11:35	7/3/13 11:40
TimeSpan:			
TotalSolid:	69.1	69.6	78.9
ClientLoc:	5-S-183-0	5-FD-184-0	5-S-184-0
SampDepth:			
WET Weight Basis	**WET Weight Basis**	**WET Weight Basis**	**WET Weight Basis**

Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
CV SM2540-G															
Total Solids	69.1		0.005	0.01	%	69.6		0.005	0.01	%	78.9		0.005	0.01	%
ES NONE															
Client Locator	5-S-183-0				none	5-FD-184-0				none	5-S-184-0				none
MT EPA 1640															
Arsenic, Dissolved, ICP-MS															
Arsenic, Total, ICP-MS															
MT EPA 200.8*SW846 6020A															
Cadmium, Dissolved, ICP-MS															
Cadmium, Total, ICP-MS															
Lead, Dissolved, ICP-MS															
Lead, Total, ICP-MS															
MT SW846 3050B*SW846 6010C															
Arsenic, Total, ICP	12.2		1.2	6.24	mg/Kg										
Lead, Total, ICP	38.8		1	4.99	mg/Kg										
OR SW846 3550B*SW846 8270D															
1-Methylnaphthalene		<MDL,H	5.3	10.7	ug/Kg		<MDL	5.3	10.7	ug/Kg		<MDL	5.3	10.7	ug/Kg
2-Methylnaphthalene		<MDL,H	5.3	10.7	ug/Kg	6.7	<RDL	5.3	10.7	ug/Kg		<MDL	5.3	10.7	ug/Kg
Acenaphthene		<MDL,H	5.3	10.7	ug/Kg	45.2		5.3	10.7	ug/Kg	5.4	<RDL	5.3	10.7	ug/Kg
Acenaphthylene		<MDL,H	5.3	10.7	ug/Kg		<MDL	5.3	10.7	ug/Kg		<MDL	5.3	10.7	ug/Kg
Anthracene		<MDL,H	5.3	10.7	ug/Kg	87		5.3	10.7	ug/Kg	9.8	<RDL	5.3	10.7	ug/Kg
Benzo(a)anthracene		<MDL,H	5.3	10.7	ug/Kg	983		5.3	10.7	ug/Kg	126		5.3	10.7	ug/Kg
Benzo(a)pyrene		<MDL,H	5.3	10.7	ug/Kg	1540		53	107	ug/Kg	199		5.3	10.7	ug/Kg
Benzo(b,j,k)fluoranthene	8	<RDL,H	5.3	10.7	ug/Kg	2820		53	107	ug/Kg	385		5.3	10.7	ug/Kg
Benzo(g,h,i)perylene		<MDL,H	5.3	10.7	ug/Kg	883		53	107	ug/Kg	108		5.3	10.7	ug/Kg
Chrysene		<MDL,H	5.3	10.7	ug/Kg	1270		5.3	10.7	ug/Kg	165		5.3	10.7	ug/Kg
Dibenzo(a,h)anthracene		<MDL,H	5.3	10.7	ug/Kg	228		53	107	ug/Kg	26.2		5.3	10.7	ug/Kg
Fluoranthene		<MDL,H	5.3	10.7	ug/Kg	1390		5.3	10.7	ug/Kg	183		5.3	10.7	ug/Kg
Fluorene		<MDL,H	5.3	10.7	ug/Kg	56.3		5.3	10.7	ug/Kg	5.9	<RDL	5.3	10.7	ug/Kg
Indeno(1,2,3-Cd)Pyrene		<MDL,H	5.3	10.7	ug/Kg	1060		53	107	ug/Kg	131		5.3	10.7	ug/Kg
Naphthalene		<MDL,H	5.3	10.7	ug/Kg	18.5		5.3	10.7	ug/Kg		<MDL	5.3	10.7	ug/Kg
Phenanthrene		<MDL,H	5.3	10.7	ug/Kg	483		5.3	10.7	ug/Kg	58.9		5.3	10.7	ug/Kg
Pyrene		<MDL,H	5.3	10.7	ug/Kg	1520		5.3	10.7	ug/Kg	189		5.3	10.7	ug/Kg

King County Environmental Lab Analytical Report

Project:	421422-100	Project:	421422-100	Project:	421422-100
Locator:	NONE	Locator:	NONE	Locator:	NONE
Descrip:	UNKNOWN LOCATOR	Descrip:	UNKNOWN LOCATOR	Descrip:	UNKNOWN LOCATOR
Sample:	L58295-88	Sample:	L58295-89	Sample:	L58295-90
Matrix:	SB SOIL	Matrix:	SB SOIL	Matrix:	SB SOIL
ColDate:	7/3/13 11:48	ColDate:	7/3/13 11:50	ColDate:	7/3/13 12:00
TimeSpan:		TimeSpan:		TimeSpan:	
TotalSolid:	68.2	TotalSolid:	78.6	TotalSolid:	58.8
ClientLoc:	5-FD-185-0	ClientLoc:	5-S-185-0	ClientLoc:	5-FD-186-0
SampDepth:		SampDepth:		SampDepth:	
WET Weight Basis		**WET Weight Basis**		**WET Weight Basis**	

Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
CV SM2540-G															
Total Solids	68.2		0.005	0.01	%	78.6		0.005	0.01	%	58.8		0.005	0.01	%
ES NONE															
Client Locator	5-FD-185-0				none	5-S-185-0				none	5-FD-186-0				none
MT EPA 1640															
Arsenic, Dissolved, ICP-MS															
Arsenic, Total, ICP-MS															
MT EPA 200.8*SW846 6020A															
Cadmium, Dissolved, ICP-MS															
Cadmium, Total, ICP-MS															
Lead, Dissolved, ICP-MS															
Lead, Total, ICP-MS															
MT SW846 3050B*SW846 6010C															
Arsenic, Total, ICP															
Lead, Total, ICP															
OR SW846 3550B*SW846 8270D															
1-Methylnaphthalene	10	<RDL	5.3	10.7	ug/Kg		<MDL	5.3	10.7	ug/Kg	59	<RDL	53	107	ug/Kg
2-Methylnaphthalene	16.3		5.3	10.7	ug/Kg	6.4	<RDL	5.3	10.7	ug/Kg	100	<RDL	53	107	ug/Kg
Acenaphthene	78.8		5.3	10.7	ug/Kg	48.8		5.3	10.7	ug/Kg	376		53	107	ug/Kg
Acenaphthylene		<MDL	5.3	10.7	ug/Kg		<MDL	5.3	10.7	ug/Kg		<MDL	53	107	ug/Kg
Anthracene	576		53	107	ug/Kg	151		5.3	10.7	ug/Kg	561		53	107	ug/Kg
Benzo(a)anthracene	2210		53	107	ug/Kg	1090		5.3	10.7	ug/Kg	10900		53	107	ug/Kg
Benzo(a)pyrene	2130		53	107	ug/Kg	1810		5.3	10.7	ug/Kg	14200		53	107	ug/Kg
Benzo(b,j,k)fluoranthene	4050		53	107	ug/Kg	3330		5.3	10.7	ug/Kg	24600		53	107	ug/Kg
Benzo(g,h,i)perylene	930		53	107	ug/Kg	294		5.3	10.7	ug/Kg	6200		53	107	ug/Kg
Chrysene	2450		53	107	ug/Kg	1280		5.3	10.7	ug/Kg	13000		53	107	ug/Kg
Dibenzo(a,h)anthracene	326		53	107	ug/Kg	120		5.3	10.7	ug/Kg	1770		53	107	ug/Kg
Fluoranthene	4770		53	107	ug/Kg	1740		5.3	10.7	ug/Kg	15800		53	107	ug/Kg
Fluorene	132		5.3	10.7	ug/Kg	36.9		5.3	10.7	ug/Kg	258		53	107	ug/Kg
Indeno(1,2,3-Cd)Pyrene	1200		53	107	ug/Kg	429		5.3	10.7	ug/Kg	8250		53	107	ug/Kg
Naphthalene	39.5		5.3	10.7	ug/Kg	11.8		5.3	10.7	ug/Kg	149		53	107	ug/Kg
Phenanthrene	2540		53	107	ug/Kg	680		5.3	10.7	ug/Kg	3010		53	107	ug/Kg
Pyrene	3780		53	107	ug/Kg	1690		5.3	10.7	ug/Kg	16300		53	107	ug/Kg

King County Environmental Lab Analytical Report

	Sample 1	Sample 2	Sample 3
Project:	421422-100	421422-100	421422-100
Locator:	NONE	NONE	NONE
Descrip:	UNKNOWN LOCATOR	UNKNOWN LOCATOR	UNKNOWN LOCATOR
Sample:	L58295-91	L58295-92	L58295-93
Matrix:	SB SOIL	SB SOIL	SB SOIL
ColDate:	7/3/13 12:05	7/3/13 12:07	7/3/13 12:15
TimeSpan:			
TotalSolid:	69.8	70.1	56.9
ClientLoc:	5-S-186-0	5-S-186-D7	5-FD-187-0
SampDepth:			
	WET Weight Basis	**WET Weight Basis**	**WET Weight Basis**

Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
CV SM2540-G															
Total Solids	69.8		0.005	0.01	%	70.1		0.005	0.01	%	56.9		0.005	0.01	%
ES NONE															
Client Locator	5-S-186-0				none	5-S-186-D7				none	5-FD-187-0				none
MT EPA 1640															
Arsenic, Dissolved, ICP-MS															
Arsenic, Total, ICP-MS															
MT EPA 200.8*SW846 6020A															
Cadmium, Dissolved, ICP-MS															
Cadmium, Total, ICP-MS															
Lead, Dissolved, ICP-MS															
Lead, Total, ICP-MS															
MT SW846 3050B*SW846 6010C															
Arsenic, Total, ICP															
Lead, Total, ICP															
OR SW846 3550B*SW846 8270D															
1-Methylnaphthalene		<MDL	5.3	10.7	ug/Kg		<MDL	5.3	10.7	ug/Kg	153		53	107	ug/Kg
2-Methylnaphthalene	6.3	<RDL	5.3	10.7	ug/Kg	6.3	<RDL	5.3	10.7	ug/Kg	154		53	107	ug/Kg
Acenaphthene	30.8		5.3	10.7	ug/Kg	29.4		5.3	10.7	ug/Kg	1130		53	107	ug/Kg
Acenaphthylene		<MDL	5.3	10.7	ug/Kg		<MDL	5.3	10.7	ug/Kg		<MDL	53	107	ug/Kg
Anthracene	49.2		5.3	10.7	ug/Kg	46.9		5.3	10.7	ug/Kg	2110		270	533	ug/Kg
Benzo(a)anthracene	1260		5.3	10.7	ug/Kg	1380		5.3	10.7	ug/Kg	35700		270	533	ug/Kg
Benzo(a)pyrene	2040		5.3	10.7	ug/Kg	2270		5.3	10.7	ug/Kg	47000		270	533	ug/Kg
Benzo(b,j,k)fluoranthene	3840		5.3	10.7	ug/Kg	4510		5.3	10.7	ug/Kg	78800		270	533	ug/Kg
Benzo(g,h,i)perylene	559		5.3	10.7	ug/Kg	586		5.3	10.7	ug/Kg	21300		270	533	ug/Kg
Chrysene	1530		5.3	10.7	ug/Kg	1670		5.3	10.7	ug/Kg	43100		270	533	ug/Kg
Dibenzo(a,h)anthracene	173		5.3	10.7	ug/Kg	182		5.3	10.7	ug/Kg	6200		270	533	ug/Kg
Fluoranthene	1570		5.3	10.7	ug/Kg	1710		5.3	10.7	ug/Kg	59200		270	533	ug/Kg
Fluorene	19.4		5.3	10.7	ug/Kg	19		5.3	10.7	ug/Kg	423		53	107	ug/Kg
Indeno(1,2,3-Cd)Pyrene	785		5.3	10.7	ug/Kg	831		5.3	10.7	ug/Kg	27500		270	533	ug/Kg
Naphthalene	9.2	<RDL	5.3	10.7	ug/Kg	8.5	<RDL	5.3	10.7	ug/Kg	163		53	107	ug/Kg
Phenanthrene	268		5.3	10.7	ug/Kg	260		5.3	10.7	ug/Kg	12800		270	533	ug/Kg
Pyrene	1740		5.3	10.7	ug/Kg	1900		5.3	10.7	ug/Kg	59900		270	533	ug/Kg

King County Environmental Lab Analytical Report

	L58295-94	L58295-95	L58295-96
Project:	421422-100	421422-100	421422-100
Locator:	NONE	NONE	NONE
Descrip:	UNKNOWN LOCATOR	UNKNOWN LOCATOR	UNKNOWN LOCATOR
Sample:	L58295-94	L58295-95	L58295-96
Matrix:	SB SOIL	SB SOIL	SB SOIL
ColDate:	7/3/13 12:20	7/3/13 12:30	7/3/13 12:35
TimeSpan:			
TotalSolid:	71.8	80.8	83.8
ClientLoc:	5-S-187-0	5-FD-188-0	5-S-188-0
SampDepth:			
	WET Weight Basis	**WET Weight Basis**	**WET Weight Basis**

Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**
CV SM2540-G															
Total Solids	71.8		0.005	0.01	%	80.8		0.005	0.01	%	83.8		0.005	0.01	%
ES NONE															
Client Locator	5-S-187-0				none	5-FD-188-0				none	5-S-188-0				none
MT EPA 1640															
Arsenic, Dissolved, ICP-MS															
Arsenic, Total, ICP-MS															
MT EPA 200.8*SW846 6020A															
Cadmium, Dissolved, ICP-MS															
Cadmium, Total, ICP-MS															
Lead, Dissolved, ICP-MS															
Lead, Total, ICP-MS															
MT SW846 3050B*SW846 6010C															
Arsenic, Total, ICP															
Lead, Total, ICP															
OR SW846 3550B*SW846 8270D															
1-Methylnaphthalene		<MDL	5.3	10.7	ug/Kg		<MDL	5.3	10.7	ug/Kg		<MDL	5.3	10.7	ug/Kg
2-Methylnaphthalene	7.4	<RDL	5.3	10.7	ug/Kg		<MDL	5.3	10.7	ug/Kg		<MDL	5.3	10.7	ug/Kg
Acenaphthene	90.6	J	5.3	10.7	ug/Kg		<MDL	5.3	10.7	ug/Kg	9.1	<RDL	5.3	10.7	ug/Kg
Acenaphthylene		<MDL	5.3	10.7	ug/Kg		<MDL	5.3	10.7	ug/Kg		<MDL	5.3	10.7	ug/Kg
Anthracene	46.2		5.3	10.7	ug/Kg		<MDL	5.3	10.7	ug/Kg	14		5.3	10.7	ug/Kg
Benzo(a)anthracene	638		5.3	10.7	ug/Kg	42.6		5.3	10.7	ug/Kg	116		5.3	10.7	ug/Kg
Benzo(a)pyrene	1450		5.3	10.7	ug/Kg	79		5.3	10.7	ug/Kg	187		5.3	10.7	ug/Kg
Benzo(b,j,k)fluoranthene	2300		5.3	10.7	ug/Kg	133		5.3	10.7	ug/Kg	296		5.3	10.7	ug/Kg
Benzo(g,h,i)perylene	257		5.3	10.7	ug/Kg	23.7		5.3	10.7	ug/Kg	83		5.3	10.7	ug/Kg
Chrysene	877		5.3	10.7	ug/Kg	63.3		5.3	10.7	ug/Kg	150		5.3	10.7	ug/Kg
Dibenzo(a,h)anthracene	92.6		5.3	10.7	ug/Kg	5.4	<RDL	5.3	10.7	ug/Kg	24.7		5.3	10.7	ug/Kg
Fluoranthene	844		5.3	10.7	ug/Kg	62.9		5.3	10.7	ug/Kg	177		5.3	10.7	ug/Kg
Fluorene	20.6	J	5.3	10.7	ug/Kg		<MDL	5.3	10.7	ug/Kg		<MDL	5.3	10.7	ug/Kg
Indeno(1,2,3-Cd)Pyrene	366		5.3	10.7	ug/Kg	32.2		5.3	10.7	ug/Kg	109		5.3	10.7	ug/Kg
Naphthalene	7	<RDL	5.3	10.7	ug/Kg		<MDL	5.3	10.7	ug/Kg		<MDL	5.3	10.7	ug/Kg
Phenanthrene	240	J	5.3	10.7	ug/Kg	17.4		5.3	10.7	ug/Kg	69.1		5.3	10.7	ug/Kg
Pyrene	1030		5.3	10.7	ug/Kg	71.2		5.3	10.7	ug/Kg	195		5.3	10.7	ug/Kg

King County Environmental Lab Analytical MATRIX Report

Owner: SWD
Matrix Class: LIQUID
User select: WET Weight Basis

LOCATOR	PROJECT	SAMPLE	Arsenic, Dissolved, ICP-MS ug/L	Arsenic, Total, ICP-MS ug/L	Cadmium, Dissolved, ICP-MS ug/L	Cadmium, Total, ICP-MS ug/L	Lead, Dissolved, ICP-MS ug/L	Lead, Total, ICP-MS ug/L
Spring-D	421422-100	L58206-11	3.02	3.06	0.06	0.062		
Spring-E	421422-100	L58206-12	1.24	1.54				0.22
Spring-F	421422-100	L58206-13	2.01	2.14				
Spring-A	421422-100	L58206-14	2.03	2.21				
Spring-B	421422-100	L58206-15	4.03	4.59		0.065		0.26

* Not converted to dry weight basis

If a parameter/analyze appears twice in the column header, it implies that they were analyzed by two different method code

King County Environmental Lab Analytical MATRIX Report

Owner: SWD
Matrix Class: SOLID/TISSUE
User select: DRY Weight Basis
NT= Not Tested

LOCATOR	PROJECT	SAMPLE	*Total Solids %	Arsenic, Total, ICP mg/Kg	Lead, Total, ICP mg/Kg	1-Methylnaphthalene ug/Kg	2-Methylnaphthalene ug/Kg	Acenaphthene ug/Kg	Acenaphthylene ug/Kg	Anthracene ug/Kg	Benzo(a)anthracene ug/Kg	Benzo(a)pyrene ug/Kg	Benzo(b,j,k)fluoranthene ug/Kg	Benzo(g,h,i)perylene ug/Kg	Chrysene ug/Kg	Dibenzo(a,h)anthracene ug/Kg	Fluoranthene ug/Kg	Fluorene ug/Kg	Indeno(1,2,3-Cd)Pyrene ug/Kg	Naphthalene ug/Kg	Phenanthrene ug/Kg	Pyrene ug/Kg
BLUFF-6	421422-100	L58206-1	96.1	1.8	1.6	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SLOUGH-4	421422-100	L58206-2	95.5	2.2	1.5	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
BLUFF-4	421422-100	L58206-3	96.5	26.9	31.1	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SLOUGH-1	421422-100	L58206-4	95	2.3	1.8	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
BLUFF-2	421422-100	L58206-5	94.9	5.1	5	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SLOUGH-3	421422-100	L58206-6	96.9	5.8	5.5	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
BLUFF-1	421422-100	L58206-7	94.3	2.3	1.6	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
BLUFF-3	421422-100	L58206-8	96.6	6.71	5.87	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SLOUGH-2	421422-100	L58206-9	91.1	6.74	7.82	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
BLUFF-5	421422-100	L58206-10	98.4	11.7	8.79	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1a-S-138-0	421422-100	L58206-16	69.9	90	195	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1a-S-138-9	421422-100	L58206-17	92	4.2	4	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1a-S-138-18	421422-100	L58206-18	93	2.5	2	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1a-S-139-0	421422-100	L58206-19	59.5	35.5	129	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1a-S-140-0	421422-100	L58206-20	71.5	144	329	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1a-S-141-0	421422-100	L58206-21	76	218	362	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1a-S-142-0	421422-100	L58295-1	69.6	113	133	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1a-S-143-0	421422-100	L58295-2	87.1	28.6	17.2	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1a-S-143-9	421422-100	L58295-3	92.5	3.5	3	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1a-S-143-18	421422-100	L58295-4	93.9	3.3	1.9	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1a-S-144-0	421422-100	L58295-5	81.5	10.2	11.1	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1a-S-145-0	421422-100	L58295-6	62.2	102	150	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1a-S-146-0	421422-100	L58295-7	69.6	151	259	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1a-S-146-9	421422-100	L58295-8	83.9	8.77	5.6	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1a-S-147-0	421422-100	L58295-9	73.2	245	437	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1a-S-147-9	421422-100	L58295-10	84.5	10.9	5.9	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1a-S-148-0	421422-100	L58295-11	82.6	69	107	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1a-S-148-9	421422-100	L58295-12	87.6	67.2	31.8	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1a-S-149-0	421422-100	L58295-13	65.8	43.2	49.4	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1a-S-149-9	421422-100	L58295-14	90.7	7.68	6.15	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1a-S-150-0	421422-100	L58295-15	78.1	218	175	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1a-S-150-9	421422-100	L58295-16	90.8	13.4	5.3	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1a-S-150-18	421422-100	L58295-17	94.1	6.77	4.3	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1a-S-149-18	421422-100	L58295-18	92	2.4	2.2	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1a-S-151-0	421422-100	L58295-19	66.9	256	776	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1a-S-151-9	421422-100	L58295-20	91.3	25.6	12.5	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1a-S-151-18	421422-100	L58295-21	93.9	3.9	5.4	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT

King County Environmental Lab Analytical MATRIX Report

Owner: **SWD**
Matrix Class: **SOLID/TISSUE**
User select: **DRY Weight Basis**
NT= **Not Tested**

			*Total Solids	Arsenic, Total, ICP	Lead, Total, ICP	1-Methylnaphthalene	2-Methylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b,j,k)fluoranthene	Benzo(g,h,i)perylene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-Cd)Pyrene	Naphthalene	Phenanthrene	Pyrene
1a-S-152-0	421422-100	L58295-22	74.1	102	86.6	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1a-S-152-D1	421422-100	L58295-23	78.2	125	56.5	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1a-S-153-0	421422-100	L58295-24	58.5	131	371	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1a-S-153-9	421422-100	L58295-25	86.6	119	102	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1a-S-154-0	421422-100	L58295-26	68.1	64.5	244	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
3a-S-158-0	421422-100	L58295-27	77.1	65.9	87.2	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
3a-S-158-9	421422-100	L58295-28	88.7	4.1	6.94	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
3a-S-159-0	421422-100	L58295-29	61	87.7	109	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
3a-S-159-D2	421422-100	L58295-30	63.9	81.2	91.2	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
3a-S-160-0	421422-100	L58295-31	79.8	49.5	42.1	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
3a-S-160-9	421422-100	L58295-32	88.4	3.5	5.97	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1a-S-155-0	421422-100	L58295-33	79.8	29.9	27.4	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
3a-S-159-D3	421422-100	L58295-34	79.1	67.8	130	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1b-S-163-0	421422-100	L58295-35	75.4	119	200	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1b-S-163-D4	421422-100	L58295-36	74.6	124	229	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1a-S-156-0	421422-100	L58295-37	63.6	297	527	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1a-S-156-9	421422-100	L58295-38	91.6	2.8	8.06	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1a-S-156-18	421422-100	L58295-39	92.2	2.3	4.4	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1a-S-165-0	421422-100	L58295-40	70.1	91.2	254	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1a-S-157-0	421422-100	L58295-41	72	102	128	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1a-S-165-9	421422-100	L58295-42	83.4	48.4	87.4	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
3a-S-159-9	421422-100	L58295-43	80.6	32	52.7	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1b-S-161-0	421422-100	L58295-44	65.7	394	510	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1b-S-164-0	421422-100	L58295-45	77.3	105	224	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1b-S-164-9	421422-100	L58295-46	85.4	3.9	4.6	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1b-S-164-18	421422-100	L58295-47	86.2	3.2	3.8	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1b-S-162-0	421422-100	L58295-48	63	205	465	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1b-S-162-9	421422-100	L58295-49	90.3	3.9	2.7	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1b-S-162-18	421422-100	L58295-50	86.9	7	4.7	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
3b-S-166-0	421422-100	L58295-51	75.4	125	128	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
3b-S-166-D5	421422-100	L58295-52	72.3	114	142	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
3b-S-167-0	421422-100	L58295-53	74.7	171	181	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
3b-S-167-9	421422-100	L58295-54	94.7	5.8	8.34	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
3b-S-167-18	421422-100	L58295-55	94.7	4.4	3.6	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
3b-S-168-0	421422-100	L58295-56	42.6	36.4	197	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
3b-S-169-0	421422-100	L58295-57	92.5	111	111	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
3b-S-169-9	421422-100	L58295-58	91.2	8.48	8.22	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
5-S-170-0	421422-100	L58295-59	84.8	76.1	36.1	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT

King County Environmental Lab Analytical MATRIX Report

Owner: SWD
Matrix Class: SOLID/TISSUE
User select: DRY Weight Basis
NT= Not Tested

			*Total Solids	Arsenic, Total, ICP	Lead, Total, ICP	1-Methylnaphthalene	2-Methylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b,j,k)fluoranthene	Benzo(g,h,i)perylene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-Cd)Pyrene	Naphthalene	Phenanthrene	Pyrene
5-S-171-0	421422-100	L58295-60	88.1	116	96	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
5-S-171-9	421422-100	L58295-61	93	8.17	10.7	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
5-S-171-18	421422-100	L58295-62	95.6	4.1	2.9	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
5-S-172-0	421422-100	L58295-63	72.8	125	348								26.2				17.7					11
5-S-173-0	421422-100	L58295-64	72.3	151	1590								59.1				27.7				10	16.5
5-S-173-9	421422-100	L58295-65	86.8	7.7	16.5	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
5-S-173-18	421422-100	L58295-66	85.8	3.5	4.9	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
5-S-174-0	421422-100	L58295-67	59.6	85.2	466								69.5				36.7				15	18.5
5-S-175-0	421422-100	L58295-68	73.7	182	193	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
5-S-176-0	421422-100	L58295-69	82.3	92.6	118	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
5-S-176-9	421422-100	L58295-70	88.3	15.2	11.2	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
5-S-176-18	421422-100	L58295-71	91.5	3.1	3.6	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
5-S-177-0	421422-100	L58295-72	82.5	171	474								12									
5-S-178-0	421422-100	L58295-73	73.4	184	339						7.4		36.4		16.8		19.2				7.5	15
5-FD-179-0	421422-100	L58295-74	43.4	33.6	71.4												19					
5-FD-178-0	421422-100	L58295-75	63.1	150	350												22				13	20
5-S-179-0	421422-100	L58295-76	74	170	246								70.4				24.6				8.4	16.2
5-FD-180-0	421422-100	L58295-77	47.9	45.9	215												16					11
5-S-180-0	421422-100	L58295-78	78.4	101	203								17.9									
5-S-180-D6	421422-100	L58295-79	79.1	111	228								17.8									
5-FD-181-0	421422-100	L58295-80	53.9	56.2	282								39.1		33.6		19					13
5-S-181-0	421422-100	L58295-81	80.2	114	249								17.5		7.9		8.5					7.1
5-FD-182-0	421422-100	L58295-82	29.2	19	459																	
5-S-182-0	421422-100	L58295-83	44.9	151	2520								127				28.7					24.5
5-FD-183-0	421422-100	L58295-84	45.9	11	48.1																	
5-S-183-0	421422-100	L58295-85	69.1	17.7	56.2								12									
5-FD-184-0	421422-100	L58295-86	69.6				9.6	64.9		125	1410	2210	4050	1270	1820	328	2000	80.9	1520	26.6	694	2180
5-S-184-0	421422-100	L58295-87	78.9					6.8		12	160	252	488	137	209	33.2	232	7.5	166		74.7	240
5-FD-185-0	421422-100	L58295-88	68.2			15	23.9	116		845	3240	3120	5940	1360	3590	478	6990	194	1760	57.9	3720	5540
5-S-185-0	421422-100	L58295-89	78.6				8.1	62.1		192	1390	2300	4240	374	1630	153	2210	46.9	546	15	865	2150
5-FD-186-0	421422-100	L58295-90	58.8			100	170	639		954	18500	24100	41800	10500	22100	3010	26900	439	14000	253	5120	27700
5-S-186-0	421422-100	L58295-91	69.8				9	44.1		70.5	1810	2920	5500	801	2190	248	2250	27.8	1120	13	384	2490
5-S-186-D7	421422-100	L58295-92	70.1				9	41.9		66.9	1970	3240	6430	836	2380	260	2440	27.1	1190	12	371	2710
5-FD-187-0	421422-100	L58295-93	56.9			269	271	1990		3710	62700	82600	138000	37400	75700	10900	104000	743	48300	286	22500	105000
5-S-187-0	421422-100	L58295-94	71.8				10	126		64.3	889	2020	3200	358	1220	129	1180	28.7	510	9.7	334	1430
5-FD-188-0	421422-100	L58295-95	80.8								52.7	97.8	165	29.3	78.3	6.7	77.8		39.9		21.5	88.1
5-S-188-0	421422-100	L58295-96	83.8					11		16.7	138	223	353	99	179	29.5	211		130		82.5	233

* Not converted to dry weight basis

King County Environmental Lab Analytical MATRIX Report

Owner: SWD
Matrix Class: SOLID/TISSUE
User select: DRY Weight Basis
NT= Not Tested

	*Total Solids	Arsenic, Total, ICP	Lead, Total, ICP	1-Methylnaphthalene	2-Methylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b,j,k)fluoranthene	Benzo(g,h,i)perylene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-Cd)Pyrene	Naphthalene	Phenanthrene	Pyrene
If a parameter/analyze appears twice in the column header, it implies that they were analyzed by two different method code																				

CDM Smith

CHAIN-OF-CUSTODY

Date 6/25/13 Page 1 of 3

PROJECT INFORMATION

Project Manager: Pam Morrill
Project Name: Maury Island
Project Number:
Site Location: Maury Island Sampled By: AW

DISPOSAL INFORMATION

☒ Lab Disposal (return if not indicated)

Disposal Method:
Disposed by: Disposal Date:

QC INFORMATION (check one)

☐ SW-846 ☐ CLP ☐ Screening ☐ CDM Std. ☐ Special

Laboratory Number:

ANALYSIS REQUEST

PETROLEUM HYDROCARBONS: TPH-HCID State: | TPH-G State: | TPH-D State: | TPH-418.1 State: | 8015M Fuel Hydrocarbon | TPH Special Instructions

ORGANIC COMPOUNDS: 8010 Halogenated VOCs | 8020 Aromatic VOCs | 8020M - BETX only | 8260 GC/MS Volatiles | 8270 GC/MS Semivolatiles | 8310 PAHs | 8040 Phenols | DWS - Volatiles and Semivolatiles

PESTS/PCBs: 8081 OC Pest/PCBs | 8082 PCBs only | 8141 OP Pesticides | 8151 OC Herbicides | DWS - Herb/Pest

METALS: Selected Metals: list As, Cd, Pb 6-26-13 | RCRA Metals (8) | TCL Metals (23) | Priority Poll. Metals (13) | DWS - Metals | MFSP - Metals (Wa)

LEACHING TESTS: TCLP - Volatiles (ZHE) | TCLP - Semivolatiles | TCLP - Pesticides | TCLP - Metals

OTHER

NUMBER OF CONTAINERS

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Selected Metals: As, Cd, Pb	NUMBER OF CONTAINERS
BLUFF-6	6/24/2013	1455	S	58206-1	X	1
SLOUGH-4	6/24/2013	1500	S	-2	X	1
BLUFF-4	6/24/2013	1415	S	-3	X	1
SLOUGH-1	6/24/2013	1215	S	-4	X	1
BLUFF-2	6/24/2013	1250	S	-5	X	1
SLOUGH-3	6/24/2013	1400	S	-6	X	1
BLUFF-1	6/24/2013	1230	S	-7	X	1
BLUFF-3	6/24/2013	1310	S	-8	X	1

LAB INFORMATION

Lab Name:
Lab Address:
Via:

SAMPLE RECEIPT

Total Number of Containers:
Chain-of-Custody Seals: Y/N/NA
Intact?: Y/N/NA
Received in Good Condition/Cold:

Turn Around Time: ☒ Standard ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 1 wk.

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA

Special Instructions:

	RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature / Time	[signature] 0717		
Printed Name / Date	August Wold 6-26-13		
Company	CDM Smith		

	RECEIVED BY: 1.	RECEIVED BY: 2.	RECEIVED BY: 3.
Signature / Time	[signature] 7:17		
Printed Name / Date	Casey Maggart 6/26/13		
Company	KCEL		

CDM Smith

CHAIN-OF-CUSTODY

Date 6/25/13 Page 2 of 3

PROJECT INFORMATION

Project Manager: Pam Morrill

Project Name: Maury Island

Project Number:

Site Location: Maury Island Sampled By: AW

DISPOSAL INFORMATION

☒ Lab Disposal (return if not indicated)

Disposal Method:

Disposed by: Disposal Date:

QC INFORMATION (check one)

☐ SW-846 ☐ CLP ☐ Screening ☐ CDM Std. ☐ Special

Laboratory Number:

ANALYSIS REQUEST

- PETROLEUM HYDROCARBONS: TPH-HCID State:; TPH-G State:; TPH-D State:; TPH-418.1 State:; 8015M Fuel Hydrocarbon; TPH Special Instructions
- ORGANIC COMPOUNDS: 8010 Halogenated VOCs; 8020 Aromatic VOCs; 8020M - BETX only; 8260 GC/MS Volatiles; 8270 GC/MS Semivolatiles; 8310 PAHs; 8040 Phenols; DWS - Volatiles and Semivolatiles
- PESTS/PCBs: 8081 OC Pest/PCBs; 8082 PCBs only; 8141 OP Pesticides; 8151 OC Herbicides; DWS - Herb/Pest
- METALS: Selected Metals: list As, Cd, Pb Totals; RCRA Metals (8); TCL Metals (23); Priority Poll. Metals (13); DWS - Metals; MFSP - Metals (Wa)
- LEACHING TESTS: TCLP - Volatiles (ZHE); TCLP - Semivolatiles; TCLP - Pesticides; TCLP - Metals
- OTHER: Dissolved As, Cd, Pb
- NUMBER OF CONTAINERS

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Selected Metals: As, Cd, Pb Totals	Other: Dissolved As, Cd, Pb	NUMBER OF CONTAINERS
SLOUGH-2	6/24/13	1330	S	58206-9	X } As, Pb only		1
BLUFF-5	6/24/13	1430	S	-10	X }		1
Spring-D	6/25/13	0950	W	-11	X	X	2
Spring-E	6/25/13	1105	W	-12	X	X	2
Spring-F	6/25/13	1045	W	-13	X	X	2
Spring-A	6/25/13	1220	W	-14	X	X	2
Spring-B	6/25/13	1300	W	-15	X	X	2
Ia-S-138-0	6/25/13	1420	S	-16	X } As, Pb only		1

LAB INFORMATION

Lab Name:

Lab Address:

Via:

SAMPLE RECEIPT

Total Number of Containers:

Chain-of-Custody Seals: Y/N/NA

Intact?: Y/N/NA

Received in Good Condition/Cold:

Turn Around Time: ☒ Standard ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 1 wk.

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA

Special Instructions: Samples for dissolved metals were field filtered w/ a 0.45 µm filter.

	RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature / Time	[signature] 0717		
Printed Name / Date	August Welch 06.26.13		
Company	CDM SMITH		

	RECEIVED BY: 1.	RECEIVED BY: 2.	RECEIVED BY: 3.
Signature / Time	[signature] 7:17		
Printed Name / Date	Casey Maggart 6/26/13		
Company	KCEL		

CDM Smith

CHAIN-OF-CUSTODY

Date 6/25/13 Page 3 of 3

PROJECT INFORMATION

Project Manager: Pam Morrill

Project Name: Maury Island

Project Number:

Site Location: Maury Isl. Sampled By: AW

DISPOSAL INFORMATION

☐ Lab Disposal (return if not indicated)

Disposal Method:

Disposed by: Disposal Date:

QC INFORMATION (check one)

☐ SW-846 ☐ CLP ☐ Screening ☐ CDM Std. ☐ Special

Laboratory Number:

ANALYSIS REQUEST

PETROLEUM HYDROCARBONS: TPH-HCID State: | TPH-G State: | TPH-D State: | TPH-418.1 State: | 8015M Fuel Hydrocarbon | TPH Special Instructions

ORGANIC COMPOUNDS: 8010 Halogenated VOCs | 8020 Aromatic VOCs | 8020M - BETX only | 8260 GC/MS Volatiles | 8270 GC/MS Semivolatiles | 8310 PAHs | 8040 Phenols | DWS - Volatiles and Semivolatiles

PESTS/PCBs: 8081 OC Pest/PCBs | 8082 PCBs only | 8141 OP Pesticides | 8151 OC Herbicides | DWS - Herb/Pest

METALS: Selected Metals: list As ~~Cd~~ Pb AS 6-26-13 | RCRA Metals (8) | TCL Metals (23) | Priority Poll. Metals (13) | DWS - Metals | MFSP - Metals (Wa)

LEACHING TESTS: TCLP - Volatiles (ZHE) | TCLP - Semivolatiles | TCLP - Pesticides | TCLP - Metals

OTHER

NUMBER OF CONTAINERS

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Selected Metals	NUMBER OF CONTAINERS
1a-S-138-9	6/25/13	1430	S	5820k-17	X	1
1a-S-138-18	↓	1432	S	-18	X	1
1a-S-139-0	↓	1440	S	-19	X	1
1a-S-140-0	↓	1455	S	-20	X	1
1a-S-141-0	6/25/13	1510	S	-21	X	1

LAB INFORMATION

Lab Name:

Lab Address:

Via:

SAMPLE RECEIPT

Total Number of Containers:

Chain-of-Custody Seals: Y/N/NA

Intact?: Y/N/NA

Received in Good Condition/Cold:

Turn Around Time: ☒ Standard ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 1 wk.

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA

Special Instructions:

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: August Welch Time: 0717	Signature: Time:	Signature: Time:
Printed Name: August Welch Date: 06-26-13	Printed Name: Date:	Printed Name: Date:
Company: CDM SMITH	Company:	Company:

RECEIVED BY: 1.	RECEIVED BY: 2.	RECEIVED BY: 3.
Signature: Casey Maggart Time: 7:17	Signature: Time:	Signature: Time:
Printed Name: Casey Maggart Date: 6/26/13	Printed Name: Date:	Printed Name: Date:
Company: KCEL	Company:	Company:

CDM Smith

CHAIN-OF-CUSTODY

Date 07.09.2013 Page 1 of 13

PROJECT INFORMATION

Project Manager: Pam Morrill
Project Name: KC Maury Island
Project Number: 19897 - 99064
Site Location: Maury Island Sampled By: AW

DISPOSAL INFORMATION

☒ Lab Disposal (return if not indicated)

Disposal Method:
Disposed by: Disposal Date:

QC INFORMATION (check one)

☐SW-846 ☐CLP ☐Screening ☐CDM Std. ☐Special

Laboratory Number:

ANALYSIS REQUEST

PETROLEUM HYDROCARBONS: TPH-HCID State:; TPH-G State:; TPH-D State:; TPH-418.1 State:; 8015M Fuel Hydrocarbon; TPH Special Instructions
ORGANIC COMPOUNDS: 8010 Halogenated VOCs; 8020 Aromatic VOCs; 8020M - BETX only; 8260 GC/MS Volatiles; 8270 GC/MS Semivolatiles; 8310 PAHs; 8040 Phenols; DWS - Volatiles and Semivolatiles
PESTS/PCBs: 8081 OC Pest/PCBs; 8082 PCBs only; 8141 OP Pesticides; 8151 OC Herbicides; DWS - Herb/Pest
METALS: Selected Metals: list As, Cd, Pb; RCRA Metals (8); TCL Metals (23); Priority Poll. Metals (13); DWS - Metals; MFSP - Metals (Wa)
LEACHING TESTS: TCLP - Volatiles (ZHE); TCLP - Semivolatiles; TCLP - Pesticides; TCLP - Metals
OTHER

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Selected Metals: list As, Cd, Pb	NUMBER OF CONTAINERS
1a-S-142-0	06.26.2013	1020	S	58295-1	X	1
1a-S-143-0		1040		-2	X	1
1a-S-143-9		1045		-3	X	1
1a-S-143-18		1047		-4	X	1
1a-S-144-0		1100		-5	X	1
1a-S-145-0		1200		-6	X	1
1a-S-146-0		1220		-7	X	1
1a-S-146-9	06.26.2013	1225	S	-8	X	1

LAB INFORMATION

Lab Name: KC lab
Lab Address:
Via:

SAMPLE RECEIPT

Total Number of Containers:
Chain-of-Custody Seals: Y/N/NA
Intact?: Y/N/NA
Received in Good Condition/Cold:

Turn Around Time: ☒ Standard ☐24 hr. ☐48 hr. ☐72 hr. ☐1 wk.

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA

Special Instructions:

	RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature:	[signature]		
Time:	1640		
Printed Name:	Kevin Lee		
Date:	7/9/13		
Company:	CDM Smith		

	RECEIVED BY: 1.	RECEIVED BY: 2.	RECEIVED BY: 3.
Signature:	[signature]		
Time:	1640		
Printed Name:	Jason Konrad		
Date:	7-9-13		
Company:	KCEL		

CDM Smith

CHAIN-OF-CUSTODY

Date 07.09.2013 Page 2 of 13

PROJECT INFORMATION

Project Manager: Pam Morrill
Project Name: KC Maury Island
Project Number: 19897-99064
Site Location: Maury Island Sampled By: AW

DISPOSAL INFORMATION

☒ Lab Disposal (return if not indicated)
Disposal Method:
Disposed by: Disposal Date:

QC INFORMATION (check one)

☐ SW-846 ☐ CLP ☐ Screening ☐ CDM Std. ☐ Special

Laboratory Number:

ANALYSIS REQUEST

PETROLEUM HYDROCARBONS: TPH-HCID State:; TPH-G State:; TPH-D State:; TPH-418.1 State:; 8015M Fuel Hydrocarbon; TPH Special Instructions
ORGANIC COMPOUNDS: 8010 Halogenated VOCs; 8020 Aromatic VOCs; 8020M - BETX only; 8260 GC/MS Volatiles; 8270 GC/MS Semivolatiles; 8310 PAHs; 8040 Phenols; DWS - Volatiles and Semivolatiles
PESTS/PCBs: 8081 OC Pest/PCBs; 8082 PCBs only; 8141 OP Pesticides; 8151 OC Herbicides; DWS - Herb/Pest
METALS: Selected Metals: list As, Cd, Pb; RCRA Metals (8); TCL Metals (23); Priority Poll. Metals (13); DWS - Metals; MFSP - Metals (Wa)
LEACHING TESTS: TCLP - Volatiles (ZHE); TCLP - Semivolatiles; TCLP - Pesticides; TCLP - Metals
OTHER

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Selected Metals: As, Cd, Pb	NUMBER OF CONTAINERS
1a-S-147-0	06.26.2013	1245	S	582959	X	1
1a-S-147-9	06.26.2013	1250	↑	-10	X	1
1a-S-148-0	↑	1350		-11	X	1
1a-S-148-9		1355		-12	X	1
1a-S-149-0		1405		-13	X	1
1a-S-149-9		1410		-14	X	1
1a-S-150-0	↓	1420	↓	-15	X	1
1a-S-150-9	06.26.2013	1425	S	-16	X	1

LAB INFORMATION

Lab Name: KC Lab
Lab Address:
Via:

SAMPLE RECEIPT

Total Number of Containers:
Chain-of-Custody Seals: Y/N/NA
Intact?: Y/N/NA
Received in Good Condition/Cold:

Turn Around Time: ☒ Standard ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 1 wk.

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA

Special Instructions:

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: [signature] Time: 1640	Signature: Time:	Signature: Time:
Printed Name: Kevin Lee Date: 7/9/13	Printed Name: Date:	Printed Name: Date:
Company: CDM Smith	Company:	Company:

RECEIVED BY: 1.	RECEIVED BY: 2.	RECEIVED BY: 3.
Signature: [signature] Time: 1640	Signature: Time:	Signature: Time:
Printed Name: Jason Kinnord Date: 7-9-13	Printed Name: Date:	Printed Name: Date:
Company: KCEL	Company:	Company:

CDM Smith

CHAIN-OF-CUSTODY

Date 07.09.2013 Page 3 of 13

PROJECT INFORMATION

Project Manager: Pam Morrill
Project Name: Maury Island
Project Number: 19897-99064
Site Location: Maury Island Sampled By: AW

DISPOSAL INFORMATION

☒ Lab Disposal (return if not indicated)
Disposal Method:
Disposed by: Disposal Date:

QC INFORMATION (check one)

☐ SW-846 ☐ CLP ☐ Screening ☐ CDM Std. ☐ Special

Laboratory Number:

ANALYSIS REQUEST

PETROLEUM HYDROCARBONS: TPH-HCID State: ; TPH-G State: ; TPH-D State: ; TPH-418.1 State: ; 8015M Fuel Hydrocarbon; TPH Special Instructions

ORGANIC COMPOUNDS: 8010 Halogenated VOCs; 8020 Aromatic VOCs; 8020M - BETX only; 8260 GC/MS Volatiles; 8270 GC/MS Semivolatiles; 8310 PAHs; 8040 Phenols; DWS - Volatiles and Semivolatiles

PESTS/PCBs: 8081 OC Pest/PCBs; 8082 PCBs only; 8141 OP Pesticides; 8151 OC Herbicides; DWS - Herb/Pest

METALS: Selected Metals: list As, Cd, Pb; RCRA Metals (8); TCL Metals (23); Priority Poll. Metals (13); DWS - Metals; MFSP - Metals (Wa)

LEACHING TESTS: TCLP - Volatiles (ZHE); TCLP - Semivolatiles; TCLP - Pesticides; TCLP - Metals

OTHER

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Selected Metals: As, Cd, Pb	NUMBER OF CONTAINERS
19-S-150-18	06.26.13	1427	S	58295-17	X	1
19-S-149-18		1412		-18	X	1
19-S-151-0		1445		-19	X	1
19-S-151-9		1450		-20	X	1
19-S-151-18		1452		-21	X	1
19-S-152-0		1505		-22	X	1
19-S-152-D1		1510		-23	X	1
19-S-153-0	06.26.2013	1515	S	-24	X	1

LAB INFORMATION

Lab Name: KL Lab
Lab Address:
Via:

SAMPLE RECEIPT

Total Number of Containers:
Chain-of-Custody Seals: Y/N/NA
Intact?: Y/N/NA
Received in Good Condition/Cold:

Turn Around Time: ☒ Standard ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 1 wk.

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA

Special Instructions:

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: [signature] Time: 1640	Signature: Time:	Signature: Time:
Printed Name: Kevin Lee Date: 7/9/13	Printed Name: Date:	Printed Name: Date:
Company: CDM Smith	Company:	Company:

RECEIVED BY: 1.	RECEIVED BY: 2.	RECEIVED BY: 3.
Signature: [signature] Time: 1640	Signature: Time:	Signature: Time:
Printed Name: Jason Leonard Date: 7-9-13	Printed Name: Date:	Printed Name: Date:
Company: KLE	Company:	Company:

CDM Smith

CHAIN-OF-CUSTODY

Date 07.09.2013 Page 4 of 13

PROJECT INFORMATION

Project Manager: Pam Morrill

Project Name: KC Maury Island

Project Number: 19897 - 99064

Site Location: Maury Island Sampled By: AW

DISPOSAL INFORMATION

☒ Lab Disposal (return if not indicated)

Disposal Method:

Disposed by: Disposal Date:

QC INFORMATION (check one)

☐ SW-846 ☐ CLP ☐ Screening ☐ CDM Std. ☐ Special

Laboratory Number:

ANALYSIS REQUEST

PETROLEUM HYDROCARBONS: TPH-HCID State:; TPH-G State:; TPH-D State:; TPH-418.1 State:; 8015M Fuel Hydrocarbon; TPH Special Instructions

ORGANIC COMPOUNDS: 8010 Halogenated VOCs; 8020 Aromatic VOCs; 8020M - BETX only; 8260 GC/MS Volatiles; 8270 GC/MS Semivolatiles; 8310 PAHs; 8040 Phenols; DWS - Volatiles and Semivolatiles

PESTS/PCBs: 8081 OC Pest/PCBs; 8082 PCBs only; 8141 OP Pesticides; 8151 OC Herbicides; DWS - Herb/Pest

METALS: Selected Metals: list As, Cd, Pb; RCRA Metals (8); TCL Metals (23); Priority Poll. Metals (13); DWS - Metals; MFSP - Metals (Wa)

LEACHING TESTS: TCLP - Volatiles (ZHE); TCLP - Semivolatiles; TCLP - Pesticides; TCLP - Metals

OTHER

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	TPH-HCID State:	TPH-G State:	TPH-D State:	TPH-418.1 State:	8015M Fuel Hydrocarbon	TPH Special Instructions	8010 Halogenated VOCs	8020 Aromatic VOCs	8020M - BETX only	8260 GC/MS Volatiles	8270 GC/MS Semivolatiles	8310 PAHs	8040 Phenols	DWS - Volatiles and Semivolatiles	8081 OC Pest/PCBs	8082 PCBs only	8141 OP Pesticides	8151 OC Herbicides	DWS - Herb/Pest	Selected Metals: list As, Cd, Pb	RCRA Metals (8)	TCL Metals (23)	Priority Poll. Metals (13)	DWS - Metals	MFSP - Metals (Wa)	TCLP - Volatiles (ZHE)	TCLP - Semivolatiles	TCLP - Pesticides	TCLP - Metals	OTHER					NUMBER OF CONTAINERS
19-S-153-9	06.26.13	1520	S	58295-25																				X															1
19-S-154-0	06.26.13	1545	S	-26																				X															1

LAB INFORMATION

Lab Name: KC Lab

Lab Address:

Via:

SAMPLE RECEIPT

Total Number of Containers:

Chain-of-Custody Seals: Y/N/NA

Intact?: Y/N/NA

Received in Good Condition/Cold:

Turn Around Time: ☐ Standard ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 1 wk.

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA

Special Instructions:

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: [signature] Time: 1640	Signature: Time:	Signature: Time:
Printed Name: Kevin Lee Date: 7/9/13	Printed Name: Date:	Printed Name: Date:
Company: CDM Smith	Company:	Company:

RECEIVED BY: 1.	RECEIVED BY: 2.	RECEIVED BY: 3.
Signature: [signature] Time: 1640	Signature: Time:	Signature: Time:
Printed Name: Jason Kinnard Date: 7-9-13	Printed Name: Date:	Printed Name: Date:
Company: KCEL	Company:	Company:

CDM Smith Bellevue: (425) 519-8300

Rev. 01/2012

DISTRIBUTION: White, Canary to Analytical Laboratory; Pink to Project

Chain of Custody.indd

CDM Smith

CHAIN-OF-CUSTODY

Date 07.09.2013 Page 5 of 13

PROJECT INFORMATION

Project Manager: Pam Morrill

Project Name: Maury Island

Project Number:

Site Location: Sampled By: AW

DISPOSAL INFORMATION

☒ Lab Disposal (return if not indicated)

Disposal Method:

Disposed by: Disposal Date:

QC INFORMATION (check one)

☐SW-846 ☐CLP ☐Screening ☐ CDM Std. ☐Special

Laboratory Number:

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	PETROLEUM HYDROCARBONS: TPH-HCID State:	TPH-G State:	TPH-D State:	TPH-418.1 State:	8015M Fuel Hydrocarbon	TPH Special Instructions	ORGANIC COMPOUNDS: 8010 Halogenated VOCs	8020 Aromatic VOCs	8020M - BETX only	8260 GC/MS Volatiles	8270 GC/MS Semivolatiles	8310 PAHs	8040 Phenols	DWS - Volatiles and Semivolatiles	PESTS/PCBs: 8081 OC Pest/PCBs	8082 PCBs only	8141 OP Pesticides	8151 OC Herbicides	DWS - Herb/Pest	METALS: Selected Metals: list As, Cd, Pb	RCRA Metals (8)	TCL Metals (23)	Priority Poll. Metals (13)	DWS - Metals	MFSP - Metals (Wa)	LEACHING TESTS: TCLP - Volatiles (ZHE)	TCLP - Semivolatiles	TCLP - Pesticides	TCLP - Metals	OTHER					NUMBER OF CONTAINERS
3a-S-158-0	06.27.13	1200	S	58245-27																				X															1
3a-S-158-9	06.27.13	1205		-28																				X															1
3a-S-159-0	6.27.13	1225		-29																				X															1
3a-S-159-D2	6.27.13	1228		-30																				X															1
3a-S-160-0	6.27.2013	1305		-31																				X															1
3a-S-160-9	6.27.2013	1310		-32																				X															1
1a-S-155-0	6-27.2013	1010		-33																				X															1
3a-S-159-D3	6.27.2013	1237	S	-34																				X															1

LAB INFORMATION

Lab Name: KC Lab

Lab Address:

Via:

SAMPLE RECEIPT

Total Number of Containers:	
Chain-of-Custody Seals: Y/N/NA	
Intact?: Y/N/NA	
Received in Good Condition/Cold:	

Turn Around Time: ☒Standard ☐24 hr. ☐48 hr. ☐72 hr. ☐1 wk.

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA

Special Instructions:

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: [signature] Time: 1640	Signature: Time:	Signature: Time:
Printed Name: Kevin Lee Date: 7/9/13	Printed Name: Date:	Printed Name: Date:
Company: CDM Smith	Company:	Company:

RECEIVED BY: 1.	RECEIVED BY: 2.	RECEIVED BY: 3.
Signature: [signature] Time: 1640	Signature: Time:	Signature: Time:
Printed Name: Jason Kuna Date: 7-9-13	Printed Name: Date:	Printed Name: Date:
Company: KCEL	Company:	Company:

![CDM Smith]

CHAIN-OF-CUSTODY

Date 07.09.2013 Page 6 of 13

PROJECT INFORMATION

Project Manager: Pam Morrill
Project Name: Maury Island
Project Number:
Site Location: Maury Island Sampled By: AW

DISPOSAL INFORMATION

☒ Lab Disposal (return if not indicated)

Disposal Method:
Disposed by: Disposal Date:

QC INFORMATION (check one)

☐ SW-846 ☐ CLP ☐ Screening ☐ CDM Std. ☐ Special

Laboratory Number:

SAMPLE ID	DATE	TIME	MATRIX	LAB ID
1b-S-163-0	06/27/2013	1455	S	552935-35
1b-S-163-D4	06/27/2013	1457		-36
1a-S-156-0	6/27/13	1025		-37
1a-S-156-9	6/27/13	1025		-38
1a-S-156-18	6/27/13	1027		-39
1a-S-165-0	6/27/13	1535		-40
1a-S-157-0	6/27/13	1045		-41
1a-S-165-9	6/27/13	1540	S	-42

ANALYSIS REQUEST

SAMPLE ID	PETROLEUM HYDROCARBONS: TPH-HCID State:	TPH-G State:	TPH-D State:	TPH-418.1 State:	8015M Fuel Hydrocarbon	TPH Special Instructions	ORGANIC COMPOUNDS: 8010 Halogenated VOCs	8020 Aromatic VOCs	8020M - BETX only	8260 GC/MS Volatiles	8270 GC/MS Semivolatiles	8310 PAHs	8040 Phenols	DWS - Volatiles and Semivolatiles	PESTS/PCBs: 8081 OC Pest/PCBs	8082 PCBs only	8141 OP Pesticides	8151 OC Herbicides	DWS - Herb/Pest	METALS: Selected Metals: list As, Cd, Pb	RCRA Metals (8)	TCL Metals (23)	Priority Poll. Metals (13)	DWS - Metals	MFSP - Metals (Wa)	LEACHING TESTS: TCLP - Volatiles (ZHE)	TCLP - Semivolatiles	TCLP - Pesticides	TCLP - Metals	OTHER					NUMBER OF CONTAINERS
1b-S-163-0																				X															1
1b-S-163-D4																				X															1
1a-S-156-0																				X															1
1a-S-156-9																				X															1
1a-S-156-18																				X															1
1a-S-165-0																				X															1
1a-S-157-0																				X															1
1a-S-165-9																				X															1

LAB INFORMATION

Lab Name: KC Lab
Lab Address:

Via:

SAMPLE RECEIPT

Total Number of Containers:
Chain-of-Custody Seals: Y/N/NA
Intact?: Y/N/NA
Received in Good Condition/Cold:

Turn Around Time: ☐ Standard ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 1 wk.

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA

Special Instructions:

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: [signature] Time: 1640	Signature: Time:	Signature: Time:
Printed Name: Kevin Lee Date: 7/9/13	Printed Name: Date:	Printed Name: Date:
Company: CDM Smith	Company:	Company:

RECEIVED BY: 1.	RECEIVED BY: 2.	RECEIVED BY: 3.
Signature: [signature] Time: 1640	Signature: Time:	Signature: Time:
Printed Name: Jason Kinnard Date: 7-9-13	Printed Name: Date:	Printed Name: Date:
Company: KCEL	Company:	Company:

CDM Smith

CHAIN-OF-CUSTODY

Date 09.09.2013 Page 7 of 13

PROJECT INFORMATION

Project Manager: Pam Morrill
Project Name: KC Maury Island
Project Number:
Site Location: Maury Island WA Sampled By: AW

DISPOSAL INFORMATION

☒ Lab Disposal (return if not indicated)
Disposal Method:
Disposed by: Disposal Date:

QC INFORMATION (check one)

☐ SW-846 ☐ CLP ☐ Screening ☐ CDM Std. ☐ Special

Laboratory Number:

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID
3a-S-159-9	06/27/13	1235	S	582915-43
1b-S-161-0	06/27/13	1425	↑	-44
1b-S-164-0	06/27/13	1515		-45
1b-S-164-9	06/27/13	1520		-46
1b-S-164-18	06/27/13	1522		-47
1b-S-162-0	06/27/2013	1440		-48
1b-S-162-9	06/27/13	1445	↓	-49
1b-S-162-18	06/27/13	1447	S	-50

SAMPLE ID	PETROLEUM HYDROCARBONS: TPH-HCID State:	TPH-G State:	TPH-D State:	TPH-418.1 State:	8015M Fuel Hydrocarbon	TPH Special Instructions	ORGANIC COMPOUNDS: 8010 Halogenated VOCs	8020 Aromatic VOCs	8020M - BETX only	8260 GC/MS Volatiles	8270 GC/MS Semivolatiles	8310 PAHs	8040 Phenols	DWS - Volatiles and Semivolatiles	PESTS/PCBs: 8081 OC Pest/PCBs	8082 PCBs only	8141 OP Pesticides	8151 OC Herbicides	DWS - Herb/Pest	METALS: Selected Metals: list As, Cd, Pb	RCRA Metals (8)	TCL Metals (23)	Priority Poll. Metals (13)	DWS - Metals	MFSP - Metals (Wa)	LEACHING TESTS: TCLP - Volatiles (ZHE)	TCLP - Semivolatiles	TCLP - Pesticides	TCLP - Metals	OTHER					NUMBER OF CONTAINERS
3a-S-159-9																				X															1
1b-S-161-0																				X															1
1b-S-164-0																				X															1
1b-S-164-9																				X															1
1b-S-164-18																				X															1
1b-S-162-0																				X															1
1b-S-162-9																				X															1
1b-S-162-18																				X															1

LAB INFORMATION

Lab Name: KC
Lab Address:
Via:

SAMPLE RECEIPT

Total Number of Containers:
Chain-of-Custody Seals: Y/N/NA
Intact?: Y/N/NA
Received in Good Condition/Cold:

Turn Around Time: ☐ Standard ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 1 wk.

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA

Special Instructions:

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: KL Time: 1640	Signature: Time:	Signature: Time:
Printed Name: Kevin Lee Date: 7/9/13	Printed Name: Date:	Printed Name: Date:
Company: CDM Smith	Company:	Company:

RECEIVED BY: 1.	RECEIVED BY: 2.	RECEIVED BY: 3.
Signature: [signature] Time: 1640	Signature: Time:	Signature: Time:
Printed Name: Jason Kinnard Date: 7-9-13	Printed Name: Date:	Printed Name: Date:
Company: KCEL	Company:	Company:

CDM Smith

CHAIN-OF-CUSTODY

Date 07.09.2013 Page 8 of 13

L58295

PROJECT INFORMATION

Project Manager: Pam Merrill
Project Name: Maury Island
Project Number:
Site Location: Maury Island Sampled By: AW

DISPOSAL INFORMATION

☒ Lab Disposal (return if not indicated)

Disposal Method:
Disposed by: Disposal Date:

QC INFORMATION (check one)

☐ SW-846 ☐ CLP ☐ Screening ☐ CDM Std. ☐ Special

Laboratory Number:

ANALYSIS REQUEST

PETROLEUM HYDROCARBONS: TPH-HCID through TPH Special Instructions; ORGANIC COMPOUNDS: 8010 through DWS - Volatiles and Semivolatiles; PESTS/PCBs: 8081 through DWS - Herb/Pest; METALS: Selected Metals through MFSP - Metals (Wa); LEACHING TESTS: TCLP columns; OTHER

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	TPH-HCID State:	TPH-G State:	TPH-D State:	TPH-418.1 State:	8015M Fuel Hydrocarbon	TPH Special Instructions	8010 Halogenated VOCs	8020 Aromatic VOCs	8020M - BETX only	8260 GC/MS Volatiles	8270 GC/MS Semivolatiles	8310 PAHs	8040 Phenols	DWS - Volatiles and Semivolatiles	8081 OC Pest/PCBs	8082 PCBs only	8141 OP Pesticides	8151 OC Herbicides	DWS - Herb/Pest	Selected Metals: list As, Cd, Pb	RCRA Metals (8)	TCL Metals (23)	Priority Poll. Metals (13)	DWS - Metals	MFSP - Metals (Wa)	TCLP - Volatiles (ZHE)	TCLP - Semivolatiles	TCLP - Pesticides	TCLP - Metals	OTHER	NUMBER OF CONTAINERS
3b-S-166-0	07.02.2013	0830	S	-51																				X											1
3b-S-166-DS	↑	0835	S	-52																				X											1
3b-S-167-0		0845	S	-53																				X											1
3b-S-167-9		0850	S	-54																				X											1
3b-S-167-18		0852	S	-55																				X											1
3b-S-168-0		0910	S	-56																				X											1
3b-S-169-0	↓	0920	S	-57																				X											1
3b-S-169-9	07.02.2013	0925	S	-58																				X											1

LAB INFORMATION

Lab Name: KC Lab
Lab Address:
Via:

SAMPLE RECEIPT

Total Number of Containers:
Chain-of-Custody Seals: Y/N/NA
Intact?: Y/N/NA
Received in Good Condition/Cold:

Turn Around Time: ☒ Standard ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 1 wk.

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA

Special Instructions:

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: [signature] Time: 1640	Signature: Time:	Signature: Time:
Printed Name: Kevin Lee Date: 7/9/13	Printed Name: Date:	Printed Name: Date:
Company: CDM Smith	Company:	Company:

RECEIVED BY: 1.	RECEIVED BY: 2.	RECEIVED BY: 3.
Signature: [signature] Time: 1640	Signature: Time:	Signature: Time:
Printed Name: Jason Kinnel Date: 7-9-13	Printed Name: Date:	Printed Name: Date:
Company: KCEL	Company:	Company:

CDM Smith

CHAIN-OF-CUSTODY

Date 07.09.2013 Page 9 of 13

L58295

PROJECT INFORMATION

Project Manager: Pam Morrill

Project Name: KC Maury Island

Project Number:

Site Location: Maury Island Sampled By: AW

DISPOSAL INFORMATION

☒ Lab Disposal (return if not indicated)

Disposal Method:

Disposed by: Disposal Date:

QC INFORMATION (check one)

☐ SW-846 ☐ CLP ☐ Screening ☐ CDM Std. ☐ Special

Laboratory Number:

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	PETROLEUM HYDROCARBONS: TPH-HCID State:	TPH-G State:	TPH-D State:	TPH-418.1 State:	8015M Fuel Hydrocarbon	TPH Special Instructions	ORGANIC COMPOUNDS: 8010 Halogenated VOCs	8020 Aromatic VOCs	8020M - BETX only	8260 GC/MS Volatiles	8270 GC/MS Semivolatiles	8310 PAHs	8040 Phenols	DWS - Volatiles and Semivolatiles
5-S-170-0	07.02.2013	1020	S	-59														
5-S-171-0		1025	S	-60														
5-S-171-9		1030	S	-61														
5-S-171-18		1032	S	-62														
5-S-172-0		1040	S	-63														
5-S-173-0		1050	S	-64														
5-S-173-9		1055	S	-65														
5-S-173-18	07.02.2013	1057	S	-66														

SAMPLE ID	PESTS/PCBs: 8081 OC Pest/PCBs	8082 PCBs only	8141 OP Pesticides	8151 OC Herbicides	DWS - Herb/Pest	METALS: Selected Metals: list As, Cd, Pb	RCRA Metals (8)	TCL Metals (23)	Priority Poll. Metals (13)	DWS - Metals	MFSP - Metals (Wa)	LEACHING TESTS: TCLP - Volatiles (ZHE)	TCLP - Semivolatiles	TCLP - Pesticides	TCLP - Metals	OTHER					NUMBER OF CONTAINERS
5-S-170-0						X															1
5-S-171-0						X															1
5-S-171-9						X															1
5-S-171-18						X															1
5-S-172-0						X															1
5-S-173-0						X															1
5-S-173-9						X															1
5-S-173-18						X															1

LAB INFORMATION

Lab Name: KC Lab

Lab Address:

Via:

SAMPLE RECEIPT

Total Number of Containers:

Chain-of-Custody Seals: Y/N/NA

Intact?: Y/N/NA

Received in Good Condition/Cold:

Turn Around Time: ☐ Standard ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 1 wk.

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA

Special Instructions:

	RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature:	[signature]		
Time:	1640		
Printed Name:	Kevin Lee		
Date:	7/9/2013		
Company:	CDM Smith		

	RECEIVED BY: 1.	RECEIVED BY: 2.	RECEIVED BY: 3.
Signature:	[signature]		
Time:	1640		
Printed Name:	Jason Kinnard		
Date:	7-9-13		
Company:	KCEL		

CDM Smith

CHAIN-OF-CUSTODY

Date 07.09.2013 Page 10 of 13

L58295

PROJECT INFORMATION

Project Manager: Pam Morrill
Project Name: KC Maury Island
Project Number:
Site Location: Maury Island Sampled By: AW

DISPOSAL INFORMATION

☒ Lab Disposal (return if not indicated)
Disposal Method:
Disposed by: Disposal Date:

QC INFORMATION (check one)

☐ SW-846 ☐ CLP ☐ Screening ☐ CDM Std. ☐ Special

Laboratory Number:

ANALYSIS REQUEST

- PETROLEUM HYDROCARBONS: TPH-HCID State:; TPH-G State:; TPH-D State:; TPH-418.1 State:; 8015M Fuel Hydrocarbon; TPH Special Instructions
- ORGANIC COMPOUNDS: 8010 Halogenated VOCs; 8020 Aromatic VOCs; 8020M - BETX only; 8260 GC/MS Volatiles; 8270 GC/MS Semivolatiles; 8310 PAHs; 8040 Phenols; DWS - Volatiles and Semivolatiles
- PESTS/PCBs: 8081 OC Pest/PCBs; 8082 PCBs only; 8141 OP Pesticides; 8151 OC Herbicides; DWS - Herb/Pest
- METALS: Selected Metals: list As, Cd, Pb; RCRA Metals (8); TCL Metals (23); Priority Poll. Metals (13); DWS - Metals; MFSP - Metals (Wa)
- LEACHING TESTS: TCLP - Volatiles (ZHE); TCLP - Semivolatiles; TCLP - Pesticides; TCLP - Metals
- OTHER
- NUMBER OF CONTAINERS

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Selected Metals: As, Cd, Pb	NUMBER OF CONTAINERS
S-S-174-0	07.02.2013	1100	S	-67	X	1
S-S-175-0	↑	1110	S	-68	X	1
S-S-176-0		1115	S	-69	X	1
S-S-176-9		1120	S	-70	X	1
S-S-176-18		1122	S	-71	X	1
S-S-177-0		1130	S	-72	X	1
S-S-178-0	↓	1240	S	-73	X	1
S-FD-179-0	07.02.2013	1300	FD	-74	X	1

LAB INFORMATION

Lab Name:
Lab Address:
Via:

SAMPLE RECEIPT

Total Number of Containers:
Chain-of-Custody Seals: Y/N/NA
Intact?: Y/N/NA
Received in Good Condition/Cold:

Turn Around Time: ☐ Standard ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 1 wk.

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA

Special Instructions:

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: KL Time: 1640	Signature: Time:	Signature: Time:
Printed Name: Kevin Lee Date: 7/9/13	Printed Name: Date:	Printed Name: Date:
Company: CDM Smith	Company:	Company:

RECEIVED BY: 1.	RECEIVED BY: 2.	RECEIVED BY: 3.
Signature: [signature] Time: 1640	Signature: Time:	Signature: Time:
Printed Name: Jason Kinnard Date: 7-9-13	Printed Name: Date:	Printed Name: Date:
Company: KCEL	Company:	Company:

CDM Smith

CHAIN-OF-CUSTODY

Date 07.09.2013 Page 11 of 13

L58295

PROJECT INFORMATION

Project Manager: Pam Morrill

Project Name: KC Maury Island

Project Number:

Site Location: Maury Island Sampled By: AW

DISPOSAL INFORMATION

☒ Lab Disposal (return if not indicated)

Disposal Method:

Disposed by: Disposal Date:

QC INFORMATION (check one)

☐ SW-846 ☐ CLP ☐ Screening ☐ CDM Std. ☐ Special

Laboratory Number:

ANALYSIS REQUEST

- PETROLEUM HYDROCARBONS: TPH-HCID State:; TPH-G State:; TPH-D State:; TPH-418.1 State:; 8015M Fuel Hydrocarbon; TPH Special Instructions
- ORGANIC COMPOUNDS: 8010 Halogenated VOCs; 8020 Aromatic VOCs; 8020M - BETX only; 8260 GC/MS Volatiles; 8270 GC/MS Semivolatiles; 8310 PAHs; 8040 Phenols; DWS - Volatiles and Semivolatiles
- PESTS/PCBs: 8081 OC Pest/PCBs; 8082 PCBs only; 8141 OP Pesticides; 8151 OC Herbicides; DWS - Herb/Pest
- METALS: Selected Metals: list As, Cd, Pb; RCRA Metals (8); TCL Metals (23); Priority Poll. Metals (13); DWS - Metals; MFSP - Metals (Wa)
- LEACHING TESTS: TCLP - Volatiles (ZHE); TCLP - Semivolatiles; TCLP - Pesticides; TCLP - Metals
- OTHER
- NUMBER OF CONTAINERS

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Selected Metals: list As, Cd, Pb	NUMBER OF CONTAINERS
5-FD-178-0	07.02.2013	1235	FD	-75	X	1
5-S-179-0	↓	1305	S	-76	X	1
5-FD-180-0		1325	FD	-77	X	1
5-S-180-0		1330	S	-78	X	1
5-S-180-D6		1332	S	-79	X	1
5-FD-181-0	↓	1400	FD	-80	X	1
5-S-181-0	07.02.2013	1405	S	-81	X	1
5-FD-182-0	07.03.2013	0955	FD	-82	X	1

LAB INFORMATION

Lab Name:

Lab Address:

Via:

SAMPLE RECEIPT

Total Number of Containers:

Chain-of-Custody Seals: Y/N/NA

Intact?: Y/N/NA

Received in Good Condition/Cold:

Turn Around Time: ☒ Standard ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 1 wk.

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA

Special Instructions:

	RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature / Time	[signature] 1640		
Printed Name / Date	Kevin Lee 7/9/13		
Company	CDM Smith		

	RECEIVED BY: 1.	RECEIVED BY: 2.	RECEIVED BY: 3.
Signature / Time	[signature] 1640		
Printed Name / Date	Jason Kunad 7-9-13		
Company	KLEC		

CDM Smith Bellevue: (425) 519-8300

Rev. 01/2012

DISTRIBUTION: White, Canary to Analytical Laboratory; Pink to Project

Chain of Custody.indd

CDM Smith

CHAIN-OF-CUSTODY

Date 07.09.2013 Page 12 of 13

PROJECT INFORMATION

Project Manager: Pam Morrill

Project Name: KC Maury Island

Project Number:

Site Location: Sampled By: AW

DISPOSAL INFORMATION

☐ Lab Disposal (return if not indicated)

Disposal Method:

Disposed by: Disposal Date:

QC INFORMATION (check one)

☐SW-846 ☐CLP ☐Screening ☐ CDM Std. ☐Special

Laboratory Number:

ANALYSIS REQUEST

- PETROLEUM HYDROCARBONS: TPH-HCID State:; TPH-G State:; TPH-D State:; TPH-418.1 State:; 8015M Fuel Hydrocarbon; TPH Special Instructions
- ORGANIC COMPOUNDS: 8010 Halogenated VOCs; 8020 Aromatic VOCs; 8020M - BETX only; 8260 GC/MS Volatiles; 8270 GC/MS Semivolatiles; 8310 PAHs; 8040 Phenols; DWS - Volatiles and Semivolatiles
- PESTS/PCBs: 8081 OC Pest/PCBs; 8082 PCBs only; 8141 OP Pesticides; 8151 OC Herbicides; DWS - Herb/Pest
- METALS: Selected Metals: list As, Cd, Pb; RCRA Metals (8); TCL Metals (23); Priority Poll. Metals (13); DWS - Metals; MFSP - Metals (Wa)
- LEACHING TESTS: TCLP - Volatiles (ZHE); TCLP - Semivolatiles; TCLP - Pesticides; TCLP - Metals
- OTHER: PAH
- NUMBER OF CONTAINERS

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Selected Metals: As, Cd, Pb	OTHER: PAH	NUMBER OF CONTAINERS
5-S-182-0	07.03.2013	1000	S	-83	X		1
5-FD-183-0	07.03.13	1015	FD	-84	X		1
5-S-183-0	07.03.13	1020	S	-85	X		1
5-FD-184-0	07.03.13	1135	FD	-86		X	1
5-S-184-0	07.03.13	1140	S	-87		X	1
5-FD-185-0	07.03.13	1148	FD	-88		X	1
5-S-185-0	07.03.13	1150	S	-89		X	1
5-FD-186-0	07.03.13	1200	FD	-90		X	1

LAB INFORMATION

Lab Name:

Lab Address:

Via:

SAMPLE RECEIPT

Total Number of Containers:

Chain-of-Custody Seals: Y/N/NA

Intact?: Y/N/NA

Received in Good Condition/Cold:

Turn Around Time: ☒ Standard ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 1 wk.

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA

Special Instructions:

	1.	2.	3.
RELINQUISHED BY: Signature	KL		
Time	1640		
Printed Name	Kevin Lee		
Date	7/9/13		
Company	CDM Smith		
RECEIVED BY: Signature	[signature]		
Time	1640		
Printed Name	Jason Kinnard		
Date	7-9-13		
Company	KCEL		

CDM Smith

CHAIN-OF-CUSTODY

Date 07.09.2013 Page 13 of 13

PROJECT INFORMATION

Project Manager: Pam Morrill
Project Name: Maury Island
Project Number:
Site Location: Sampled By: AW

DISPOSAL INFORMATION

☒ Lab Disposal (return if not indicated)
Disposal Method:
Disposed by: Disposal Date:

QC INFORMATION (check one)

☐ SW-846 ☐ CLP ☐ Screening ☐ CDM Std. ☐ Special

Laboratory Number:

ANALYSIS REQUEST

PETROLEUM HYDROCARBONS: TPH-HCID State: ; TPH-G State: ; TPH-D State: ; TPH-418.1 State: ; 8015M Fuel Hydrocarbon; TPH Special Instructions

ORGANIC COMPOUNDS: 8010 Halogenated VOCs; 8020 Aromatic VOCs; 8020M - BETX only; 8260 GC/MS Volatiles; 8270 GC/MS Semivolatiles; 8310 PAHs; 8040 Phenols; DWS - Volatiles and Semivolatiles

PESTS/PCBs: 8081 OC Pest/PCBs; 8082 PCBs only; 8141 OP Pesticides; 8151 OC Herbicides; DWS - Herb/Pest

METALS: Selected Metals: list; RCRA Metals (8); TCL Metals (23); Priority Poll. Metals (13); DWS - Metals; MFSP - Metals (Wa)

LEACHING TESTS: TCLP - Volatiles (ZHE); TCLP - Semivolatiles; TCLP - Pesticides; TCLP - Metals

OTHER: PAH

NUMBER OF CONTAINERS

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	PAH	NUMBER OF CONTAINERS
5-S-186-0	07.03.2013	1205	S	-91	✓	
5-S-186-D7	↓	1207	S	-92	✓	
5-FD-187-0	↓	1215	FD	-93	✓	
5-S-187-0	↓	1220	S	-94	✓	
5-FD-188-0	↓	1230	FD	-95	✓	
5-S-188-0	07.03.2013	1235	S	-96	✓	

LAB INFORMATION

Lab Name:
Lab Address:
Via:

SAMPLE RECEIPT

Total Number of Containers:
Chain-of-Custody Seals: Y/N/NA
Intact?: Y/N/NA
Received in Good Condition/Cold:

Turn Around Time: ☒ Standard ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 1 wk.

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA

Special Instructions:

	RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature:	KL		
Time:	1640		
Printed Name:	Kevin Lee		
Date:	7/9/13		
Company:	CDM Smith		

	RECEIVED BY: 1.	RECEIVED BY: 2.	RECEIVED BY: 3.
Signature:	[signature]		
Time:	1640		
Printed Name:	Jason Kinney		
Date:	7-9-13		
Company:	KCEC		

WG127769 Total Solids

Sample	Project	Project Description	List Type	Matrix	Collect Date	Prep Date	Anal Date	QC Association	Comments
L58070-3	421184-100	OCS-City of Buckley	CVTOTS	SLUDGE	7/7/2013 0:00	7/8/2013 18:00	7/9/2013 17:04	WG127769-1,-2,-3	
L58206-1	421422-100	SWD , Brownfield Program	CVTOTS	SOIL	6/24/2013 14:55	7/8/2013 18:00	7/9/2013 17:01		
L58206-2	421422-100		CVTOTS	SOIL	6/24/2013 15:00	7/8/2013 18:00	7/9/2013 17:01		
L58206-3	421422-100		CVTOTS	SOIL	6/24/2013 14:15	7/8/2013 18:00	7/9/2013 17:01		
L58206-4	421422-100		CVTOTS	SOIL	6/24/2013 12:15	7/8/2013 18:00	7/9/2013 17:02		
L58206-5	421422-100		CVTOTS	SOIL	6/24/2013 12:50	7/8/2013 18:00	7/9/2013 17:02		
L58206-6	421422-100		CVTOTS	SOIL	6/24/2013 14:00	7/8/2013 18:00	7/9/2013 17:02		
L58206-7	421422-100		CVTOTS	SOIL	6/24/2013 12:30	7/8/2013 18:00	7/9/2013 17:02		
L58206-8	421422-100		CVTOTS	SOIL	6/24/2013 13:10	7/8/2013 18:00	7/9/2013 17:02		
L58206-9	421422-100		CVTOTS	SOIL	6/24/2013 13:30	7/8/2013 18:00	7/9/2013 17:03		
L58206-10	421422-100		CVTOTS	SOIL	6/24/2013 14:30	7/8/2013 18:00	7/9/2013 17:03		
L58206-16	421422-100		CVTOTS	SOIL	6/25/2013 14:20	7/8/2013 18:00	7/9/2013 17:03		
L58206-17	421422-100		CVTOTS	SOIL	6/25/2013 14:30	7/8/2013 18:00	7/9/2013 17:03		
L58206-18	421422-100		CVTOTS	SOIL	6/25/2013 14:32	7/8/2013 18:00	7/9/2013 17:03		
L58206-19	421422-100		CVTOTS	SOIL	6/25/2013 14:40	7/8/2013 18:00	7/9/2013 17:03		
L58206-20	421422-100		CVTOTS	SOIL	6/25/2013 14:55	7/8/2013 18:00	7/9/2013 17:03		
L58206-21	421422-100		CVTOTS	SOIL	6/25/2013 15:10	7/8/2013 18:00	7/9/2013 17:04		
WG127769-1	MB		CVTOTS	OTHR SOLID		7/8/2013 18:00	7/9/2013 17:04		MB1 7/8/13
WG127769-2	LD		CVTOTS	SOIL		7/8/2013 18:00	7/9/2013 17:01		L58206-1
WG127769-3	LD		CVTOTS	SLUDGE		7/8/2013 18:00	7/9/2013 17:04		L58070-3

Workgroup: WG127769 Total Solids

MB:WG127769-1 Matrix: OTHR SOLID Listtype:CVTOTS Method:SM2540-G Project: Pkey:STD
(Method Blank)

Parameter	MDL	RDL	Units	MB Value	Qual
Total Solids	0.005	0.01	%	<MDL	

LD:WG127769-2 L58206-1 Matrix: SOIL Listtype:CVTOTS Method:SM2540-G Project:421422-100 Pkey:STD
(Lab Duplicate)

Parameter	MDL	RDL	Units	SAMP Value	LD Value	RPD	Qual	Lab Limit
Total Solids	0.005	0.01	%	96.1	95.9	0		0--20

LD:WG127769-3 L58070-3 Matrix: SLUDGE Listtype:CVTOTS Method:SM2540-G Project:421184-100 Pkey:STD
(Lab Duplicate)

Parameter	MDL	RDL	Units	SAMP Value	LD Value	RPD	Qual	Lab Limit
Total Solids	0.005	0.01	%	14.1	14.2	0		0--20

WG127779 Total Solids

Sample	Project	Project Description	List Type	Matrix	Collect Date	Prep Date	Anal Date	QC Association	Comments
L58295-1	421422-100	SWD , Brownfield Program	CVTOTS	SOIL	6/26/2013 10:20	7/11/2013 18:25	7/15/2013 10:09	WG127779-1,-2,-3,-4,-5,-6	
L58295-2	421422-100		CVTOTS	SOIL	6/26/2013 10:40	7/11/2013 18:25	7/15/2013 10:09		
L58295-3	421422-100		CVTOTS	SOIL	6/26/2013 10:45	7/11/2013 18:25	7/15/2013 10:09		
L58295-4	421422-100		CVTOTS	SOIL	6/26/2013 10:47	7/11/2013 18:25	7/15/2013 10:09		
L58295-5	421422-100		CVTOTS	SOIL	6/26/2013 11:00	7/11/2013 18:25	7/15/2013 10:10		
L58295-6	421422-100		CVTOTS	SOIL	6/26/2013 12:00	7/11/2013 18:25	7/15/2013 10:10		
L58295-7	421422-100		CVTOTS	SOIL	6/26/2013 12:20	7/11/2013 18:25	7/15/2013 10:10		
L58295-8	421422-100		CVTOTS	SOIL	6/26/2013 12:25	7/11/2013 18:25	7/15/2013 10:10		
L58295-9	421422-100		CVTOTS	SOIL	6/26/2013 12:45	7/11/2013 18:25	7/15/2013 10:10		
L58295-10	421422-100		CVTOTS	SOIL	6/26/2013 12:50	7/11/2013 18:25	7/15/2013 10:10		
L58295-11	421422-100		CVTOTS	SOIL	6/26/2013 13:50	7/11/2013 18:25	7/15/2013 10:11		
L58295-12	421422-100		CVTOTS	SOIL	6/26/2013 13:55	7/11/2013 18:25	7/15/2013 10:11		
L58295-13	421422-100		CVTOTS	SOIL	6/26/2013 14:05	7/11/2013 18:25	7/15/2013 10:11		
L58295-14	421422-100		CVTOTS	SOIL	6/26/2013 14:10	7/11/2013 18:25	7/15/2013 10:11		
L58295-15	421422-100		CVTOTS	SOIL	6/26/2013 14:20	7/11/2013 18:25	7/15/2013 10:11		
L58295-16	421422-100		CVTOTS	SOIL	6/26/2013 14:25	7/11/2013 18:25	7/15/2013 10:12		
L58295-17	421422-100		CVTOTS	SOIL	6/26/2013 14:27	7/11/2013 18:25	7/15/2013 10:12		
L58295-18	421422-100		CVTOTS	SOIL	6/26/2013 14:12	7/11/2013 18:25	7/15/2013 10:12		
L58295-19	421422-100		CVTOTS	SOIL	6/26/2013 14:45	7/11/2013 18:25	7/15/2013 10:12		
L58295-20	421422-100		CVTOTS	SOIL	6/26/2013 14:50	7/11/2013 18:25	7/15/2013 10:12		
L58295-21	421422-100		CVTOTS	SOIL	6/26/2013 14:52	7/11/2013 18:25	7/15/2013 10:13		
L58295-22	421422-100		CVTOTS	SOIL	6/26/2013 15:05	7/11/2013 18:25	7/15/2013 10:14		
L58295-23	421422-100		CVTOTS	SOIL	6/26/2013 15:10	7/11/2013 18:25	7/15/2013 10:14		
L58295-24	421422-100		CVTOTS	SOIL	6/26/2013 15:15	7/11/2013 18:25	7/15/2013 10:14		
L58295-25	421422-100		CVTOTS	SOIL	6/26/2013 15:20	7/11/2013 18:25	7/15/2013 10:14		
L58295-26	421422-100		CVTOTS	SOIL	6/26/2013 15:45	7/11/2013 18:25	7/15/2013 10:14		
L58295-27	421422-100		CVTOTS	SOIL	6/27/2013 12:00	7/11/2013 18:25	7/15/2013 10:14		
L58295-28	421422-100		CVTOTS	SOIL	6/27/2013 12:05	7/11/2013 18:25	7/15/2013 10:15		
L58295-29	421422-100		CVTOTS	SOIL	6/27/2013 12:25	7/11/2013 18:25	7/15/2013 10:15		
L58295-30	421422-100		CVTOTS	SOIL	6/27/2013 12:28	7/11/2013 18:25	7/15/2013 10:15		
L58295-31	421422-100		CVTOTS	SOIL	6/27/2013 13:05	7/11/2013 18:25	7/15/2013 10:15		
L58295-32	421422-100		CVTOTS	SOIL	6/27/2013 13:10	7/11/2013 18:25	7/15/2013 10:15		
L58295-33	421422-100		CVTOTS	SOIL	6/27/2013 10:10	7/11/2013 18:25	7/15/2013 10:15		
L58295-34	421422-100		CVTOTS	SOIL	6/27/2013 12:37	7/11/2013 18:25	7/15/2013 10:16		
L58295-35	421422-100		CVTOTS	SOIL	6/27/2013 14:55	7/11/2013 18:25	7/15/2013 10:16		
L58295-36	421422-100		CVTOTS	SOIL	6/27/2013 14:57	7/11/2013 18:25	7/15/2013 10:16		
L58295-37	421422-100		CVTOTS	SOIL	6/27/2013 10:25	7/11/2013 18:25	7/15/2013 10:16		
L58295-38	421422-100		CVTOTS	SOIL	6/27/2013 10:25	7/11/2013 18:25	7/15/2013 10:16		
L58295-39	421422-100		CVTOTS	SOIL	6/27/2013 10:27	7/11/2013 18:25	7/15/2013 10:16		
L58295-40	421422-100		CVTOTS	SOIL	6/27/2013 15:35	7/11/2013 18:25	7/15/2013 10:17		
L58295-41	421422-100		CVTOTS	SOIL	6/27/2013 10:45	7/11/2013 18:25	7/15/2013 10:18		
L58295-42	421422-100		CVTOTS	SOIL	6/27/2013 15:40	7/11/2013 18:25	7/15/2013 10:18		
L58295-43	421422-100		CVTOTS	SOIL	6/27/2013 12:35	7/11/2013 18:25	7/15/2013 10:18		

L58295-44	421422-100		CVTOTS	SOIL	6/27/2013 14:25	7/11/2013 18:25	7/15/2013 10:18		
L58295-45	421422-100		CVTOTS	SOIL	6/27/2013 15:15	7/11/2013 18:25	7/15/2013 10:18		
L58295-46	421422-100		CVTOTS	SOIL	6/27/2013 15:20	7/11/2013 18:25	7/15/2013 10:19		
L58295-47	421422-100		CVTOTS	SOIL	6/27/2013 15:22	7/11/2013 18:25	7/15/2013 10:19		
L58295-48	421422-100		CVTOTS	SOIL	6/27/2013 14:40	7/11/2013 18:25	7/15/2013 10:19		
L58295-49	421422-100		CVTOTS	SOIL	6/27/2013 14:45	7/11/2013 18:25	7/15/2013 10:19		
L58295-50	421422-100		CVTOTS	SOIL	6/27/2013 14:47	7/11/2013 18:25	7/15/2013 10:19		
L58295-51	421422-100		CVTOTS	SOIL	7/2/2013 8:30	7/11/2013 18:25	7/15/2013 10:19		
L58295-52	421422-100		CVTOTS	SOIL	7/2/2013 8:35	7/11/2013 18:25	7/15/2013 10:20		
L58295-53	421422-100		CVTOTS	SOIL	7/2/2013 8:45	7/11/2013 18:25	7/15/2013 10:20		
L58295-56	421422-100		CVTOTS	SOIL	7/2/2013 9:10	7/11/2013 18:25	7/15/2013 10:20		
L58295-57	421422-100		CVTOTS	SOIL	7/2/2013 9:20	7/11/2013 18:25	7/15/2013 10:20		
L58295-58	421422-100		CVTOTS	SOIL	7/2/2013 9:25	7/11/2013 18:25	7/15/2013 10:20		
WG127779-1	MB		CVTOTS	OTHR SOLID		7/11/2013 18:25	7/15/2013 10:08		MB2 7/11/13
WG127779-2	LD		CVTOTS	SOIL		7/11/2013 18:25	7/15/2013 10:09		L58295-1
WG127779-3	MB		CVTOTS	OTHR SOLID		7/11/2013 18:25	7/15/2013 10:13		MB3 7/11/13
WG127779-4	LD		CVTOTS	SOIL		7/11/2013 18:25	7/15/2013 10:14		L58295-21
WG127779-5	MB		CVTOTS	OTHR SOLID		7/11/2013 18:25	7/15/2013 10:17		MB4 7/11/13
WG127779-6	LD		CVTOTS	SOIL		7/11/2013 18:25	7/15/2013 10:18		L58295-41

Workgroup: WG127779 Total Solids

MB:WG127779-1 Matrix: OTHR SOLID Listtype:CVTOTS Method:SM2540-G Project: Pkey:STD (Method Blank)

Parameter	MDL	RDL	Units	MB Value	Qual
Total Solids	0.005	0.01	%	<MDL	

LD:WG127779-2 L58295-1 Matrix: SOIL Listtype:CVTOTS Method:SM2540-G Project:421422-100 Pkey:STD (Lab Duplicate)

Parameter	MDL	RDL	Units	SAMP Value	LD Value	RPD	Qual	Lab Limit
Total Solids	0.005	0.01	%	69.6	69.7	0		0--20

MB:WG127779-3 Matrix: OTHR SOLID Listtype:CVTOTS Method:SM2540-G Project: Pkey:STD (Method Blank)

Parameter	MDL	RDL	Units	MB Value	Qual
Total Solids	0.005	0.01	%	<MDL	

LD:WG127779-4 L58295-21 Matrix: SOIL Listtype:CVTOTS Method:SM2540-G Project:421422-100 Pkey:STD (Lab Duplicate)

Parameter	MDL	RDL	Units	SAMP Value	LD Value	RPD	Qual	Lab Limit
Total Solids	0.005	0.01	%	93.9	93.8	0		0--20

MB:WG127779-5 Matrix: OTHR SOLID Listtype:CVTOTS Method:SM2540-G Project: Pkey:STD (Method Blank)

Parameter	MDL	RDL	Units	MB Value	Qual
Total Solids	0.005	0.01	%	<MDL	

LD:WG127779-6 L58295-41 Matrix: SOIL Listtype:CVTOTS Method:SM2540-G Project:421422-100 Pkey:STD (Lab Duplicate)

Parameter	MDL	RDL	Units	SAMP Value	LD Value	RPD	Qual	Lab Limit
Total Solids	0.005	0.01	%	72	72.1	0		0--20

King County Environmental Laboratory Batch Report

Vashon-Maury Soils and Water, L58206, L58295

WG127862 Total Solids

Sample	Project	Project Description	List Type	Matrix	Collect Date	Prep Date	Anal Date	QC Association	Comments
L58295-54	421422-100	SWD , Brownfield Program	CVTOTS	SOIL	7/2/2013 8:50	7/16/2013 19:30	7/17/2013 17:11	WG127862-1,-2,-3,-4	
L58295-55	421422-100		CVTOTS	SOIL	7/2/2013 8:52	7/16/2013 19:30	7/17/2013 17:11		
L58295-59	421422-100		CVTOTS	SOIL	7/2/2013 10:20	7/16/2013 19:30	7/17/2013 17:12		
L58295-60	421422-100		CVTOTS	SOIL	7/2/2013 10:25	7/16/2013 19:30	7/17/2013 17:12		
L58295-61	421422-100		CVTOTS	SOIL	7/2/2013 10:30	7/16/2013 19:30	7/17/2013 17:12		
L58295-62	421422-100		CVTOTS	SOIL	7/2/2013 10:32	7/16/2013 19:30	7/17/2013 17:12		
L58295-63	421422-100		CVTOTS	SOIL	7/2/2013 10:40	7/16/2013 19:30	7/17/2013 17:13		
L58295-64	421422-100		CVTOTS	SOIL	7/2/2013 10:50	7/16/2013 19:30	7/17/2013 17:13		
L58295-65	421422-100		CVTOTS	SOIL	7/2/2013 10:55	7/16/2013 19:30	7/17/2013 17:13		
L58295-66	421422-100		CVTOTS	SOIL	7/2/2013 10:57	7/16/2013 19:30	7/17/2013 17:13		
L58295-67	421422-100		CVTOTS	SOIL	7/2/2013 11:00	7/16/2013 19:30	7/17/2013 17:13		
L58295-68	421422-100		CVTOTS	SOIL	7/2/2013 11:10	7/16/2013 19:30	7/17/2013 17:13		
L58295-69	421422-100		CVTOTS	SOIL	7/2/2013 11:15	7/16/2013 19:30	7/17/2013 17:14		
L58295-70	421422-100		CVTOTS	SOIL	7/2/2013 11:20	7/16/2013 19:30	7/17/2013 17:14		
L58295-71	421422-100		CVTOTS	SOIL	7/2/2013 11:22	7/16/2013 19:30	7/17/2013 17:14		
L58295-72	421422-100		CVTOTS	SOIL	7/2/2013 11:30	7/16/2013 19:30	7/17/2013 17:14		
L58295-73	421422-100		CVTOTS	SOIL	7/2/2013 12:40	7/16/2013 19:30	7/17/2013 17:14		
L58295-74	421422-100		CVTOTS	SOIL	7/2/2013 13:00	7/16/2013 19:30	7/17/2013 17:14		
L58295-75	421422-100		CVTOTS	SOIL	7/2/2013 12:35	7/16/2013 19:30	7/17/2013 17:15		
L58295-76	421422-100		CVTOTS	SOIL	7/2/2013 13:05	7/16/2013 19:30	7/17/2013 17:15		
L58295-77	421422-100		CVTOTS	SOIL	7/2/2013 13:25	7/16/2013 19:30	7/17/2013 17:15		
L58295-78	421422-100		CVTOTS	SOIL	7/2/2013 13:30	7/16/2013 19:30	7/17/2013 17:16		
L58295-79	421422-100		CVTOTS	SOIL	7/2/2013 13:32	7/16/2013 19:30	7/17/2013 17:16		
L58295-80	421422-100		CVTOTS	SOIL	7/2/2013 14:00	7/16/2013 19:30	7/17/2013 17:16		
L58295-81	421422-100		CVTOTS	SOIL	7/2/2013 14:05	7/16/2013 19:30	7/17/2013 17:16		
L58295-82	421422-100		CVTOTS	SOIL	7/3/2013 9:55	7/16/2013 19:30	7/17/2013 17:17		
L58295-83	421422-100		CVTOTS	SOIL	7/3/2013 10:00	7/16/2013 19:30	7/17/2013 17:17		
L58295-84	421422-100		CVTOTS	SOIL	7/3/2013 10:15	7/16/2013 19:30	7/17/2013 17:17		
L58295-85	421422-100		CVTOTS	SOIL	7/3/2013 10:20	7/16/2013 19:30	7/17/2013 17:17		
WG127862-1	MB		CVTOTS	OTHR SOLID		7/16/2013 19:30	7/17/2013 17:11		MB1 7/16/13
WG127862-2	LD		CVTOTS	SOIL		7/16/2013 19:30	7/17/2013 17:12		L58295-59
WG127862-3	MB		CVTOTS	OTHR SOLID		7/16/2013 19:30	7/17/2013 17:15		MB2 7/16/13
WG127862-4	LD		CVTOTS	SOIL		7/16/2013 19:30	7/17/2013 17:16		L58295-78

Workgroup: WG127862 Total Solids

MB:WG127862-1 Matrix: OTHR SOLID Listtype:CVTOTS Method:SM2540-G Project: Pkey:STD (Method Blank)

Parameter	MDL	RDL	Units	MB Value	Qual
Total Solids	0.005	0.01	%	<MDL	

LD:WG127862-2 L58295-59 Matrix: SOIL Listtype:CVTOTS Method:SM2540-G Project:421422-100 Pkey:STD (Lab Duplicate)

Parameter	MDL	RDL	Units	SAMP Value	LD Value	RPD	Qual	Lab Limit
Total Solids	0.005	0.01	%	84.8	84.8	0		0--20

MB:WG127862-3 Matrix: OTHR SOLID Listtype:CVTOTS Method:SM2540-G Project: Pkey:STD (Method Blank)

Parameter	MDL	RDL	Units	MB Value	Qual
Total Solids	0.005	0.01	%	<MDL	

LD:WG127862-4 L58295-78 Matrix: SOIL Listtype:CVTOTS Method:SM2540-G Project:421422-100 Pkey:STD (Lab Duplicate)

Parameter	MDL	RDL	Units	SAMP Value	LD Value	RPD	Qual	Lab Limit
Total Solids	0.005	0.01	%	78.4	78.1	0		0--20

WG127915 Total Solids

Sample	Project	Project Description	List Type	Matrix	Collect Date	Prep Date	Anal Date	QC Association	Comments
L58295-86	421422-100	SWD , Brownfield Program	CVTOTS	SOIL	7/3/2013 11:35	7/17/2013 17:50	7/18/2013 17:01	WG127915-1,-2	
L58295-87	421422-100		CVTOTS	SOIL	7/3/2013 11:40	7/17/2013 17:50	7/18/2013 17:01		
L58295-88	421422-100		CVTOTS	SOIL	7/3/2013 11:48	7/17/2013 17:50	7/18/2013 17:01		
L58295-89	421422-100		CVTOTS	SOIL	7/3/2013 11:50	7/17/2013 17:50	7/18/2013 17:01		
L58295-90	421422-100		CVTOTS	SOIL	7/3/2013 12:00	7/17/2013 17:50	7/18/2013 17:02		
L58295-91	421422-100		CVTOTS	SOIL	7/3/2013 12:05	7/17/2013 17:50	7/18/2013 17:02		
L58295-92	421422-100		CVTOTS	SOIL	7/3/2013 12:07	7/17/2013 17:50	7/18/2013 17:02		
L58295-93	421422-100		CVTOTS	SOIL	7/3/2013 12:15	7/17/2013 17:50	7/18/2013 17:02		
L58295-94	421422-100		CVTOTS	SOIL	7/3/2013 12:20	7/17/2013 17:50	7/18/2013 17:02		
L58295-95	421422-100		CVTOTS	SOIL	7/3/2013 12:30	7/17/2013 17:50	7/18/2013 17:03		
L58295-96	421422-100		CVTOTS	SOIL	7/3/2013 12:35	7/17/2013 17:50	7/18/2013 17:03		
WG127915-1	MB		CVTOTS	OTHR SOLID		7/17/2013 17:50	7/18/2013 17:01		MB1 7/17/13
WG127915-2	LD		CVTOTS	SOIL		7/17/2013 17:50	7/18/2013 17:03		L58295-96

Workgroup: WG127915 Total Solids

MB:WG127915-1 Matrix: OTHR SOLID Listtype:CVTOTS Method:SM2540-G Project: Pkey:STD
(Method Blank)

Parameter	MDL	RDL	Units	MB Value	Qual
Total Solids	0.005	0.01	%	<MDL	

LD:WG127915-2 L58295-96 Matrix: SOIL Listtype:CVTOTS Method:SM2540-G Project:421422-100 Pkey:STD
(Lab Duplicate)

Parameter	MDL	RDL	Units	SAMP Value	LD Value	RPD	Qual	Lab Limit
Total Solids	0.005	0.01	%	83.8	83.7	0		0--20

WG127739 Total Metals - Soil

Sample	Project	Project Description	List Type	Matrix	Collect Date	Prep Date	Anal Date	QC Association	Comments
L58206-1	421422-100	SWD , Brownfield Program	MTICP-SED	SOIL	6/24/2013 14:55	7/11/2013 9:00	7/12/2013 9:21	WG127739-1,-2,-3,-4,-5,-6	
L58206-2	421422-100		MTICP-SED	SOIL	6/24/2013 15:00	7/11/2013 9:00	7/12/2013 9:27		
L58206-3	421422-100		MTICP-SED	SOIL	6/24/2013 14:15	7/11/2013 9:00	7/12/2013 9:32		
L58206-4	421422-100		MTICP-SED	SOIL	6/24/2013 12:15	7/11/2013 9:00	7/12/2013 9:38		
L58206-5	421422-100		MTICP-SED	SOIL	6/24/2013 12:50	7/11/2013 9:00	7/12/2013 9:43		
L58206-6	421422-100		MTICP-SED	SOIL	6/24/2013 14:00	7/11/2013 9:00	7/12/2013 9:49		
L58206-7	421422-100		MTICP-SED	SOIL	6/24/2013 12:30	7/11/2013 9:00	7/12/2013 10:05		
L58206-8	421422-100		MTICP-SED	SOIL	6/24/2013 13:10	7/11/2013 9:00	7/12/2013 10:11		
L58206-9	421422-100		MTICP-SED	SOIL	6/24/2013 13:30	7/11/2013 9:00	7/12/2013 10:27		
L58206-10	421422-100		MTICP-SED	SOIL	6/24/2013 14:30	7/11/2013 9:00	7/12/2013 10:33		
L58206-16	421422-100		MTICP-SED	SOIL	6/25/2013 14:20	7/11/2013 9:00	7/12/2013 10:38		
L58206-17	421422-100		MTICP-SED	SOIL	6/25/2013 14:30	7/11/2013 9:00	7/12/2013 10:44		
L58206-18	421422-100		MTICP-SED	SOIL	6/25/2013 14:32	7/11/2013 9:00	7/12/2013 10:49		
L58206-19	421422-100		MTICP-SED	SOIL	6/25/2013 14:40	7/11/2013 9:00	7/12/2013 10:55		
L58206-20	421422-100		MTICP-SED	SOIL	6/25/2013 14:55	7/11/2013 9:00	7/12/2013 11:11		
L58206-21	421422-100		MTICP-SED	SOIL	6/25/2013 15:10	7/11/2013 9:00	7/12/2013 11:17		
WG127739-1	SB		MTICP-SED	SOLIDBLANK		7/11/2013 9:00	7/12/2013 8:59		WG127739-2 ICPH
WG127739-2	MB		MTICP-SED	SOLIDBLANK		7/11/2013 9:00	7/12/2013 9:05		METHOD BLANK
WG127739-3	LD		MTICP-SED	SOIL		7/11/2013 9:00	7/12/2013 10:16		L58206-8 RPD-SOL
WG127739-4	MS		MTICP-SED	SOIL		7/11/2013 9:00	7/12/2013 10:22		L58206-8 ICPH
WG127739-5	LCS		MTICP-SED	SOIL		7/11/2013 9:00	7/12/2013 9:10		ERASOIL
WG127739-6	LCSD		MTICP-SED	SOIL		7/11/2013 9:00	7/12/2013 9:16		WG127739-5 ERASOIL

Workgroup: WG127739 Total Metals - Soil

MB:WG127739-2 Matrix: SOLIDBLANK Listtype:MTICP-SED Method:SW846 3050B*SW846 6010C Project: Pkey:STD
(Method Blank)

Parameter	MDL	RDL	Units	MB Value	Qual
Arsenic, Total, ICP	1.2	5.95	mg/Kg	<MDL	
Lead, Total, ICP	0.95	4.76	mg/Kg	<MDL	

SB:WG127739-1 MB:WG127739-2 Matrix: SOLIDBLANK Listtype:MTICP-SED Method:SW846 3050B*SW846 6010C Project: Pkey:STD
(Spike Blank, Method Blank)

Parameter	MDL	RDL	Units	MB Value	True Value	SB Value	% Rec.	Qual	Lab Limit
Arsenic, Total, ICP	1.2	5.95	mg/Kg	<MDL	47.6	48	101		85--115
Lead, Total, ICP	0.95	4.76	mg/Kg	<MDL	47.6	47.5	100		85--115

LD:WG127739-3 L58206-8 Matrix: SOIL Listtype:MTICP-SED Method:SW846 3050B*SW846 6010C Project:421422-100 Pkey:STD
(Lab Duplicate)

Parameter	MDL	RDL	Units	SAMP Value	LD Value	RPD	Qual	Lab Limit
Arsenic, Total, ICP	1.2	6.18	mg/Kg	6.48	6.41	1		0--20
Lead, Total, ICP	0.99	4.94	mg/Kg	5.67	5.3	7		0--20

MS:WG127739-4 L58206-8 Matrix: SOIL Listtype:MTICP-SED Method:SW846 3050B*SW846 6010C Project:421422-100 Pkey:STD
(Matrix Spike)

Parameter	MDL	RDL	Units	SAMP Value	True Value	MS Value	% Rec.	Qual	Lab Limit
Arsenic, Total, ICP	1.2	6.18	mg/Kg	6.48	49.6	56.6	101		75--125
Lead, Total, ICP	0.99	4.94	mg/Kg	5.67	49.6	53.4	96		75--125

LCSD:WG127739-6 LCS:WG127739-5 Matrix: SOIL Listtype:MTICP-SED Method:SW846 3050B*SW846 6010C Project: Pkey:STD
(Lab Control Sample Duplicate, Lab Control Sample)

Parameter	MDL	RDL	Units	True Value	LCS Value	% Rec.	Qual	Lab Limit	True Value	LCSD Value	% Rec.	Qual	RPD	Qual	Lab Limit
Arsenic, Total, ICP	5	25	mg/Kg	168	168	100		80--120	168	172	102		2		0--20
Lead, Total, ICP	4	20	mg/Kg	76.9	79.4	103		80--120	76.9	77.8	101		2		0--20

WG127812 Total Metals - Soil

Sample	Project	Project Description	List Type	Matrix	Collect Date	Prep Date	Anal Date	QC Association	Comments
L58295-1	421422-100	SWD , Brownfield Program	MTICP-SED	SOIL	6/26/2013 10:20	7/16/2013 8:00	7/18/2013 9:11	WG127812-1,-2,-3,-4,-5,-6	
L58295-2	421422-100		MTICP-SED	SOIL	6/26/2013 10:40	7/16/2013 8:00	7/18/2013 9:17		
L58295-3	421422-100		MTICP-SED	SOIL	6/26/2013 10:45	7/16/2013 8:00	7/18/2013 9:22		
L58295-4	421422-100		MTICP-SED	SOIL	6/26/2013 10:47	7/16/2013 8:00	7/18/2013 9:39		
L58295-5	421422-100		MTICP-SED	SOIL	6/26/2013 11:00	7/16/2013 8:00	7/18/2013 9:55		
L58295-6	421422-100		MTICP-SED	SOIL	6/26/2013 12:00	7/16/2013 8:00	7/18/2013 10:01		
L58295-7	421422-100		MTICP-SED	SOIL	6/26/2013 12:20	7/16/2013 8:00	7/18/2013 10:06		
L58295-8	421422-100		MTICP-SED	SOIL	6/26/2013 12:25	7/16/2013 8:00	7/18/2013 10:12		
L58295-9	421422-100		MTICP-SED	SOIL	6/26/2013 12:45	7/16/2013 8:00	7/18/2013 10:17		
L58295-10	421422-100		MTICP-SED	SOIL	6/26/2013 12:50	7/16/2013 8:00	7/18/2013 10:23		
L58295-11	421422-100		MTICP-SED	SOIL	6/26/2013 13:50	7/16/2013 8:00	7/18/2013 10:28		
L58295-12	421422-100		MTICP-SED	SOIL	6/26/2013 13:55	7/16/2013 8:00	7/18/2013 10:33		
L58295-13	421422-100		MTICP-SED	SOIL	6/26/2013 14:05	7/16/2013 8:00	7/18/2013 10:39		
L58295-14	421422-100		MTICP-SED	SOIL	6/26/2013 14:10	7/16/2013 8:00	7/18/2013 10:44		
L58295-15	421422-100		MTICP-SED	SOIL	6/26/2013 14:20	7/16/2013 8:00	7/18/2013 11:01		
L58295-16	421422-100		MTICP-SED	SOIL	6/26/2013 14:25	7/16/2013 8:00	7/18/2013 11:06		
L58295-17	421422-100		MTICP-SED	SOIL	6/26/2013 14:27	7/16/2013 8:00	7/18/2013 11:12		
L58295-18	421422-100		MTICP-SED	SOIL	6/26/2013 14:12	7/16/2013 8:00	7/18/2013 11:17		
L58295-19	421422-100		MTICP-SED	SOIL	6/26/2013 14:45	7/16/2013 8:00	7/18/2013 11:23		
L58295-20	421422-100		MTICP-SED	SOIL	6/26/2013 14:50	7/16/2013 8:00	7/18/2013 11:28		
WG127812-1	SB		MTICP-SED	SOLIDBLANK		7/16/2013 8:00	7/18/2013 8:49		WG127812-2 ICPH SPIKE BLANK
WG127812-2	MB		MTICP-SED	SOLIDBLANK		7/16/2013 8:00	7/18/2013 8:55		DIGESTED METHOD BLANK
WG127812-3	LD		MTICP-SED	SOIL		7/16/2013 8:00	7/18/2013 9:28		L58295-3 RPD-SOL LAB DUPLICATE
WG127812-4	MS		MTICP-SED	SOIL		7/16/2013 8:00	7/18/2013 9:33		L58295-3 ICPH MATRIX SPIKE
WG127812-5	LCS		MTICP-SED	SOIL		7/16/2013 8:00	7/18/2013 9:00		ERASOIL M-12-026 #1
WG127812-6	LCSD		MTICP-SED	SOIL		7/16/2013 8:00	7/18/2013 9:06		WG127812-5 ERASOIL M-12-026 #2

Workgroup: WG127812 Total Metals - Soil

MB:WG127812-2 Matrix: SOLIDBLANK Listtype:MTICP-SED Method:SW846 3050B*SW846 6010C Project: Pkey:STD
(Method Blank)

Parameter	MDL	RDL	Units	MB Value	Qual
Arsenic, Total, ICP	1.2	5.95	mg/Kg	<MDL	
Lead, Total, ICP	0.95	4.76	mg/Kg	<MDL	

SB:WG127812-1 MB:WG127812-2 Matrix: SOLIDBLANK Listtype:MTICP-SED Method:SW846 3050B*SW846 6010C Project: Pkey:STD
(Spike Blank, Method Blank)

Parameter	MDL	RDL	Units	MB Value	True Value	SB Value	% Rec.	Qual	Lab Limit
Arsenic, Total, ICP	1.2	5.95	mg/Kg	<MDL	47.6	48.4	102		85--115
Lead, Total, ICP	0.95	4.76	mg/Kg	<MDL	47.6	47.1	99		85--115

LD:WG127812-3 L58295-3 Matrix: SOIL Listtype:MTICP-SED Method:SW846 3050B*SW846 6010C Project:421422-100 Pkey:STD
(Lab Duplicate)

Parameter	MDL	RDL	Units	SAMP Value	LD Value	RPD	Qual	Lab Limit
Arsenic, Total, ICP	1.2	6.23	mg/Kg	3.2	3.5			0--20
Lead, Total, ICP	1	4.99	mg/Kg	2.8	2.6			0--20

MS:WG127812-4 L58295-3 Matrix: SOIL Listtype:MTICP-SED Method:SW846 3050B*SW846 6010C Project:421422-100 Pkey:STD
(Matrix Spike)

Parameter	MDL	RDL	Units	SAMP Value	True Value	MS Value	% Rec.	Qual	Lab Limit
Arsenic, Total, ICP	1.2	6.23	mg/Kg	3.2	49.9	51.7	97		75--125
Lead, Total, ICP	1	4.99	mg/Kg	2.8	49.9	50	94		75--125

LCSD:WG127812-6 LCS:WG127812-5 Matrix: SOIL Listtype:MTICP-SED Method:SW846 3050B*SW846 6010C Project: Pkey:STD
(Lab Control Sample Duplicate, Lab Control Sample)

Parameter	MDL	RDL	Units	True Value	LCS Value	% Rec.	Qual	Lab Limit	True Value	LCSD Value	% Rec.	Qual	RPD	Qual	Lab Limit
Arsenic, Total, ICP	5	25.2	mg/Kg	168	168	100		80--120	168	169	100		0		0--20
Lead, Total, ICP	4	20.2	mg/Kg	76.9	75.1	98		80--120	76.9	75.7	98		1		0--20

WG127865 Total Metals - Soil

Sample	Project	Project Description	List Type	Matrix	Collect Date	Prep Date	Anal Date	QC Association	Comments
L58295-21	421422-100	SWD , Brownfield Program	MTICP-SED	SOIL	6/26/2013 14:52	7/17/2013 9:00	7/18/2013 9:12	WG127865-1,-2,-3,-4,-5,-6	
L58295-22	421422-100		MTICP-SED	SOIL	6/26/2013 15:05	7/17/2013 9:00	7/18/2013 9:18		
L58295-23	421422-100		MTICP-SED	SOIL	6/26/2013 15:10	7/17/2013 9:00	7/18/2013 9:23		
L58295-24	421422-100		MTICP-SED	SOIL	6/26/2013 15:15	7/17/2013 9:00	7/18/2013 9:29		
L58295-25	421422-100		MTICP-SED	SOIL	6/26/2013 15:20	7/17/2013 9:00	7/18/2013 9:34		
L58295-26	421422-100		MTICP-SED	SOIL	6/26/2013 15:45	7/17/2013 9:00	7/18/2013 9:40		
L58295-27	421422-100		MTICP-SED	SOIL	6/27/2013 12:00	7/17/2013 9:00	7/18/2013 9:56		
L58295-28	421422-100		MTICP-SED	SOIL	6/27/2013 12:05	7/17/2013 9:00	7/18/2013 10:02		
L58295-29	421422-100		MTICP-SED	SOIL	6/27/2013 12:25	7/17/2013 9:00	7/18/2013 10:20		
L58295-30	421422-100		MTICP-SED	SOIL	6/27/2013 12:28	7/17/2013 9:00	7/18/2013 10:25		
L58295-31	421422-100		MTICP-SED	SOIL	6/27/2013 13:05	7/17/2013 9:00	7/18/2013 10:31		
L58295-32	421422-100		MTICP-SED	SOIL	6/27/2013 13:10	7/17/2013 9:00	7/18/2013 10:37		
L58295-33	421422-100		MTICP-SED	SOIL	6/27/2013 10:10	7/17/2013 9:00	7/18/2013 10:42		
L58295-34	421422-100		MTICP-SED	SOIL	6/27/2013 12:37	7/17/2013 9:00	7/18/2013 10:48		
L58295-35	421422-100		MTICP-SED	SOIL	6/27/2013 14:55	7/17/2013 9:00	7/18/2013 11:05		
L58295-36	421422-100		MTICP-SED	SOIL	6/27/2013 14:57	7/17/2013 9:00	7/18/2013 11:10		
L58295-37	421422-100		MTICP-SED	SOIL	6/27/2013 10:25	7/17/2013 9:00	7/18/2013 11:16		
L58295-38	421422-100		MTICP-SED	SOIL	6/27/2013 10:25	7/17/2013 9:00	7/18/2013 11:21		
L58295-39	421422-100		MTICP-SED	SOIL	6/27/2013 10:27	7/17/2013 9:00	7/18/2013 11:27		
L58295-40	421422-100		MTICP-SED	SOIL	6/27/2013 15:35	7/17/2013 9:00	7/18/2013 11:33		
WG127865-1	SB		MTICP-SED	SOLIDBLANK		7/17/2013 9:00	7/18/2013 8:50		WG127865-2 ICPH SPIKE BLANK
WG127865-2	MB		MTICP-SED	SOLIDBLANK		7/17/2013 9:00	7/18/2013 8:56		DIGESTED METHOD BLANK
WG127865-3	LD		MTICP-SED	SOIL		7/17/2013 9:00	7/18/2013 10:08		L58295-28 RPD-SOL LAB DUPLICATE
WG127865-4	MS		MTICP-SED	SOIL		7/17/2013 9:00	7/18/2013 10:13		L58295-28 ICPH MATRIX SPIKE
WG127865-5	LCS		MTICP-SED	SOIL		7/17/2013 9:00	7/18/2013 9:01		ERASOIL M-12-026 #1
WG127865-6	LCSD		MTICP-SED	SOIL		7/17/2013 9:00	7/18/2013 9:07		WG127865-5 ERASOIL M-12-026 #2

Workgroup: WG127865 Total Metals - Soil

MB:WG127865-2 Matrix: SOLIDBLANK Listtype:MTICP-SED Method:SW846 3050B*SW846 6010C Project: Pkey:STD
(Method Blank)

Parameter	MDL	RDL	Units	MB Value	Qual
Arsenic, Total, ICP	1.2	5.95	mg/Kg	<MDL	
Lead, Total, ICP	0.95	4.76	mg/Kg	<MDL	

SB:WG127865-1 MB:WG127865-2 Matrix: SOLIDBLANK Listtype:MTICP-SED Method:SW846 3050B*SW846 6010C Project: Pkey:STD
(Spike Blank, Method Blank)

Parameter	MDL	RDL	Units	MB Value	True Value	SB Value	% Rec.	Qual	Lab Limit
Arsenic, Total, ICP	1.2	5.95	mg/Kg	<MDL	47.6	46.6	98		85--115
Lead, Total, ICP	0.95	4.76	mg/Kg	<MDL	47.6	44.7	94		85--115

LD:WG127865-3 L58295-28 Matrix: SOIL Listtype:MTICP-SED Method:SW846 3050B*SW846 6010C Project:421422-100 Pkey:STD
(Lab Duplicate)

Parameter	MDL	RDL	Units	SAMP Value	LD Value	RPD	Qual	Lab Limit
Arsenic, Total, ICP	1.2	6.24	mg/Kg	3.6	3.1			0--20
Lead, Total, ICP	1	4.99	mg/Kg	6.16	6.35	3		0--20

MS:WG127865-4 L58295-28 Matrix: SOIL Listtype:MTICP-SED Method:SW846 3050B*SW846 6010C Project:421422-100 Pkey:STD
(Matrix Spike)

Parameter	MDL	RDL	Units	SAMP Value	True Value	MS Value	% Rec.	Qual	Lab Limit
Arsenic, Total, ICP	1.2	6.24	mg/Kg	3.6	49.8	53.8	101		75--125
Lead, Total, ICP	1	4.99	mg/Kg	6.16	49.8	54.8	98		75--125

LCSD:WG127865-6 LCS:WG127865-5 Matrix: SOIL Listtype:MTICP-SED Method:SW846 3050B*SW846 6010C Project: Pkey:STD
(Lab Control Sample Duplicate, Lab Control Sample)

Parameter	MDL	RDL	Units	True Value	LCS Value	% Rec.	Qual	Lab Limit	True Value	LCSD Value	% Rec.	Qual	RPD	Qual	Lab Limit
Arsenic, Total, ICP	5.1	25.4	mg/Kg	168	167	100		80--120	168	170	101		2		0--20
Lead, Total, ICP	4.1	20.3	mg/Kg	76.9	72.5	94		80--120	76.9	76.9	100		6		0--20

WG127876 Total Metals - Soil

Sample	Project	Project Description	List Type	Matrix	Collect Date	Prep Date	Anal Date	QC Association	Comments
L58295-41	421422-100	SWD , Brownfield Program	MTICP-SED	SOIL	6/27/2013 10:45	7/22/2013 8:00	7/23/2013 9:37	WG127876-1,-2,-3,-4,-5,-6	
L58295-42	421422-100		MTICP-SED	SOIL	6/27/2013 15:40	7/22/2013 8:00	7/23/2013 9:43		
L58295-43	421422-100		MTICP-SED	SOIL	6/27/2013 12:35	7/22/2013 8:00	7/23/2013 9:59		
L58295-44	421422-100		MTICP-SED	SOIL	6/27/2013 14:25	7/22/2013 8:00	7/23/2013 10:05		
L58295-45	421422-100		MTICP-SED	SOIL	6/27/2013 15:15	7/22/2013 8:00	7/23/2013 10:21		
L58295-46	421422-100		MTICP-SED	SOIL	6/27/2013 15:20	7/22/2013 8:00	7/23/2013 10:27		
L58295-47	421422-100		MTICP-SED	SOIL	6/27/2013 15:22	7/22/2013 8:00	7/23/2013 10:32		
L58295-48	421422-100		MTICP-SED	SOIL	6/27/2013 14:40	7/22/2013 8:00	7/23/2013 10:38		
L58295-49	421422-100		MTICP-SED	SOIL	6/27/2013 14:45	7/22/2013 8:00	7/23/2013 10:43		
L58295-50	421422-100		MTICP-SED	SOIL	6/27/2013 14:47	7/22/2013 8:00	7/23/2013 10:49		
L58295-51	421422-100		MTICP-SED	SOIL	7/2/2013 8:30	7/22/2013 8:00	7/23/2013 10:54		
L58295-52	421422-100		MTICP-SED	SOIL	7/2/2013 8:35	7/22/2013 8:00	7/23/2013 11:00		
L58295-53	421422-100		MTICP-SED	SOIL	7/2/2013 8:45	7/22/2013 8:00	7/23/2013 11:05		
L58295-54	421422-100		MTICP-SED	SOIL	7/2/2013 8:50	7/22/2013 8:00	7/23/2013 11:11		
L58295-55	421422-100		MTICP-SED	SOIL	7/2/2013 8:52	7/22/2013 8:00	7/23/2013 11:27		
L58295-56	421422-100		MTICP-SED	SOIL	7/2/2013 9:10	7/22/2013 8:00	7/23/2013 11:33		
L58295-57	421422-100		MTICP-SED	SOIL	7/2/2013 9:20	7/22/2013 8:00	7/23/2013 11:38		
L58295-58	421422-100		MTICP-SED	SOIL	7/2/2013 9:25	7/22/2013 8:00	7/23/2013 11:44		
L58295-59	421422-100		MTICP-SED	SOIL	7/2/2013 10:20	7/22/2013 8:00	7/23/2013 11:49		
L58295-60	421422-100		MTICP-SED	SOIL	7/2/2013 10:25	7/22/2013 8:00	7/23/2013 11:55		
WG127876-1	SB		MTICP-SED	SOLIDBLANK		7/22/2013 8:00	7/23/2013 9:15		WG127876-2 ICPH SPIKE BLANK
WG127876-2	MB		MTICP-SED	SOLIDBLANK		7/22/2013 8:00	7/23/2013 9:21		DIGESTED METHOD BLANK
WG127876-3	LD		MTICP-SED	SOIL		7/22/2013 8:00	7/23/2013 9:48		L58295-42 RPD-SOL LAB DUPLICATE
WG127876-4	MS		MTICP-SED	SOIL		7/22/2013 8:00	7/23/2013 9:54		L58295-42 ICPH MATRIX SPIKE
WG127876-5	LCS		MTICP-SED	SOIL		7/22/2013 8:00	7/23/2013 9:26		ERASOIL M-12-026 #1
WG127876-6	LCSD		MTICP-SED	SOIL		7/22/2013 8:00	7/23/2013 9:32		WG127876-5 ERASOIL M-12-026 #2

Workgroup: WG127876 Total Metals - Soil

MB:WG127876-2 Matrix: SOLIDBLANK Listtype:MTICP-SED Method:SW846 3050B*SW846 6010C Project: Pkey:STD
(Method Blank)

Parameter	MDL	RDL	Units	MB Value	Qual
Arsenic, Total, ICP	1.2	5.95	mg/Kg	<MDL	
Lead, Total, ICP	0.95	4.76	mg/Kg	<MDL	

SB:WG127876-1 MB:WG127876-2 Matrix: SOLIDBLANK Listtype:MTICP-SED Method:SW846 3050B*SW846 6010C Project: Pkey:STD
(Spike Blank, Method Blank)

Parameter	MDL	RDL	Units	MB Value	True Value	SB Value	% Rec.	Qual	Lab Limit
Arsenic, Total, ICP	1.2	5.95	mg/Kg	<MDL	47.6	47.4	99		85--115
Lead, Total, ICP	0.95	4.76	mg/Kg	<MDL	47.6	47.1	99		85--115

LD:WG127876-3 L58295-42 Matrix: SOIL Listtype:MTICP-SED Method:SW846 3050B*SW846 6010C Project:421422-100 Pkey:STD
(Lab Duplicate)

Parameter	MDL	RDL	Units	SAMP Value	LD Value	RPD	Qual	Lab Limit
Arsenic, Total, ICP	1.2	6.24	mg/Kg	40.4	42.8	6		0--20
Lead, Total, ICP	1	4.99	mg/Kg	72.9	77.4	6		0--20

MS:WG127876-4 L58295-42 Matrix: SOIL Listtype:MTICP-SED Method:SW846 3050B*SW846 6010C Project:421422-100 Pkey:STD
(Matrix Spike)

Parameter	MDL	RDL	Units	SAMP Value	True Value	MS Value	% Rec.	Qual	Lab Limit
Arsenic, Total, ICP	1.2	6.24	mg/Kg	40.4	49.9	89.3	98		75--125
Lead, Total, ICP	1	4.99	mg/Kg	72.9	49.9	120	94		75--125

LCSD:WG127876-6 LCS:WG127876-5 Matrix: SOIL Listtype:MTICP-SED Method:SW846 3050B*SW846 6010C Project: Pkey:STD
(Lab Control Sample Duplicate, Lab Control Sample)

Parameter	MDL	RDL	Units	True Value	LCS Value	% Rec.	Qual	Lab Limit	True Value	LCSD Value	% Rec.	Qual	RPD	Qual	Lab Limit
Arsenic, Total, ICP	5	25.1	mg/Kg	168	172	103		80--120	168	159	95		8		0--20
Lead, Total, ICP	4	20.1	mg/Kg	76.9	78.1	102		80--120	76.9	72.8	95		7		0--20

WG127922 Total Metals - Soil

Sample	Project	Project Description	List Type	Matrix	Collect Date	Prep Date	Anal Date	QC Association	Comments
L58295-61	421422-100	SWD , Brownfield Program	MTICP-SED	SOIL	7/2/2013 10:30	7/23/2013 8:00	7/24/2013 9:11	WG127922-1,-2,-3,-4,-5,-6	
L58295-62	421422-100		MTICP-SED	SOIL	7/2/2013 10:32	7/23/2013 8:00	7/24/2013 9:28		
L58295-63	421422-100		MTICP-SED	SOIL	7/2/2013 10:40	7/23/2013 8:00	7/24/2013 9:33		
L58295-64	421422-100		MTICP-SED	SOIL	7/2/2013 10:50	7/23/2013 8:00	7/24/2013 9:39		
L58295-65	421422-100		MTICP-SED	SOIL	7/2/2013 10:55	7/23/2013 8:00	7/24/2013 9:55		
L58295-66	421422-100		MTICP-SED	SOIL	7/2/2013 10:57	7/23/2013 8:00	7/24/2013 10:01		
L58295-67	421422-100		MTICP-SED	SOIL	7/2/2013 11:00	7/23/2013 8:00	7/24/2013 10:06		
L58295-68	421422-100		MTICP-SED	SOIL	7/2/2013 11:10	7/23/2013 8:00	7/24/2013 10:12		
L58295-69	421422-100		MTICP-SED	SOIL	7/2/2013 11:15	7/23/2013 8:00	7/24/2013 10:17		
L58295-70	421422-100		MTICP-SED	SOIL	7/2/2013 11:20	7/23/2013 8:00	7/24/2013 10:23		
L58295-71	421422-100		MTICP-SED	SOIL	7/2/2013 11:22	7/23/2013 8:00	7/24/2013 10:28		
L58295-72	421422-100		MTICP-SED	SOIL	7/2/2013 11:30	7/23/2013 8:00	7/24/2013 10:34		
L58295-73	421422-100		MTICP-SED	SOIL	7/2/2013 12:40	7/23/2013 8:00	7/24/2013 10:39		
L58295-74	421422-100		MTICP-SED	SOIL	7/2/2013 13:00	7/23/2013 8:00	7/24/2013 10:45		
L58295-75	421422-100		MTICP-SED	SOIL	7/2/2013 12:35	7/23/2013 8:00	7/24/2013 11:01		
L58295-76	421422-100		MTICP-SED	SOIL	7/2/2013 13:05	7/23/2013 8:00	7/24/2013 11:07		
L58295-77	421422-100		MTICP-SED	SOIL	7/2/2013 13:25	7/23/2013 8:00	7/24/2013 11:12		
L58295-78	421422-100		MTICP-SED	SOIL	7/2/2013 13:30	7/23/2013 8:00	7/24/2013 11:18		
L58295-79	421422-100		MTICP-SED	SOIL	7/2/2013 13:32	7/23/2013 8:00	7/24/2013 11:23		
L58295-80	421422-100		MTICP-SED	SOIL	7/2/2013 14:00	7/23/2013 8:00	7/24/2013 11:29		
WG127922-1	SB		MTICP-SED	SOLIDBLANK		7/23/2013 8:00	7/24/2013 8:49		WG127922-2 ICPH SPIKE BLANK
WG127922-2	MB		MTICP-SED	SOLIDBLANK		7/23/2013 8:00	7/24/2013 8:55		DIGESTED METHOD BLANL
WG127922-3	LD		MTICP-SED	SOIL		7/23/2013 8:00	7/24/2013 9:17		L58295-61 RPD-SOL LAB DUPLICATE
WG127922-4	MS		MTICP-SED	SOIL		7/23/2013 8:00	7/24/2013 9:22		L58295-61 ICPH MATRIX SPIKE
WG127922-5	LCS		MTICP-SED	SOIL		7/23/2013 8:00	7/24/2013 9:00		ERASOIL M-12-026 #1
WG127922-6	LCSD		MTICP-SED	SOIL		7/23/2013 8:00	7/24/2013 9:06		WG127922-5 ERASOIL M-12-026 #2

Workgroup: WG127922 Total Metals - Soil

MB:WG127922-2 Matrix: SOLIDBLANK Listtype:MTICP-SED Method:SW846 3050B*SW846 6010C Project: Pkey:STD
(Method Blank)

Parameter	MDL	RDL	Units	MB Value	Qual
Arsenic, Total, ICP	1.2	5.95	mg/Kg	<MDL	
Lead, Total, ICP	0.95	4.76	mg/Kg	<MDL	

SB:WG127922-1 MB:WG127922-2 Matrix: SOLIDBLANK Listtype:MTICP-SED Method:SW846 3050B*SW846 6010C Project: Pkey:STD
(Spike Blank, Method Blank)

Parameter	MDL	RDL	Units	MB Value	True Value	SB Value	% Rec.	Qual	Lab Limit
Arsenic, Total, ICP	1.2	5.95	mg/Kg	<MDL	47.6	44.5	93		85--115
Lead, Total, ICP	0.95	4.76	mg/Kg	<MDL	47.6	44.6	94		85--115

LD:WG127922-3 L58295-61 Matrix: SOIL Listtype:MTICP-SED Method:SW846 3050B*SW846 6010C Project:421422-100 Pkey:STD
(Lab Duplicate)

Parameter	MDL	RDL	Units	SAMP Value	LD Value	RPD	Qual	Lab Limit
Arsenic, Total, ICP	1.2	6.24	mg/Kg	7.6	7.21	5		0--20
Lead, Total, ICP	1	4.99	mg/Kg	9.99	9.83	2		0--20

MS:WG127922-4 L58295-61 Matrix: SOIL Listtype:MTICP-SED Method:SW846 3050B*SW846 6010C Project:421422-100 Pkey:STD
(Matrix Spike)

Parameter	MDL	RDL	Units	SAMP Value	True Value	MS Value	% Rec.	Qual	Lab Limit
Arsenic, Total, ICP	1.2	6.24	mg/Kg	7.6	50	53.7	92		75--125
Lead, Total, ICP	1	4.99	mg/Kg	9.99	50	56.9	94		75--125

LCSD:WG127922-6 LCS:WG127922-5 Matrix: SOIL Listtype:MTICP-SED Method:SW846 3050B*SW846 6010C Project: Pkey:STD
(Lab Control Sample Duplicate, Lab Control Sample)

Parameter	MDL	RDL	Units	True Value	LCS Value	% Rec.	Qual	Lab Limit	True Value	LCSD Value	% Rec.	Qual	RPD	Qual	Lab Limit
Arsenic, Total, ICP	5.1	25.5	mg/Kg	168	156	93		80--120	168	163	97		4		0--20
Lead, Total, ICP	4.1	20.4	mg/Kg	76.9	70.9	92		80--120	76.9	74.8	97		5		0--20

WG127963 Total Metals - Soil

Sample	Project	Project Description	List Type	Matrix	Collect Date	Prep Date	Anal Date	QC Association	Comments
L58295-81	421422-100	SWD , Brownfield Program	MTICP-SED	SOIL	7/2/2013 14:05	7/24/2013 8:00	7/25/2013 8:59	WG127963-1,-2,-3,-4,-5,-6	
L58295-82	421422-100		MTICP-SED	SOIL	7/3/2013 9:55	7/24/2013 8:00	7/25/2013 9:15		
L58295-83	421422-100		MTICP-SED	SOIL	7/3/2013 10:00	7/24/2013 8:00	7/25/2013 9:21		
L58295-84	421422-100		MTICP-SED	SOIL	7/3/2013 10:15	7/24/2013 8:00	7/25/2013 9:26		
L58295-85	421422-100		MTICP-SED	SOIL	7/3/2013 10:20	7/24/2013 8:00	7/25/2013 9:43		
WG127963-1	SB		MTICP-SED	SOLIDBLANK		7/24/2013 8:00	7/25/2013 8:37		WG127963-2 ICPH SPIKE BLANK
WG127963-2	MB		MTICP-SED	SOLIDBLANK		7/24/2013 8:00	7/25/2013 8:42		DIGESTED METHOD BLANK
WG127963-3	LD		MTICP-SED	SOIL		7/24/2013 8:00	7/25/2013 9:04		L58295-81 RPD-SOL LAB DUPLICATE
WG127963-4	MS		MTICP-SED	SOIL		7/24/2013 8:00	7/25/2013 9:10		L58295-81 ICPH MATRIX SPIKE
WG127963-5	LCS		MTICP-SED	SOIL		7/24/2013 8:00	7/25/2013 8:48		ERASOIL M-12-026 #1
WG127963-6	LCSD		MTICP-SED	SOIL		7/24/2013 8:00	7/25/2013 8:53		WG127963-5 ERASOIL M-12-026 #2

Workgroup: WG127963 Total Metals - Soil

MB:WG127963-2 Matrix: SOLIDBLANK Listtype:MTICP-SED Method:SW846 3050B*SW846 6010C Project: Pkey:STD (Method Blank)

Parameter	MDL	RDL	Units	MB Value	Qual
Arsenic, Total, ICP	1.2	5.95	mg/Kg	<MDL	
Lead, Total, ICP	0.95	4.76	mg/Kg	<MDL	

SB:WG127963-1 MB:WG127963-2 Matrix: SOLIDBLANK Listtype:MTICP-SED Method:SW846 3050B*SW846 6010C Project: Pkey:STD (Spike Blank, Method Blank)

Parameter	MDL	RDL	Units	MB Value	True Value	SB Value	% Rec.	Qual	Lab Limit
Arsenic, Total, ICP	1.2	5.95	mg/Kg	<MDL	47.6	47.3	99		85--115
Lead, Total, ICP	0.95	4.76	mg/Kg	<MDL	47.6	46.8	98		85--115

LD:WG127963-3 L58295-81 Matrix: SOIL Listtype:MTICP-SED Method:SW846 3050B*SW846 6010C Project:421422-100 Pkey:STD (Lab Duplicate)

Parameter	MDL	RDL	Units	SAMP Value	LD Value	RPD	Qual	Lab Limit
Arsenic, Total, ICP	1.2	6.24	mg/Kg	91.7	92.9	1		0--20
Lead, Total, ICP	1	4.99	mg/Kg	200	224	11		0--20

MS:WG127963-4 L58295-81 Matrix: SOIL Listtype:MTICP-SED Method:SW846 3050B*SW846 6010C Project:421422-100 Pkey:STD (Matrix Spike)

Parameter	MDL	RDL	Units	SAMP Value	True Value	MS Value	% Rec.	Qual	Lab Limit
Arsenic, Total, ICP	1.2	6.24	mg/Kg	91.7	49.9	140	96		75--125
Lead, Total, ICP	1	4.99	mg/Kg	200	49.9	241		4xRule	75--125

LCSD:WG127963-6 LCS:WG127963-5 Matrix: SOIL Listtype:MTICP-SED Method:SW846 3050B*SW846 6010C Project: Pkey:STD (Lab Control Sample Duplicate, Lab Control Sample)

Parameter	MDL	RDL	Units	True Value	LCS Value	% Rec.	Qual	Lab Limit	True Value	LCSD Value	% Rec.	Qual	RPD	Qual	Lab Limit
Arsenic, Total, ICP	5.1	25.7	mg/Kg	168	168	100		80--120	168	163	97		3		0--20
Lead, Total, ICP	4.1	20.6	mg/Kg	76.9	76.1	99		80--120	76.9	75	98		1		0--20

WG127738 Total Metals - Water

Sample	Project	Project Description	List Type	Matrix	Collect Date	Prep Date	Anal Date	QC Association	Comments
L58070-1	421184-100	OCS-City of Buckley	MTICPMS	EFFLUENT	7/7/2013 0:00	7/11/2013 11:15	7/12/2013 9:33	WG127738-1,-2,-3,-4,-5,-6	
L58101-1	421430-300	OCS-Lake Haven Utility District routine testing	MTHARD-ICPMS	EFFLUENT	7/8/2013 7:45	7/11/2013 11:15	7/17/2013 12:38	WG127738-1,-2,-3,-4	
L58101-1	421430-300		MTICPMS	EFFLUENT	7/8/2013 7:45	7/11/2013 11:15	7/12/2013 9:39	WG127738-1,-2,-3,-4,-5,-6	
L58125-1	421184-110	OCS-City of Enumclaw	MTICPMS	EFFLUENT	7/1/2013 7:35	7/11/2013 11:15	7/12/2013 9:59		
L58125-3	421184-110		MTICPMS	INFLUENT	7/1/2013 7:40	7/11/2013 11:15	7/12/2013 10:06		
L58126-11	421196-130	Roads Groundwater	MTICPMS	GRND WTR	6/19/2013 12:30	7/11/2013 11:15	7/12/2013 10:12		
L58126-12	421196-130		MTICPMS	GRND WTR	6/20/2013 12:40	7/11/2013 11:15	7/12/2013 10:18		
L58126-13	421196-130		MTICPMS	GRND WTR	6/20/2013 11:55	7/11/2013 11:15	7/12/2013 10:37		
L58126-14	421196-130		MTICPMS	GRND WTR	6/20/2013 12:15	7/11/2013 11:15	7/12/2013 10:44		
L58197-1	421422-CHGW	SWD-CHGW Cedar Hills Groundwater Quarterly	MTICPMS	GRND WTR	7/9/2013 8:45	7/11/2013 11:15	7/12/2013 10:50		
L58198-1	421422-CHGW		MTICPMS	GRND WTR	7/9/2013 6:20	7/11/2013 11:15	7/12/2013 10:56		
L58198-2	421422-CHGW		MTICPMS	GRND WTR	7/8/2013 9:26	7/11/2013 11:15	7/12/2013 11:03		
L58198-5	421422-CHGW		MTICPMS	GRND WTR	7/8/2013 10:51	7/11/2013 11:15	7/12/2013 11:09		
L58198-6	421422-CHGW		MTICPMS	GRND WTR	7/9/2013 10:34	7/11/2013 11:15	7/12/2013 11:15		
L58200-5	421422-CHGW		MTICPMS	GRND WTR	7/9/2013 9:03	7/11/2013 11:15	7/12/2013 11:22		
L58206-11	421422-100	SWD , Brownfield Program	MTICPMS	FRESH WTR	6/25/2013 9:50	7/11/2013 11:15	7/12/2013 11:54		
L58206-12	421422-100		MTICPMS	FRESH WTR	6/25/2013 11:05	7/11/2013 11:15	7/12/2013 12:00		
L58206-13	421422-100		MTICPMS	FRESH WTR	6/25/2013 10:45	7/11/2013 11:15	7/12/2013 12:06		
L58206-14	421422-100		MTICPMS	FRESH WTR	6/25/2013 12:20	7/11/2013 11:15	7/12/2013 12:13		
L58206-15	421422-100		MTICPMS	FRESH WTR	6/25/2013 13:00	7/11/2013 11:15	7/12/2013 12:19		
L58266-1	421155	Quality Assurance	MTICPMS	FRESH WTR	7/4/2013 0:00	7/11/2013 11:15	7/12/2013 12:25		
WG127738-1	MB		MTHARD-ICPMS	BLANK WTR		7/11/2013 11:15	7/17/2013 12:38	WG127738-1,-2,-3,-4	METHOD BLANK
WG127738-1	MB		MTICPMS	BLANK WTR		7/11/2013 11:15	7/12/2013 9:20	WG127738-1,-2,-3,-4,-5,-6	METHOD BLANK
WG127738-2	SB		MTHARD-ICPMS	BLANK WTR		7/11/2013 11:15	7/17/2013 12:38	WG127738-1,-2,-3,-4	WG127738-1 MS-20 SPIKE BLANK
WG127738-2	SB		MTICPMS	BLANK WTR		7/11/2013 11:15	7/12/2013 9:27	WG127738-1,-2,-3,-4,-5,-6	WG127738-1 MS-20 SPIKE BLANK
WG127738-3	LD		MTHARD-ICPMS	EFFLUENT		7/11/2013 11:15	7/17/2013 12:38	WG127738-1,-2,-3,-4	L58101-1 RPD-LIQ LAB DUPLICATE
WG127738-3	LD		MTICPMS	EFFLUENT		7/11/2013 11:15	7/12/2013 9:47	WG127738-1,-2,-3,-4,-5,-6	L58101-1 RPD-LIQ LAB DUPLICATE
WG127738-4	MS		MTHARD-ICPMS	EFFLUENT		7/11/2013 11:15	7/17/2013 12:38	WG127738-1,-2,-3,-4	L58101-1 MS-20 MATRIX SPIKE
WG127738-4	MS		MTICPMS	EFFLUENT		7/11/2013 11:15	7/12/2013 9:53	WG127738-1,-2,-3,-4,-5,-6	L58101-1 MS-20 MATRIX SPIKE
WG127738-5	LD		MTICPMS	GRND WTR		7/11/2013 11:15	7/12/2013 11:28		L58200-5 RPD-LIQ LAB DUPLCIATE
WG127738-6	MS		MTICPMS	GRND WTR		7/11/2013 11:15	7/12/2013 11:34		L58200-5 MS-20 MATRIX SPIKE

Workgroup: WG127738 Total Metals - Water

MB:WG127738-1 Matrix: BLANK WTR Listtype:MTHARD-ICPMS Method:EPA 200.8/SW846 6020A*SM2340B Project: Pkey:STD
(Method Blank)

Parameter	MDL	RDL	Units	MB Value	Qual
Hardness, Calc	0.331	0.331	mg CaCO3/L	<MDL	

MB:WG127738-1 Matrix: BLANK WTR Listtype:MTICPMS Method:EPA 200.8*SW846 6020A Project: Pkey:STD
(Method Blank)

Parameter	MDL	RDL	Units	MB Value	Qual
Beryllium, Total, ICP-MS	0.1	0.5	ug/L	<MDL	
Sodium, Total, ICP-MS	100	100	ug/L	<MDL	
Magnesium, Total, ICP-MS	50	50	ug/L	<MDL	
Potassium, Total, ICP-MS	100	500	ug/L	<MDL	
Calcium, Total, ICP-MS	50	50	ug/L	<MDL	
Vanadium, Total, ICP-MS	0.075	0.375	ug/L	<MDL	
Chromium, Total, ICP-MS	0.2	1	ug/L	<MDL	
Iron, Total, ICP-MS	10	50	ug/L	<MDL	
Manganese, Total, ICP-MS	0.1	0.5	ug/L	<MDL	
Cobalt, Total, ICP-MS	0.05	0.25	ug/L	<MDL	
Nickel, Total, ICP-MS	0.1	0.5	ug/L	<MDL	
Copper, Total, ICP-MS	0.4	2	ug/L	<MDL	
Zinc, Total, ICP-MS	0.5	2.5	ug/L	<MDL	
Arsenic, Total, ICP-MS	0.1	0.5	ug/L	<MDL	
Selenium, Total, ICP-MS	0.5	1	ug/L	<MDL	
Silver, Total, ICP-MS	0.04	0.2	ug/L	<MDL	
Cadmium, Total, ICP-MS	0.05	0.25	ug/L	<MDL	
Antimony, Total, ICP-MS	0.3	1	ug/L	<MDL	
Barium, Total, ICP-MS	0.05	0.25	ug/L	<MDL	
Thallium, Total, ICP-MS	0.04	0.2	ug/L	<MDL	
Lead, Total, ICP-MS	0.1	0.5	ug/L	<MDL	

SB:WG127738-2 MB:WG127738-1 Matrix: BLANK WTR Listtype:MTHARD-ICPMS Method:EPA 200.8/SW846 6020A*SM2340B Project: Pkey:STD
(Spike Blank, Method Blank)

Parameter	MDL	RDL	Units	MB Value	True Value	SB Value	% Rec.	Qual	Lab Limit
Hardness, Calc	0.331	0.331	mg CaCO3/L	<MDL	33.1	32.4	98		85--115

SB:WG127738-2 MB:WG127738-1 Matrix: BLANK WTR Listtype:MTICPMS Method:EPA 200.8*SW846 6020A Project: Pkey:STD
(Spike Blank, Method Blank)

Parameter	MDL	RDL	Units	MB Value	True Value	SB Value	% Rec.	Qual	Lab Limit
Beryllium, Total, ICP-MS	0.1	0.5	ug/L	<MDL	20	19.5	97		85--115
Sodium, Total, ICP-MS	100	100	ug/L	<MDL	5000	5090	102		85--115
Magnesium, Total, ICP-MS	50	50	ug/L	<MDL	5000	4920	98		85--115
Potassium, Total, ICP-MS	100	500	ug/L	<MDL	5000	4550	91		85--115
Calcium, Total, ICP-MS	50	50	ug/L	<MDL	5000	4870	97		85--115
Vanadium, Total, ICP-MS	0.075	0.375	ug/L	<MDL	20	19.2	96		85--115
Chromium, Total, ICP-MS	0.2	1	ug/L	<MDL	20	19.9	100		85--115
Iron, Total, ICP-MS	10	50	ug/L	<MDL	5000	4990	100		85--115
Manganese, Total, ICP-MS	0.1	0.5	ug/L	<MDL	20	19.6	98		85--115
Cobalt, Total, ICP-MS	0.05	0.25	ug/L	<MDL	20	19.7	98		85--115
Nickel, Total, ICP-MS	0.1	0.5	ug/L	<MDL	20	20.7	104		85--115
Copper, Total, ICP-MS	0.4	2	ug/L	<MDL	20	20.8	104		85--115
Zinc, Total, ICP-MS	0.5	2.5	ug/L	<MDL	20	20.1	101		85--115
Arsenic, Total, ICP-MS	0.1	0.5	ug/L	<MDL	20	19.8	99		85--115
Selenium, Total, ICP-MS	0.5	1	ug/L	<MDL	20	20.7	103		85--115
Silver, Total, ICP-MS	0.04	0.2	ug/L	<MDL	20	20.2	101		85--115
Cadmium, Total, ICP-MS	0.05	0.25	ug/L	<MDL	20	19.6	98		85--115
Antimony, Total, ICP-MS	0.3	1	ug/L	<MDL	20	18.8	94		85--115
Barium, Total, ICP-MS	0.05	0.25	ug/L	<MDL	20	19.1	95		85--115
Thallium, Total, ICP-MS	0.04	0.2	ug/L	<MDL	20	17.6	88		85--115
Lead, Total, ICP-MS	0.1	0.5	ug/L	<MDL	20	20	100		85--115

LD:WG127738-3 L58101-1 Matrix: EFFLUENT Listtype:MTHARD-ICPMS Method:EPA 200.8/SW846 6020A*SM2340B Project:421430-300 Pkey:STD (Lab Duplicate)

Parameter	MDL	RDL	Units	SAMP Value	LD Value	RPD	Qual	Lab Limit
Hardness, Calc	0.331	0.331	mg CaCO3/L	52.8	53.3	1		0--20

LD:WG127738-3 L58101-1 Matrix: EFFLUENT Listtype:MTICPMS Method:EPA 200.8*SW846 6020A Project:421430-300 Pkey:STD (Lab Duplicate)

Parameter	MDL	RDL	Units	SAMP Value	LD Value	RPD	Qual	Lab Limit
Beryllium, Total, ICP-MS	0.1	0.5	ug/L	<MDL	<MDL			0--20
Magnesium, Total, ICP-MS	50	50	ug/L	4900	4920	0		0--20
Calcium, Total, ICP-MS	50	50	ug/L	13100	13200	1		0--20
Chromium, Total, ICP-MS	0.2	1	ug/L	0.45	0.46			0--20
Nickel, Total, ICP-MS	0.1	0.5	ug/L	1.88	1.92	2		0--20
Copper, Total, ICP-MS	0.4	2	ug/L	22.1	22.7	3		0--20
Zinc, Total, ICP-MS	0.5	2.5	ug/L	56.3	57.2	2		0--20
Arsenic, Total, ICP-MS	0.1	0.5	ug/L	1.2	1.23	2		0--20
Selenium, Total, ICP-MS	0.5	1	ug/L	<MDL	<MDL			0--20
Silver, Total, ICP-MS	0.04	0.2	ug/L	0.074	0.076			0--20
Cadmium, Total, ICP-MS	0.05	0.25	ug/L	0.056	0.056			0--20
Antimony, Total, ICP-MS	0.3	1	ug/L	0.36	0.35			0--20
Thallium, Total, ICP-MS	0.04	0.2	ug/L	<MDL	<MDL			0--20
Lead, Total, ICP-MS	0.1	0.5	ug/L	0.4	0.4			0--20

MS:WG127738-4 L58101-1 Matrix: EFFLUENT Listtype:MTHARD-ICPMS Method:EPA 200.8/SW846 6020A*SM2340B Project:421430-300 Pkey:STD (Matrix Spike)

Parameter	MDL	RDL	Units	SAMP Value	True Value	MS Value	% Rec.	Qual	Lab Limit
Hardness, Calc	0.331	0.331	mg CaCO3/L	52.8	33.1	84.8	97		75--125

MS:WG127738-4 L58101-1 Matrix: EFFLUENT Listtype:MTICPMS Method:EPA 200.8*SW846 6020A Project:421430-300 Pkey:STD (Matrix Spike)

Parameter	MDL	RDL	Units	SAMP Value	True Value	MS Value	% Rec.	Qual	Lab Limit
Beryllium, Total, ICP-MS	0.1	0.5	ug/L	<MDL	20	18.7	94		75--125
Magnesium, Total, ICP-MS	50	50	ug/L	4900	5000	9640	95		75--125
Calcium, Total, ICP-MS	50	50	ug/L	13100	5000	18100	100		75--125
Chromium, Total, ICP-MS	0.2	1	ug/L	0.45	20	20.4	100		75--125
Nickel, Total, ICP-MS	0.1	0.5	ug/L	1.88	20	22.1	101		75--125
Copper, Total, ICP-MS	0.4	2	ug/L	22.1	20	42.6	102		75--125
Zinc, Total, ICP-MS	0.5	2.5	ug/L	56.3	20	75.7	97		75--125
Arsenic, Total, ICP-MS	0.1	0.5	ug/L	1.2	20	20.7	98		75--125
Selenium, Total, ICP-MS	0.5	1	ug/L	<MDL	20	20.2	101		75--125
Silver, Total, ICP-MS	0.04	0.2	ug/L	0.074	20	19.4	96		75--125
Cadmium, Total, ICP-MS	0.05	0.25	ug/L	0.056	20	19.6	98		75--125
Antimony, Total, ICP-MS	0.3	1	ug/L	0.36	20	18.8	92		75--125
Thallium, Total, ICP-MS	0.04	0.2	ug/L	<MDL	20	17.6	88		75--125
Lead, Total, ICP-MS	0.1	0.5	ug/L	0.4	20	19.8	97		75--125

LD:WG127738-5 L58200-5 Matrix: GRND WTR Listtype:MTICPMS Method:EPA 200.8*SW846 6020A Project:421422-CHGW Pkey:STD
(Lab Duplicate)

Parameter	MDL	RDL	Units	SAMP Value	LD Value	RPD	Qual	Lab Limit
Beryllium, Total, ICP-MS	0.1	0.5	ug/L	<MDL	<MDL			0--20
Sodium, Total, ICP-MS	100	100	ug/L	8940	9010	1		0--20
Magnesium, Total, ICP-MS	50	50	ug/L	15800	16000	2		0--20
Potassium, Total, ICP-MS	100	500	ug/L	1750	1780	1		0--20
Calcium, Total, ICP-MS	50	50	ug/L	28400	28800	1		0--20
Vanadium, Total, ICP-MS	0.075	0.375	ug/L	<MDL	<MDL			0--20
Chromium, Total, ICP-MS	0.2	1	ug/L	<MDL	<MDL			0--20
Iron, Total, ICP-MS	10	50	ug/L	2560	2610	2		0--20
Manganese, Total, ICP-MS	0.1	0.5	ug/L	247	251	2		0--20
Cobalt, Total, ICP-MS	0.05	0.25	ug/L	0.23	0.23			0--20
Nickel, Total, ICP-MS	0.1	0.5	ug/L	0.886	0.889	0		0--20
Copper, Total, ICP-MS	0.4	2	ug/L	<MDL	<MDL			0--20
Zinc, Total, ICP-MS	0.5	2.5	ug/L	1.6	1.8			0--20
Arsenic, Total, ICP-MS	0.1	0.5	ug/L	1.16	1.17	1		0--20
Selenium, Total, ICP-MS	0.5	1	ug/L	<MDL	<MDL			0--20
Silver, Total, ICP-MS	0.04	0.2	ug/L	<MDL	<MDL			0--20
Cadmium, Total, ICP-MS	0.05	0.25	ug/L	<MDL	<MDL			0--20
Antimony, Total, ICP-MS	0.3	1	ug/L	<MDL	<MDL			0--20
Barium, Total, ICP-MS	0.05	0.25	ug/L	6.92	7.12	3		0--20
Thallium, Total, ICP-MS	0.04	0.2	ug/L	<MDL	<MDL			0--20
Lead, Total, ICP-MS	0.1	0.5	ug/L	<MDL	<MDL			0--20

MS:WG127738-6 L58200-5 Matrix: GRND WTR Listtype:MTICPMS Method:EPA 200.8*SW846 6020A Project:421422-CHGW Pkey:STD
(Matrix Spike)

Parameter	MDL	RDL	Units	SAMP Value	True Value	MS Value	% Rec.	Qual	Lab Limit
Beryllium, Total, ICP-MS	0.1	0.5	ug/L	<MDL	20	18.6	93		75--125
Sodium, Total, ICP-MS	100	100	ug/L	8940	5000	13800	98		75--125
Magnesium, Total, ICP-MS	50	50	ug/L	15800	5000	20600	96		75--125
Potassium, Total, ICP-MS	100	500	ug/L	1750	5000	6240	90		75--125
Calcium, Total, ICP-MS	50	50	ug/L	28400	5000	33600		4xRule	75--125
Vanadium, Total, ICP-MS	0.075	0.375	ug/L	<MDL	20	18.3	92		75--125
Chromium, Total, ICP-MS	0.2	1	ug/L	<MDL	20	19.5	98		75--125
Iron, Total, ICP-MS	10	50	ug/L	2560	5000	7560	100		75--125
Manganese, Total, ICP-MS	0.1	0.5	ug/L	247	20	269		4xRule	75--125
Cobalt, Total, ICP-MS	0.05	0.25	ug/L	0.23	20	18.3	91		75--125
Nickel, Total, ICP-MS	0.1	0.5	ug/L	0.886	20	20.7	99		75--125
Copper, Total, ICP-MS	0.4	2	ug/L	<MDL	20	19.3	97		75--125
Zinc, Total, ICP-MS	0.5	2.5	ug/L	1.6	20	20.7	95		75--125
Arsenic, Total, ICP-MS	0.1	0.5	ug/L	1.16	20	20.1	95		75--125
Selenium, Total, ICP-MS	0.5	1	ug/L	<MDL	20	18.9	94		75--125
Silver, Total, ICP-MS	0.04	0.2	ug/L	<MDL	20	19.3	97		75--125
Cadmium, Total, ICP-MS	0.05	0.25	ug/L	<MDL	20	19.1	95		75--125
Antimony, Total, ICP-MS	0.3	1	ug/L	<MDL	20	17.8	89		75--125
Barium, Total, ICP-MS	0.05	0.25	ug/L	6.92	20	25.4	92		75--125
Thallium, Total, ICP-MS	0.04	0.2	ug/L	<MDL	20	17	85		75--125
Lead, Total, ICP-MS	0.1	0.5	ug/L	<MDL	20	19	95		75--125

WG127897 Dissolved Metals - Water

Sample	Project	Project Description	List Type	Matrix	Collect Date	Prep Date	Anal Date	QC Association	Comments
L58075-3	421422-CHGW	SWD-CHGW Cedar Hills Groundwater Quarterly	MTICPMS-DISS	GRND WTR	7/16/2013 6:35	7/19/2013 7:30	7/22/2013 9:41	WG127897-1,-2,-3,-4	
L58197-1	421422-CHGW		MTICPMS-DISS	GRND WTR	7/9/2013 8:45	7/19/2013 7:30	7/22/2013 9:48		
L58198-1	421422-CHGW		MTICPMS-DISS	GRND WTR	7/9/2013 6:20	7/19/2013 7:30	7/22/2013 10:07		
L58198-2	421422-CHGW		MTICPMS-DISS	GRND WTR	7/8/2013 9:26	7/19/2013 7:30	7/22/2013 10:13		
L58198-5	421422-CHGW		MTICPMS-DISS	GRND WTR	7/8/2013 10:51	7/19/2013 7:30	7/22/2013 10:19		
L58198-6	421422-CHGW		MTICPMS-DISS	GRND WTR	7/9/2013 10:34	7/19/2013 7:30	7/22/2013 10:26		
L58200-1	421422-CHGW		MTICPMS-DISS	GRND WTR	7/12/2013 8:35	7/19/2013 7:30	7/22/2013 10:45		
L58200-2	421422-CHGW		MTICPMS-DISS	GRND WTR	7/12/2013 7:00	7/19/2013 7:30	7/22/2013 10:51		
L58200-5	421422-CHGW		MTICPMS-DISS	GRND WTR	7/9/2013 9:03	7/19/2013 7:30	7/22/2013 10:57		
L58200-6	421422-CHGW		MTICPMS-DISS	GRND WTR	7/17/2013 10:37	7/19/2013 7:30	7/22/2013 11:04		
L58206-11	421422-100	SWD , Brownfield Program	MTICPMS-DISS	FRESH WTR	6/25/2013 9:50	7/19/2013 7:30	7/22/2013 11:10		
L58206-12	421422-100		MTICPMS-DISS	FRESH WTR	6/25/2013 11:05	7/19/2013 7:30	7/22/2013 11:17		
L58206-13	421422-100		MTICPMS-DISS	FRESH WTR	6/25/2013 10:45	7/19/2013 7:30	7/22/2013 11:23		
L58206-14	421422-100		MTICPMS-DISS	FRESH WTR	6/25/2013 12:20	7/19/2013 7:30	7/22/2013 11:29		
L58206-15	421422-100		MTICPMS-DISS	FRESH WTR	6/25/2013 13:00	7/19/2013 7:30	7/23/2013 9:58		
L58235-1	421422-CHGW	SWD-CHGW Cedar Hills Groundwater Quarterly	MTICPMS-DISS	GRND WTR	7/15/2013 10:20	7/19/2013 7:30	7/22/2013 12:07		
L58235-2	421422-CHGW		MTICPMS-DISS	GRND WTR	7/15/2013 9:01	7/19/2013 7:30	7/22/2013 12:14		
L58235-5	421422-CHGW		MTICPMS-DISS	GRND WTR	7/15/2013 5:10	7/19/2013 7:30	7/22/2013 12:20		
L58235-6	421422-CHGW		MTICPMS-DISS	GRND WTR	7/16/2013 5:05	7/19/2013 7:30	7/22/2013 12:26		
L58246-1	423589-330-4	Green Rvr PCB/PAH Loading	MTICPMS-DISS	FRESH WTR	7/10/2013 5:00	7/19/2013 7:30	7/22/2013 12:33		SAMP
WG127897-1	MB		MTICPMS-DISS	BLANK WTR		7/19/2013 7:30	7/22/2013 9:29		METHOD BLANK
WG127897-2	SB		MTICPMS-DISS	BLANK WTR		7/19/2013 7:30	7/22/2013 9:35		WG127897-1 MS-20 SPIKE BLANK
WG127897-3	LD		MTICPMS-DISS	STORM WTR		7/19/2013 7:30	7/22/2013 9:54		L58197-1 RPD-LIQ LAB DUPLICATE
WG127897-4	MS		MTICPMS-DISS	STORM WTR		7/19/2013 7:30	7/22/2013 10:00		L58197-1 MS-20 MATRIX SPIKE

Workgroup: WG127897 Dissolved Metals - Water

MB:WG127897-1 Matrix: BLANK WTR Listtype:MTICPMS-DISS Method:EPA 200.8*SW846 6020A Project: Pkey:STD (Method Blank)

Parameter	MDL	RDL	Units	MB Value	Qual
Beryllium, Dissolved, ICP-MS	0.1	0.5	ug/L	<MDL	
Sodium, Dissolved, ICP-MS	100	100	ug/L	<MDL	
Magnesium, Dissolved, ICP-MS	50	50	ug/L	<MDL	
Potassium, Dissolved, ICP-MS	100	500	ug/L	<MDL	
Calcium, Dissolved, ICP-MS	50	50	ug/L	<MDL	
Vanadium, Dissolved, ICP-MS	0.075	0.375	ug/L	<MDL	
Chromium, Dissolved, ICP-MS	0.2	1	ug/L	<MDL	
Iron, Dissolved, ICP-MS	10	50	ug/L	<MDL	
Manganese, Dissolved, ICP-MS	0.1	0.5	ug/L	<MDL	
Cobalt, Dissolved, ICP-MS	0.05	0.25	ug/L	<MDL	
Nickel, Dissolved, ICP-MS	0.1	0.5	ug/L	<MDL	
Copper, Dissolved, ICP-MS	0.4	2	ug/L	<MDL	
Zinc, Dissolved, ICP-MS	0.5	2.5	ug/L	<MDL	
Arsenic, Dissolved, ICP-MS	0.1	0.5	ug/L	<MDL	
Selenium, Dissolved, ICP-MS	0.5	1	ug/L	<MDL	
Silver, Dissolved, ICP-MS	0.04	0.2	ug/L	<MDL	
Cadmium, Dissolved, ICP-MS	0.05	0.25	ug/L	<MDL	
Antimony, Dissolved, ICP-MS	0.3	1	ug/L	<MDL	
Barium, Dissolved, ICP-MS	0.05	0.25	ug/L	<MDL	
Thallium, Dissolved, ICP-MS	0.04	0.2	ug/L	<MDL	
Lead, Dissolved, ICP-MS	0.1	0.5	ug/L	<MDL	

SB:WG127897-2 MB:WG127897-1 Matrix: BLANK WTR Listtype:MTICPMS-DISS Method:EPA 200.8*SW846 6020A Project: Pkey:STD
(Spike Blank, Method Blank)

Parameter	MDL	RDL	Units	MB Value	True Value	SB Value	% Rec.	Qual	Lab Limit
Beryllium, Dissolved, ICP-MS	0.1	0.5	ug/L	<MDL	20	20.6	103		85--115
Sodium, Dissolved, ICP-MS	100	100	ug/L	<MDL	5000	5050	101		85--115
Magnesium, Dissolved, ICP-MS	50	50	ug/L	<MDL	5000	5560	111		85--115
Potassium, Dissolved, ICP-MS	100	500	ug/L	<MDL	5000	5150	103		85--115
Calcium, Dissolved, ICP-MS	50	50	ug/L	<MDL	5000	5210	104		85--115
Vanadium, Dissolved, ICP-MS	0.075	0.375	ug/L	<MDL	20	20.3	101		85--115
Chromium, Dissolved, ICP-MS	0.2	1	ug/L	<MDL	20	20.4	102		85--115
Iron, Dissolved, ICP-MS	10	50	ug/L	<MDL	5000	5120	102		85--115
Manganese, Dissolved, ICP-MS	0.1	0.5	ug/L	<MDL	20	21	105		85--115
Cobalt, Dissolved, ICP-MS	0.05	0.25	ug/L	<MDL	20	21.4	107		85--115
Nickel, Dissolved, ICP-MS	0.1	0.5	ug/L	<MDL	20	21.2	106		85--115
Copper, Dissolved, ICP-MS	0.4	2	ug/L	<MDL	20	21.2	106		85--115
Zinc, Dissolved, ICP-MS	0.5	2.5	ug/L	<MDL	20	20.5	103		85--115
Arsenic, Dissolved, ICP-MS	0.1	0.5	ug/L	<MDL	20	20.4	102		85--115
Selenium, Dissolved, ICP-MS	0.5	1	ug/L	<MDL	20	22	110		85--115
Silver, Dissolved, ICP-MS	0.04	0.2	ug/L	<MDL	20	22.3	111		85--115
Cadmium, Dissolved, ICP-MS	0.05	0.25	ug/L	<MDL	20	20.7	103		85--115
Antimony, Dissolved, ICP-MS	0.3	1	ug/L	<MDL	20	20.1	100		85--115
Barium, Dissolved, ICP-MS	0.05	0.25	ug/L	<MDL	20	19.6	98		85--115
Thallium, Dissolved, ICP-MS	0.04	0.2	ug/L	<MDL	20	21.7	108		85--115
Lead, Dissolved, ICP-MS	0.1	0.5	ug/L	<MDL	20	22.2	111		85--115

LD:WG127897-3 L58197-1 Matrix: STORM WTR Listtype:MTICPMS-DISS Method:EPA 200.8*SW846 6020A Project:421422-CHGW Pkey:STD (Lab Duplicate)

Parameter	MDL	RDL	Units	SAMP Value	LD Value	RPD	Qual	Lab Limit
Beryllium, Dissolved, ICP-MS	0.1	0.5	ug/L	<MDL	<MDL			0--20
Sodium, Dissolved, ICP-MS	100	100	ug/L	9470	9440	0		0--20
Magnesium, Dissolved, ICP-MS	50	50	ug/L	19900	20300	2		0--20
Potassium, Dissolved, ICP-MS	100	500	ug/L	1880	1860	1		0--20
Calcium, Dissolved, ICP-MS	50	50	ug/L	39300	39300	0		0--20
Vanadium, Dissolved, ICP-MS	0.075	0.375	ug/L	1.87	1.89	1		0--20
Chromium, Dissolved, ICP-MS	0.2	1	ug/L	<MDL	<MDL			0--20
Iron, Dissolved, ICP-MS	10	50	ug/L	<MDL	<MDL			0--20
Manganese, Dissolved, ICP-MS	0.1	0.5	ug/L	293	290	1		0--20
Cobalt, Dissolved, ICP-MS	0.05	0.25	ug/L	0.871	0.969	11		0--20
Nickel, Dissolved, ICP-MS	0.1	0.5	ug/L	0.3	0.29			0--20
Copper, Dissolved, ICP-MS	0.4	2	ug/L	<MDL	<MDL			0--20
Zinc, Dissolved, ICP-MS	0.5	2.5	ug/L	8.46	8.53	1		0--20
Arsenic, Dissolved, ICP-MS	0.1	0.5	ug/L	1.44	1.42	1		0--20
Selenium, Dissolved, ICP-MS	0.5	1	ug/L	<MDL	<MDL			0--20
Silver, Dissolved, ICP-MS	0.04	0.2	ug/L	<MDL	<MDL			0--20
Cadmium, Dissolved, ICP-MS	0.05	0.25	ug/L	<MDL	<MDL			0--20
Antimony, Dissolved, ICP-MS	0.3	1	ug/L	<MDL	<MDL			0--20
Barium, Dissolved, ICP-MS	0.05	0.25	ug/L	8.92	8.89	0		0--20
Thallium, Dissolved, ICP-MS	0.04	0.2	ug/L	<MDL	<MDL			0--20
Lead, Dissolved, ICP-MS	0.1	0.5	ug/L	<MDL	<MDL			0--20

MS:WG127897-4 L58197-1 Matrix: STORM WTR Listtype:MTICPMS-DISS Method:EPA 200.8*SW846 6020A Project:421422-CHGW Pkey:STD
(Matrix Spike)

Parameter	MDL	RDL	Units	SAMP Value	True Value	MS Value	% Rec.	Qual	Lab Limit
Beryllium, Dissolved, ICP-MS	0.1	0.5	ug/L	<MDL	20	20.3	101		75--125
Sodium, Dissolved, ICP-MS	100	100	ug/L	9470	5000	14400	100		75--125
Magnesium, Dissolved, ICP-MS	50	50	ug/L	19900	5000	24900	100		75--125
Potassium, Dissolved, ICP-MS	100	500	ug/L	1880	5000	6520	93		75--125
Calcium, Dissolved, ICP-MS	50	50	ug/L	39300	5000	44100		4xRule	75--125
Vanadium, Dissolved, ICP-MS	0.075	0.375	ug/L	1.87	20	21.6	99		75--125
Chromium, Dissolved, ICP-MS	0.2	1	ug/L	<MDL	20	19.4	97		75--125
Iron, Dissolved, ICP-MS	10	50	ug/L	<MDL	5000	5050	101		75--125
Manganese, Dissolved, ICP-MS	0.1	0.5	ug/L	293	20	313		4xRule	75--125
Cobalt, Dissolved, ICP-MS	0.05	0.25	ug/L	0.871	20	22.1	106		75--125
Nickel, Dissolved, ICP-MS	0.1	0.5	ug/L	0.3	20	20.3	100		75--125
Copper, Dissolved, ICP-MS	0.4	2	ug/L	<MDL	20	19.4	97		75--125
Zinc, Dissolved, ICP-MS	0.5	2.5	ug/L	8.46	20	28.8	102		75--125
Arsenic, Dissolved, ICP-MS	0.1	0.5	ug/L	1.44	20	22.5	105		75--125
Selenium, Dissolved, ICP-MS	0.5	1	ug/L	<MDL	20	21.8	109		75--125
Silver, Dissolved, ICP-MS	0.04	0.2	ug/L	<MDL	20	21.5	108		75--125
Cadmium, Dissolved, ICP-MS	0.05	0.25	ug/L	<MDL	20	20.5	103		75--125
Antimony, Dissolved, ICP-MS	0.3	1	ug/L	<MDL	20	20.6	103		75--125
Barium, Dissolved, ICP-MS	0.05	0.25	ug/L	8.92	20	29.3	102		75--125
Thallium, Dissolved, ICP-MS	0.04	0.2	ug/L	<MDL	20	21.2	106		75--125
Lead, Dissolved, ICP-MS	0.1	0.5	ug/L	<MDL	20	21.4	107		75--125

WG128595 Dissolved Metals - Water - Arsenic Only

Sample	Project	Project Description	List Type	Matrix	Collect Date	Prep Date	Anal Date	QC Association	Comments
L58206-11	421422-100	SWD , Brownfield Program	MTICPMS-DISS-SEA	FRESH WTR	6/25/2013 9:50	8/29/2013 10:15	8/30/2013 9:37	WG128595-1,-2,-4,-3	
L58206-12	421422-100		MTICPMS-DISS-SEA	FRESH WTR	6/25/2013 11:05	8/29/2013 10:15	8/30/2013 9:41		
L58206-13	421422-100		MTICPMS-DISS-SEA	FRESH WTR	6/25/2013 10:45	8/29/2013 10:15	8/30/2013 9:45		
L58206-14	421422-100		MTICPMS-DISS-SEA	FRESH WTR	6/25/2013 12:20	8/29/2013 10:15	8/30/2013 9:58		
L58206-15	421422-100		MTICPMS-DISS-SEA	FRESH WTR	6/25/2013 13:00	8/29/2013 10:15	8/30/2013 10:03		
WG128595-1	MB		MTICPMS-DISS-SEA	BLANK WTR		8/29/2013 10:15	8/30/2013 9:28		METHOD BLANK
WG128595-2	SB		MTICPMS-DISS-SEA	BLANK WTR		8/29/2013 10:15	8/30/2013 9:32		WG128595-1 MS-20 SPIKE BLANK
WG128595-3	LD		MTICPMS-DISS-SEA	FRESH WTR		8/29/2013 10:15	8/30/2013 9:50		L58206-13 RPD-LIQ LAB DUPLCIATE
WG128595-4	MS		MTICPMS-DISS-SEA	FRESH WTR		8/29/2013 10:15	8/30/2013 9:54		L58206-13 MS-20 MATRIX SPIKE

Workgroup: WG128595 Dissolved Metals - Water - Arsenic Only

MB:WG128595-1 Matrix: BLANK WTR Listtype:MTICPMS-DISS-SEA Method:EPA 1640 Project: Pkey:STD
(Method Blank)

Parameter	MDL	RDL	Units	MB Value	Qual
Arsenic, Dissolved, ICP-MS	0.1	0.5	ug/L	<MDL	

SB:WG128595-2 MB:WG128595-1 Matrix: BLANK WTR Listtype:MTICPMS-DISS-SEA Method:EPA 1640 Project: Pkey:STD
(Spike Blank, Method Blank)

Parameter	MDL	RDL	Units	MB Value	True Value	SB Value	% Rec.	Qual	Lab Limit
Arsenic, Dissolved, ICP-MS	0.1	0.5	ug/L	<MDL	2.5	2.41	96		85--115

LD:WG128595-3 L58206-13 Matrix: FRESH WTR Listtype:MTICPMS-DISS-SEA Method:EPA 1640 Project:421422-100 Pkey:STD
(Lab Duplicate)

Parameter	MDL	RDL	Units	SAMP Value	LD Value	RPD	Qual	Lab Limit
Arsenic, Dissolved, ICP-MS	0.1	0.5	ug/L	2.01	2.02	1		0--20

MS:WG128595-4 L58206-13 Matrix: FRESH WTR Listtype:MTICPMS-DISS-SEA Method:EPA 1640 Project:421422-100 Pkey:STD
(Matrix Spike)

Parameter	MDL	RDL	Units	SAMP Value	True Value	MS Value	% Rec.	Qual	Lab Limit
Arsenic, Dissolved, ICP-MS	0.1	0.5	ug/L	2.01	2.5	4.44	97		75--125

WG128593 Total Metals - Water - Arsenic Only

Sample	Project	Project Description	List Type	Matrix	Collect Date	Prep Date	Anal Date	QC Association	Comments
L58206-11	421422-100	SWD , Brownfield Program	MTICPMS-SEA	FRESH WTR	6/25/2013 9:50	8/29/2013 10:15	8/30/2013 13:50	WG128593-1,-2,-3,-4	
L58206-12	421422-100		MTICPMS-SEA	FRESH WTR	6/25/2013 11:05	8/29/2013 10:15	8/30/2013 10:37		
L58206-13	421422-100		MTICPMS-SEA	FRESH WTR	6/25/2013 10:45	8/29/2013 10:15	8/30/2013 10:41		
L58206-14	421422-100		MTICPMS-SEA	FRESH WTR	6/25/2013 12:20	8/29/2013 10:15	8/30/2013 10:45		
L58206-15	421422-100		MTICPMS-SEA	FRESH WTR	6/25/2013 13:00	8/29/2013 10:15	8/30/2013 10:50		
WG128593-1	MB		MTICPMS-SEA	BLANK WTR		8/29/2013 10:15	8/30/2013 10:15		METHOD BLANK
WG128593-2	SB		MTICPMS-SEA	BLANK WTR		8/29/2013 10:15	8/30/2013 10:20		WG128593-1 MS-20 SPIKE BLANK
WG128593-3	LD		MTICPMS-SEA	FRESH WTR		8/29/2013 10:15	8/30/2013 13:54		L58206-11 RPD-LIQ LAB DUPLICATE
WG128593-4	MS		MTICPMS-SEA	FRESH WTR		8/29/2013 10:15	8/30/2013 13:59		L58206-11 MS-20 MATRIX SPIKE

Workgroup: WG128593 Total Metals - Water - Arsenic Only

MB:WG128593-1 Matrix: BLANK WTR Listtype:MTICPMS-SEA Method:EPA 1640 Project: Pkey:STD
(Method Blank)

Parameter	MDL	RDL	Units	MB Value	Qual
Arsenic, Total, ICP-MS	0.1	0.5	ug/L	<MDL	

SB:WG128593-2 MB:WG128593-1 Matrix: BLANK WTR Listtype:MTICPMS-SEA Method:EPA 1640 Project: Pkey:STD
(Spike Blank, Method Blank)

Parameter	MDL	RDL	Units	MB Value	True Value	SB Value	% Rec.	Qual	Lab Limit
Arsenic, Total, ICP-MS	0.1	0.5	ug/L	<MDL	2.5	2.5	100		85--115

LD:WG128593-3 L58206-11 Matrix: FRESH WTR Listtype:MTICPMS-SEA Method:EPA 1640 Project:421422-100 Pkey:STD
(Lab Duplicate)

Parameter	MDL	RDL	Units	SAMP Value	LD Value	RPD	Qual	Lab Limit
Arsenic, Total, ICP-MS	0.2	1	ug/L	3.06	2.99	3		0--20

MS:WG128593-4 L58206-11 Matrix: FRESH WTR Listtype:MTICPMS-SEA Method:EPA 1640 Project:421422-100 Pkey:STD
(Matrix Spike)

Parameter	MDL	RDL	Units	SAMP Value	True Value	MS Value	% Rec.	Qual	Lab Limit
Arsenic, Total, ICP-MS	0.2	1	ug/L	3.06	2.5	5.62	102		75--125

WG127809 PAH

Sample	Project	Project Description	List Type	Matrix	Collect Date	Prep Date	Anal Date	QC Association	Comments
L58295-86	421422-100	SWD , Brownfield Program	ORPAH	SOIL	7/3/2013 11:35	7/15/2013 17:00	7/25/2013 16:22	WG127809-6,-1,-2,-3,-4,-5,-7	
L58295-87	421422-100		ORPAH	SOIL	7/3/2013 11:40	7/15/2013 17:00	7/24/2013 14:13		
L58295-88	421422-100		ORPAH	SOIL	7/3/2013 11:48	7/15/2013 17:00	7/25/2013 17:02		
L58295-89	421422-100		ORPAH	SOIL	7/3/2013 11:50	7/15/2013 17:00	7/25/2013 15:01		
L58295-90	421422-100		ORPAH	SOIL	7/3/2013 12:00	7/15/2013 17:00	7/25/2013 9:37		
L58295-91	421422-100		ORPAH	SOIL	7/3/2013 12:05	7/15/2013 17:00	7/25/2013 14:20		
L58295-92	421422-100		ORPAH	SOIL	7/3/2013 12:07	7/15/2013 17:00	7/25/2013 15:41		
L58295-93	421422-100		ORPAH	SOIL	7/3/2013 12:15	7/15/2013 17:00	7/24/2013 16:14		
L58295-94	421422-100		ORPAH	SOIL	7/3/2013 12:20	7/15/2013 17:00	7/25/2013 13:40		
L58295-95	421422-100		ORPAH	SOIL	7/3/2013 12:30	7/15/2013 17:00	7/24/2013 14:53		
L58295-96	421422-100		ORPAH	SOIL	7/3/2013 12:35	7/15/2013 17:00	7/24/2013 15:34		
WG127809-1	MB		ORPAH	OTHR SOLID		7/15/2013 17:00	7/24/2013 10:11		MB130715
WG127809-2	SB		ORPAH	OTHR SOLID		7/15/2013 17:00	7/24/2013 10:51		WG127809-1
WG127809-3	MS		ORPAH	SOIL		7/15/2013 17:00	7/24/2013 12:52		L58295-87
WG127809-4	MSD		ORPAH	SOIL		7/15/2013 17:00	7/24/2013 13:32		WG127809-3 L58295-87
WG127809-5	SRM		ORPAH	SALTWTRSED		7/15/2013 17:00	7/24/2013 11:31		
WG127809-6	SRMD		ORPAH	SALTWTRSED		7/15/2013 17:00	7/24/2013 12:11		WG127809-5
WG127809-7	LD		ORPAH	SOIL		7/15/2013 17:00	7/25/2013 13:00		L58295-94

Workgroup: WG127809 PAH

MB:WG127809-1 Matrix: OTHR SOLID Listtype:ORPAH Method:SW846 3550B*SW846 8270D Project: Pkey:STD
(Method Blank)

Parameter	MDL	RDL	Units	MB Value	Qual
Naphthalene	5.3	10.7	ug/Kg	<MDL	
2-Methylnaphthalene	5.3	10.7	ug/Kg	<MDL	
1-Methylnaphthalene	5.3	10.7	ug/Kg	<MDL	
Acenaphthylene	5.3	10.7	ug/Kg	<MDL	
Acenaphthene	5.3	10.7	ug/Kg	<MDL	
Fluorene	5.3	10.7	ug/Kg	<MDL	
Phenanthrene	5.3	10.7	ug/Kg	<MDL	
Anthracene	5.3	10.7	ug/Kg	<MDL	
Fluoranthene	5.3	10.7	ug/Kg	<MDL	
Pyrene	5.3	10.7	ug/Kg	<MDL	
Benzo(a)anthracene	5.3	10.7	ug/Kg	<MDL	
Chrysene	5.3	10.7	ug/Kg	<MDL	
Benzo(b,j,k)fluoranthene	5.3	10.7	ug/Kg	<MDL	
Benzo(a)pyrene	5.3	10.7	ug/Kg	<MDL	
Indeno(1,2,3-Cd)Pyrene	5.3	10.7	ug/Kg	<MDL	
Dibenzo(a,h)anthracene	5.3	10.7	ug/Kg	<MDL	
Benzo(g,h,i)perylene	5.3	10.7	ug/Kg	<MDL	

SB:WG127809-2 MB:WG127809-1 Matrix: OTHR SOLID Listtype:ORPAH Method:SW846 3550B*SW846 8270D Project: Pkey:STD
(Spike Blank, Method Blank)

Parameter	MDL	RDL	Units	MB Value	True Value	SB Value	% Rec.	Qual	Lab Limit
Naphthalene	5.3	10.7	ug/Kg	<MDL	667	432	65		37--105
2-Methylnaphthalene	5.3	10.7	ug/Kg	<MDL	667	455	68		20--141
1-Methylnaphthalene	5.3	10.7	ug/Kg	<MDL	667	461	69		20--141
Acenaphthylene	5.3	10.7	ug/Kg	<MDL	667	507	76		45--123
Acenaphthene	5.3	10.7	ug/Kg	<MDL	667	430	65		45--115
Fluorene	5.3	10.7	ug/Kg	<MDL	667	527	79		43--134
Phenanthrene	5.3	10.7	ug/Kg	<MDL	667	516	77		52--128
Anthracene	5.3	10.7	ug/Kg	<MDL	667	464	70		44--138
Fluoranthene	5.3	10.7	ug/Kg	<MDL	667	647	97		47--150
Pyrene	5.3	10.7	ug/Kg	<MDL	667	651	98		49--139
Benzo(a)anthracene	5.3	10.7	ug/Kg	<MDL	667	568	85		40--146
Chrysene	5.3	10.7	ug/Kg	<MDL	667	609	91		42--137
Benzo(b,j,k)fluoranthene	5.3	10.7	ug/Kg	<MDL	2000	1900	95		39--150
Benzo(a)pyrene	5.3	10.7	ug/Kg	<MDL	667	563	84		51--126
Indeno(1,2,3-Cd)Pyrene	5.3	10.7	ug/Kg	<MDL	667	675	101		29--150
Dibenzo(a,h)anthracene	5.3	10.7	ug/Kg	<MDL	667	709	106		30--150
Benzo(g,h,i)perylene	5.3	10.7	ug/Kg	<MDL	667	600	90		30--150

MSD:WG127809-4 MS:WG127809-3 L58295-87 Matrix: SOIL Listtype:ORPAH Method:SW846 3550B*SW846 8270D Project:421422-100 Pkey:STD
(Matrix Spike Duplicate, Matrix Spike)

Parameter	MDL	RDL	Units	SAMP Value	True Value	MS Value	% Rec.	Qual	Lab Limit	True Value	MSD Value	% Rec.	Qual	RPD	Qual	Lab Limit
Naphthalene	5.3	10.7	ug/Kg	<MDL	667	377	57		36--103	667	394	59		4		0--35
2-Methylnaphthalene	5.3	10.7	ug/Kg	<MDL	667	434	65		22--150	667	443	66		2		0--35
1-Methylnaphthalene	5.3	10.7	ug/Kg	<MDL	667	448	67		23--150	667	456	68		2		0--35
Acenaphthylene	5.3	10.7	ug/Kg	<MDL	667	540	81		47--137	667	555	83		3		0--35
Acenaphthene	5.3	10.7	ug/Kg	5.4	667	470	70		52--120	667	492	73		4		0--35
Fluorene	5.3	10.7	ug/Kg	5.9	667	679	101		46--140	667	700	104		3		0--35
Phenanthrene	5.3	10.7	ug/Kg	58.9	667	620	84		34--146	667	639	87		3		0--35
Anthracene	5.3	10.7	ug/Kg	9.8	667	494	73		53--136	667	514	76		4		0--35
Fluoranthene	5.3	10.7	ug/Kg	183	667	878	104		48--150	667	910	109		4		0--35
Pyrene	5.3	10.7	ug/Kg	189	667	917	109		50--150	667	946	114		3		0--35
Benzo(a)anthracene	5.3	10.7	ug/Kg	126	667	747	93		41--147	667	773	97		3		0--35
Chrysene	5.3	10.7	ug/Kg	165	667	801	95		38--133	667	825	99		3		0--35
Benzo(b,j,k)fluoranthene	5.3	10.7	ug/Kg	385	2000	2330	97		38--150	2000	2460	104		6		0--35
Benzo(a)pyrene	5.3	10.7	ug/Kg	199	667	848	97		53--130	667	890	104		5		0--35
Indeno(1,2,3-Cd)Pyrene	5.3	10.7	ug/Kg	131	667	650	78		36--142	667	649	78		0		0--35
Dibenzo(a,h)anthracene	5.3	10.7	ug/Kg	26.2	667	515	73		36--137	667	521	74		1		0--35
Benzo(g,h,i)perylene	5.3	10.7	ug/Kg	108	667	530	63		30--150	667	524	62		1		0--35

SRMD:WG127809-6 SRM:WG127809-5 Matrix: SALTWTRSED Listtype:ORPAH Method:SW846 3550B*SW846 8270D Project: Pkey:SED
(Std Reference Material Duplicate, Std Reference Material)

Parameter	MDL	RDL	Units	True Value	SRM Value	% Rec.	Qual	Lab Limit	True Value	SRMD Value	% Rec.	Qual	RPD	Qual	Lab Limit
Phenanthrene	270	533	ug/Kg	5200	4110	79		49--124	5200	4030	78		2		0--35
Fluoranthene	270	533	ug/Kg	8800	7790	89		56--137	8800	7670	87		2		0--35
Pyrene	270	533	ug/Kg	9570	8570	90		58--123	9570	8560	89		0		0--35
Benzo(a)anthracene	270	533	ug/Kg	4660	3690	79		48--127	4660	3620	78		2		0--35
Chrysene	270	533	ug/Kg	4800	5100	106		64--150	4800	5010	104		2		0--35
Benzo(b,j,k)fluoranthene	270	533	ug/Kg	8150	7070	87		50--126	8150	6890	85		3		0--35
Benzo(a)pyrene	270	533	ug/Kg	4240	2970	70		48--119	4240	2960	70		0		0--35
Indeno(1,2,3-Cd)Pyrene	270	533	ug/Kg	2740	2540	93		40--130	2740	2600	95		2		0--35
Dibenzo(a,h)anthracene	270	533	ug/Kg	419	615	147		54--200	419	697	167		13		0--35
Benzo(g,h,i)perylene	270	533	ug/Kg	2800	2420	86		42--141	2800	2390	85		1		0--35

LD:WG127809-7 L58295-94 Matrix: SOIL Listtype:ORPAH Method:SW846 3550B*SW846 8270D Project:421422-100 Pkey:STD
(Lab Duplicate)

Parameter	MDL	RDL	Units	SAMP Value	LD Value	RPD	Qual	Lab Limit
Naphthalene	5.3	10.7	ug/Kg	7	<MDL			0--35
2-Methylnaphthalene	5.3	10.7	ug/Kg	7.4	<MDL			0--35
1-Methylnaphthalene	5.3	10.7	ug/Kg	<MDL	<MDL			0--35
Acenaphthylene	5.3	10.7	ug/Kg	<MDL	<MDL			0--35
Acenaphthene	5.3	10.7	ug/Kg	90.6	46.2	65	*	0--35
Fluorene	5.3	10.7	ug/Kg	20.6	12.1	52	*	0--35
Phenanthrene	5.3	10.7	ug/Kg	240	168	36	*	0--35
Anthracene	5.3	10.7	ug/Kg	46.2	33.5	32		0--35
Fluoranthene	5.3	10.7	ug/Kg	844	709	17		0--35
Pyrene	5.3	10.7	ug/Kg	1030	833	21		0--35
Benzo(a)anthracene	5.3	10.7	ug/Kg	638	537	17		0--35
Chrysene	5.3	10.7	ug/Kg	877	740	17		0--35
Benzo(b,j,k)fluoranthene	5.3	10.7	ug/Kg	2300	1930	18		0--35
Benzo(a)pyrene	5.3	10.7	ug/Kg	1450	1190	20		0--35
Indeno(1,2,3-Cd)Pyrene	5.3	10.7	ug/Kg	366	326	11		0--35
Dibenzo(a,h)anthracene	5.3	10.7	ug/Kg	92.6	79.9	15		0--35
Benzo(g,h,i)perylene	5.3	10.7	ug/Kg	257	223	14		0--35

Surrogate: (Lab Limits)	2-Fluoro biphenyl 29--138	d14-Ter phenyl 45--150
L58295-86	65	69
L58295-87	76	84
L58295-88	71	77
L58295-89	72	80
L58295-90	73	74
L58295-91	79	84
L58295-92	81	88
L58295-93	77	74
L58295-94	75	77
L58295-95	84	82
L58295-96	82	82
WG127809-1	68	91
WG127809-2	83	86
WG127809-3	81	82
WG127809-4	81	84
WG127809-5	73	87
WG127809-6	83	87
WG127809-7	76	76

WG128334 PAH

Sample	Project	Project Description	List Type	Matrix	Collect Date	Prep Date	Anal Date	QC Association	Comments
L58295-63	421422-100	SWD , Brownfield Program	ORPAH	SOIL	7/2/2013 10:40	8/14/2013 17:00	8/15/2013 21:11	WG128334-7,-1,-2,-3,-4,-5,-6	
L58295-64	421422-100		ORPAH	SOIL	7/2/2013 10:50	8/14/2013 17:00	8/15/2013 21:52		
L58295-67	421422-100		ORPAH	SOIL	7/2/2013 11:00	8/14/2013 17:00	8/15/2013 22:32		
L58295-72	421422-100		ORPAH	SOIL	7/2/2013 11:30	8/14/2013 17:00	8/15/2013 23:13		
L58295-73	421422-100		ORPAH	SOIL	7/2/2013 12:40	8/14/2013 17:00	8/15/2013 23:53		
L58295-74	421422-100		ORPAH	SOIL	7/2/2013 13:00	8/14/2013 17:00	8/16/2013 13:38		
L58295-75	421422-100		ORPAH	SOIL	7/2/2013 12:35	8/14/2013 17:00	8/16/2013 14:19		
L58295-76	421422-100		ORPAH	SOIL	7/2/2013 13:05	8/14/2013 17:00	8/16/2013 14:59		
L58295-77	421422-100		ORPAH	SOIL	7/2/2013 13:25	8/14/2013 17:00	8/16/2013 15:40		
L58295-78	421422-100		ORPAH	SOIL	7/2/2013 13:30	8/14/2013 17:00	8/15/2013 17:48		
L58295-79	421422-100		ORPAH	SOIL	7/2/2013 13:32	8/14/2013 17:00	8/16/2013 16:20		
L58295-80	421422-100		ORPAH	SOIL	7/2/2013 14:00	8/14/2013 17:00	8/16/2013 17:00		
L58295-81	421422-100		ORPAH	SOIL	7/2/2013 14:05	8/14/2013 17:00	8/16/2013 17:40		
L58295-82	421422-100		ORPAH	SOIL	7/3/2013 9:55	8/14/2013 17:00	8/16/2013 18:21		
L58295-83	421422-100		ORPAH	SOIL	7/3/2013 10:00	8/14/2013 17:00	8/16/2013 19:01		
L58295-84	421422-100		ORPAH	SOIL	7/3/2013 10:15	8/14/2013 17:00	8/16/2013 19:42		
L58295-85	421422-100		ORPAH	SOIL	7/3/2013 10:20	8/14/2013 17:00	8/15/2013 20:31		
WG128334-1	MB		ORPAH	OTHR SOLID		8/14/2013 17:00	8/15/2013 15:06		MB130814
WG128334-2	SB		ORPAH	OTHR SOLID		8/14/2013 17:00	8/15/2013 15:46		WG128334-1
WG128334-3	MS		ORPAH	SOIL		8/14/2013 17:00	8/15/2013 16:27		L58295-78
WG128334-4	MSD		ORPAH	SOIL		8/14/2013 17:00	8/15/2013 17:07		WG128334-3 L58295-78
WG128334-5	SRM		ORPAH	SALTWTRSED		8/14/2013 17:00	8/15/2013 18:28		
WG128334-6	SRMD		ORPAH	SALTWTRSED		8/14/2013 17:00	8/15/2013 19:09		WG128334-5
WG128334-7	LD		ORPAH	SOIL		8/14/2013 17:00	8/15/2013 19:51		L58295-85

Workgroup: WG128334 PAH

MB:WG128334-1 Matrix: OTHR SOLID Listtype:ORPAH Method:SW846 3550B*SW846 8270D Project: Pkey:STD
(Method Blank)

Parameter	MDL	RDL	Units	MB Value	Qual
Naphthalene	5.3	10.7	ug/Kg	<MDL	
2-Methylnaphthalene	5.3	10.7	ug/Kg	<MDL	
1-Methylnaphthalene	5.3	10.7	ug/Kg	<MDL	
Acenaphthylene	5.3	10.7	ug/Kg	<MDL	
Acenaphthene	5.3	10.7	ug/Kg	<MDL	
Fluorene	5.3	10.7	ug/Kg	<MDL	
Phenanthrene	5.3	10.7	ug/Kg	<MDL	
Anthracene	5.3	10.7	ug/Kg	<MDL	
Fluoranthene	5.3	10.7	ug/Kg	<MDL	
Pyrene	5.3	10.7	ug/Kg	<MDL	
Benzo(a)anthracene	5.3	10.7	ug/Kg	<MDL	
Chrysene	5.3	10.7	ug/Kg	<MDL	
Benzo(b,j,k)fluoranthene	5.3	10.7	ug/Kg	<MDL	
Benzo(a)pyrene	5.3	10.7	ug/Kg	<MDL	
Indeno(1,2,3-Cd)Pyrene	5.3	10.7	ug/Kg	<MDL	
Dibenzo(a,h)anthracene	5.3	10.7	ug/Kg	<MDL	
Benzo(g,h,i)perylene	5.3	10.7	ug/Kg	<MDL	

SB:WG128334-2 MB:WG128334-1 Matrix: OTHR SOLID Listtype:ORPAH Method:SW846 3550B*SW846 8270D Project: Pkey:STD
(Spike Blank, Method Blank)

Parameter	MDL	RDL	Units	MB Value	True Value	SB Value	% Rec.	Qual	Lab Limit
Naphthalene	5.3	10.7	ug/Kg	<MDL	667	297	45		37--105
2-Methylnaphthalene	5.3	10.7	ug/Kg	<MDL	667	330	49		20--141
1-Methylnaphthalene	5.3	10.7	ug/Kg	<MDL	667	336	50		20--141
Acenaphthylene	5.3	10.7	ug/Kg	<MDL	667	360	54		45--123
Acenaphthene	5.3	10.7	ug/Kg	<MDL	667	325	49		45--115
Fluorene	5.3	10.7	ug/Kg	<MDL	667	310	46		43--134
Phenanthrene	5.3	10.7	ug/Kg	<MDL	667	459	69		52--128
Anthracene	5.3	10.7	ug/Kg	<MDL	667	475	71		44--138
Fluoranthene	5.3	10.7	ug/Kg	<MDL	667	633	95		47--150
Pyrene	5.3	10.7	ug/Kg	<MDL	667	575	86		49--139
Benzo(a)anthracene	5.3	10.7	ug/Kg	<MDL	667	571	86		40--146
Chrysene	5.3	10.7	ug/Kg	<MDL	667	588	88		42--137
Benzo(b,j,k)fluoranthene	5.3	10.7	ug/Kg	<MDL	2000	1800	90		39--150
Benzo(a)pyrene	5.3	10.7	ug/Kg	<MDL	667	572	86		51--126
Indeno(1,2,3-Cd)Pyrene	5.3	10.7	ug/Kg	<MDL	667	645	97		29--150
Dibenzo(a,h)anthracene	5.3	10.7	ug/Kg	<MDL	667	676	101		30--150
Benzo(g,h,i)perylene	5.3	10.7	ug/Kg	<MDL	667	475	71		30--150

MSD:WG128334-4 MS:WG128334-3 L58295-78 Matrix: SOIL Listtype:ORPAH Method:SW846 3550B*SW846 8270D Project:421422-100 Pkey:STD
(Matrix Spike Duplicate, Matrix Spike)

Parameter	MDL	RDL	Units	SAMP Value	True Value	MS Value	% Rec.	Qual	Lab Limit	True Value	MSD Value	% Rec.	Qual	RPD	Qual	Lab Limit
Naphthalene	5.3	10.7	ug/Kg	<MDL	667	335	50		36--103	667	387	58		14		0--35
2-Methylnaphthalene	5.3	10.7	ug/Kg	<MDL	667	402	60		22--150	667	454	68		12		0--35
1-Methylnaphthalene	5.3	10.7	ug/Kg	<MDL	667	413	62		23--150	667	465	70		12		0--35
Acenaphthylene	5.3	10.7	ug/Kg	<MDL	667	461	69		47--137	667	498	75		8		0--35
Acenaphthene	5.3	10.7	ug/Kg	<MDL	667	408	61		52--120	667	437	66		7		0--35
Fluorene	5.3	10.7	ug/Kg	<MDL	667	428	64		46--140	667	443	66		3		0--35
Phenanthrene	5.3	10.7	ug/Kg	<MDL	667	475	71		34--146	667	482	72		1		0--35
Anthracene	5.3	10.7	ug/Kg	<MDL	667	441	66		53--136	667	453	68		3		0--35
Fluoranthene	5.3	10.7	ug/Kg	<MDL	667	561	84		48--150	667	556	83		1		0--35
Pyrene	5.3	10.7	ug/Kg	<MDL	667	525	79		50--150	667	526	79		0		0--35
Benzo(a)anthracene	5.3	10.7	ug/Kg	<MDL	667	509	76		41--147	667	504	76		1		0--35
Chrysene	5.3	10.7	ug/Kg	<MDL	667	514	77		38--133	667	508	76		1		0--35
Benzo(b,j,k)fluoranthene	5.3	10.7	ug/Kg	14	2000	1700	84		38--150	2000	1680	83		1		0--35
Benzo(a)pyrene	5.3	10.7	ug/Kg	<MDL	667	623	93		53--130	667	627	94		1		0--35
Indeno(1,2,3-Cd)Pyrene	5.3	10.7	ug/Kg	<MDL	667	449	67		36--142	667	389	58		14		0--35
Dibenzo(a,h)anthracene	5.3	10.7	ug/Kg	<MDL	667	477	71		36--137	667	447	67		6		0--35
Benzo(g,h,i)perylene	5.3	10.7	ug/Kg	<MDL	667	300	45		30--150	667	275	41		9		0--35

SRMD:WG128334-6 SRM:WG128334-5 Matrix: SALTWTRSED Listtype:ORPAH Method:SW846 3550B*SW846 8270D Project: Pkey:SED
(Std Reference Material Duplicate, Std Reference Material)

Parameter	MDL	RDL	Units	True Value	SRM Value	% Rec.	Qual	Lab Limit	True Value	SRMD Value	% Rec.	Qual	RPD	Qual	Lab Limit
Phenanthrene	270	533	ug/Kg	5200	3630	70		49--124	5200	3810	73		5		0--35
Fluoranthene	270	533	ug/Kg	8800	7300	83		56--137	8800	7670	87		5		0--35
Pyrene	270	533	ug/Kg	9570	7160	75		58--123	9570	7600	79		6		0--35
Benzo(a)anthracene	270	533	ug/Kg	4660	3550	76		48--127	4660	3650	78		3		0--35
Chrysene	270	533	ug/Kg	4800	4630	96		64--150	4800	4820	100		4		0--35
Benzo(b,j,k)fluoranthene	270	533	ug/Kg	8150	6290	77		50--126	8150	6590	81		5		0--35
Benzo(a)pyrene	270	533	ug/Kg	4240	2780	65		48--119	4240	2870	68		3		0--35
Indeno(1,2,3-Cd)Pyrene	270	533	ug/Kg	2740	2200	80		40--130	2740	2340	85		6		0--35
Dibenzo(a,h)anthracene	270	533	ug/Kg	419	543	130		54--200	419	573	137		5		0--35
Benzo(g,h,i)perylene	270	533	ug/Kg	2800	1670	60		42--141	2800	1600	57		4		0--35

LD:WG128334-7 L58295-85 Matrix: SOIL Listtype:ORPAH Method:SW846 3550B*SW846 8270D Project:421422-100 Pkey:STD (Lab Duplicate)

Parameter	MDL	RDL	Units	SAMP Value	LD Value	RPD	Qual	Lab Limit
Naphthalene	5.3	10.7	ug/Kg	<MDL	<MDL			0--35
2-Methylnaphthalene	5.3	10.7	ug/Kg	<MDL	<MDL			0--35
1-Methylnaphthalene	5.3	10.7	ug/Kg	<MDL	<MDL			0--35
Acenaphthylene	5.3	10.7	ug/Kg	<MDL	<MDL			0--35
Acenaphthene	5.3	10.7	ug/Kg	<MDL	<MDL			0--35
Fluorene	5.3	10.7	ug/Kg	<MDL	<MDL			0--35
Phenanthrene	5.3	10.7	ug/Kg	<MDL	<MDL			0--35
Anthracene	5.3	10.7	ug/Kg	<MDL	<MDL			0--35
Fluoranthene	5.3	10.7	ug/Kg	<MDL	<MDL			0--35
Pyrene	5.3	10.7	ug/Kg	<MDL	<MDL			0--35
Benzo(a)anthracene	5.3	10.7	ug/Kg	<MDL	<MDL			0--35
Chrysene	5.3	10.7	ug/Kg	<MDL	<MDL			0--35
Benzo(b,j,k)fluoranthene	5.3	10.7	ug/Kg	8	8.6			0--35
Benzo(a)pyrene	5.3	10.7	ug/Kg	<MDL	<MDL			0--35
Indeno(1,2,3-Cd)Pyrene	5.3	10.7	ug/Kg	<MDL	<MDL			0--35
Dibenzo(a,h)anthracene	5.3	10.7	ug/Kg	<MDL	<MDL			0--35
Benzo(g,h,i)perylene	5.3	10.7	ug/Kg	<MDL	<MDL			0--35

Surrogate: (Lab Limits)	2-Fluoro biphenyl 29--138	d14-Ter phenyl 45--150
L58295-63	56	75
L58295-64	66	75
L58295-67	65	73
L58295-72	66	82
L58295-73	64	83
L58295-74	75	78
L58295-75	68	79
L58295-76	67	72
L58295-77	84	90
L58295-78	69	81
L58295-79	71	85
L58295-80	42	49
L58295-81	69	83
L58295-82	76	74
L58295-83	76	77
L58295-84	71	73
L58295-85	68	83
WG128334-1	53	93
WG128334-2	52	86
WG128334-3	63	80
WG128334-4	69	79
WG128334-5	62	89
WG128334-6	65	89
WG128334-7	62	78

==

4xRule indicates no MS/MSD recovery was calculated due to the 4x rule.

Conventionals Data Anomaly Form

Date(s) Occurred: *7/11/13*

WG #(s): *WG127779*

☐ **All samples in WKGP(s)** **or** ☒ **Sample #(s):** *L58295-1 to -26, -1 LD (WG127779-2), -21 LD (WG127779-4)*

Project #(s): *421422-100*

Matrix: ☐ **Liquid** ☒ **Solid** ☐ **Air** ☒ **Tissue** ☐ **Calibration** ☐ **Other:**

I. Analysis

☐ Anions:
☐ Chlorophylls:
☐ Cyanides:
☐ Demands:
☐ Nutrients:
☐ Physicals:
☒ Solids: *Total Solids (TOTS)*
☐ Subcontract:
☐ Other:

II. Instrument

Analytical Balance:	☒ Mettler Toledo XP205 ☐ Ohaus Voyager Pro
	☐ Mettler Toledo AT201
Autoanalyzer:	☐ Astoria2+2 (freshwater system) ☐ Astoria2+2 (saltwater system)
	☐ Astoria2 (total nutrients system) ☐ Astoria2 (cyanide system)
Autotitrator:	☐ Brinkmann Tiamo 855 Autotitrator with integrated 712 Conductometer
Dissolved Oxygen:	☐ YSI 5100 ☐ Brinkmann Bottletop Buret 25
Fluorometer:	☐ Turner 10-AU
Ion Chromatography:	☐ Dionex 120
pH Probe:	☐ Metrohm 736GP ☐ Accument XL60
Salinometer:	☐ Portosal 8410A
Spectrophotometer:	☐ Hitachi U3000 UV/VIS ☐ Hitachi U3900 UV/VIS
	☐ Hach DR 890
TOC Analyzer:	☐ OI 1020A ☐ OI TOC Analyzer
Turbidimeter:	☐ Hach 2100AN
Other:	☐ Description:

III. Type of Sample/Analytical Anomaly

☐ Values Outside of Control Limits:

1 ☐ Initial Calibration	4 ☐ MB Anomaly	7 ☐ MS RPD
2 ☐ Continuing Calibration Checks	5 ☐ LCS/SRM Recoveries	8 ☐ Sample/LD RPD
3 ☐ SB Spike Recoveries	6 ☐ Sample/LD/LT RSD	9 ☐ MS Recoveries

10 ☒ Holding time exceeded by: *1 day*
11 ☐ Insufficient sample amount.
12 ☐ Inappropriate storage, container or preservation.
☐ Other

Anomaly Description:

IV. Type of Project Anomaly

☐ SAP/Work Plan specified MDLs not met.
☐ SAP/Work Plan specified QC frequency or QC type not met.
☐ SAP/Work Plan specified methodology not used.
☐ Sample exceeds regulatory and/or hazardous waste limits.
☐ Sample data results are unusual or inconsistent with expected results.
☐ Other

Anomaly Description: *Samples were maintained at <=6 degrees Celsius since receipt at the laboratory. Analysis was not conducted until July 11, 2013. This was one day beyond the established 14 day holding time.*

V. Corrective Action Taken

☐ Sample(s) re-analyzed ☐ Sample(s) re-prepared and re-analyzed
☒ Sample(s) reported "AS IS"
☒ Data qualified with the following flags: *H*
☐ Text added:
☐ Other

Corrective Action Description: *Sample analysis was conducted using the available refrigerated aliquots on the day the holding time anomaly was identified. The data were qualified with the "H" qualifier to indicate that sample handling criteria were not met.*

VI. Potential Effects on Data Quality

Potential Effects on Data Quality (explanation mandatory): *Sample analysis was conducted one day beyond holding time using sample aliquots that were maintained under refrigerated conditions during the interim period. As a result, any sample degradation would most likely be minimal. However, the extent to which any bias may have been introduced cannot be quantified and these data should be used with caution.*

	Signatures	Signature Dates
Reported By: *Terry Siebens*		
Reviewer: *Jason Kinnard*		
Supervisor: *Brian Prosch*		
QA Officer: *Colin Elliott* **(For QA1 only)**		
cc: LPM: *Fritz Grothkopp*		

Trace Organics Data Anomaly Form

Date(s) Occurred: *24,-25-JUL-13*

WG #(s): *WG127809*

☒ **All samples in WKGP(s)** **or** ☐ **Sample #(s):**

Project #(s): *421422-100 SWD BROWNFIELD PROGRAM*

Matrix: ☐ **Liquid** ☒ **Solid** ☐ **Air** ☐ **Tissue** ☐ **Calibration** ☐ **Other:**

I. Analysis/Extraction

☐ BNA	☐ BNALL	☐ EDC	☐ EDC-LVI
☐ CLPESTPCB	☐ PEST	☐ PCB	☐ OPPEST
☐ VOA-GCMS	☐ NWTPH-GX	☐ NWTPH-DX	☐ NWTPH-HCID
☐ BUTYL TIN	☐ HERB		
☒ Other: *PAH*			
☐ Subcontracted:			

II. Instrument

GC/ICP/MS:	☐ P					
GC/MS:	☐ A	☐ J	☐ K	☐ L	☐ M	☐ N
GC ECD:	☐ F	☐ B	☐ C			
GC FID:	☐ I	☐ D	☐ Q TCD/ECD			
Extraction/Cleanup:	☐ PFE		☐ GPC			
	☒ Other: *7890E*					

III. Type of Sample/Analytical Anomaly

☒ Values Outside of Control Limits:

1 ☐ Blank Contamination	8 ☐ Surrogate Spike Recoveries
2 ☐ SB/SBD Spike Recoveries	9 ☐ SB/SBD RPD
3 ☐ MS/MSD Spike Recoveries	10 ☐ MS/MSD RPD
4 ☐ LCS/SRM Recoveries	11 ☒ Sample/LD RPD
5 ☐ Initial Calibration	12 ☐ Continuing Calibration Checks
6 ☐ Performance Checks	13 ☐ Tuning Criteria
7 ☒ ISTD %Differences	14 ☐ Interferences in Sample Matrix

15 ☐ Holding time exceeded by:
16 ☐ Insufficient sample amount.
17 ☐ Inappropriate storage, container or preservation.
18 ☐ Other

Anomaly Description:
7. Multiple samples had ISTD #6 (D12-Perylene) exceed QC criteria for % difference compared to daily standard.

11. WG127809-7 LD and L58295-94 had 3 compounds exceed QC Lab Limits for % RPD.

IV. Type of Project Anomaly

☒ SAP/Work Plan specified MDLs not met.
☐ SAP/Work Plan specified QC frequency or QC type not met.
☐ SAP/Work Plan specified methodology not used.
☐ Sample exceeds regulatory and/or hazardous waste limits.
☐ Sample data results are unusual or inconsistent with expected results.
☒ Other

Anomaly Description:

1. The MDLs and RDLs for specific analytes requiring dilutions (e.g., exceedance of analyte calibration range and/or matrix interferences) will increase as a multiple of the specific dilution. MDLs/RDLs are re-calculated as the dilution data is loaded to LIMS. If the MDLs/RDLs increase due to dilutions from interferences, and analytes are not detected, it will be important for the PM to evaluate the non-detects for exceedances against the multiple criteria in the SAP.

2. The current QC acceptance could differ from those in the current SAP due to the updating of the limits on an annual basis.

V. Corrective Action Taken

☐ Sample(s) re-analyzed
☒ Sample(s) reported "AS IS"
☒ Sample(s) Diluted
☒ Data qualified with the following flags: *J*
☐ Other
☐ Sample(s) re-prepared and re-analyzed
☒ Asterisk(s) applied to QC Report outlier(s)

Corrective Action Description:

7. Compounds quantitated using ISTD#6 were reported from sample dilutions. The diluted extracts lessened the matrix effect on the ISTD.

11. The compounds which exceeded QC Lab Limits were asterisked on the QC LAB Report..

VI. Potential Effects on Data Quality (mandatory):

7. The MLD/RDLs were recalculated for the compounds from the dilutions.

11. Acenaphthene, Fluorene, and Phenanthrene were flagged "J" for WG127809-7 and sample L58295-94 indicating uncertainty in the reported results due to high variability.

	Signatures	Signature Dates
Reported By: Mike Doubrava		
Reviewer: Michael Muramoto		
Supervisor: Diane McElhany		
QA Officer: *Colin Elliott* **(For QA1 only)**		
cc: LPM:		

Trace Organics Data Anomaly Form

Date(s) Occurred: *15/16-AUG-13*

WG #(s): *WG128334*

☒ **All samples in WKGP(s)** **or** ☐ **Sample #(s):**

Project #(s): *421422-100 SWD BROWNFIELD PROGRAM*

Matrix: ☐ **Liquid** ☒ **Solid** ☐ **Air** ☐ **Tissue** ☐ **Calibration** ☐ **Other:**

I. Analysis/Extraction

☐ BNA	☐ BNALL	☐ EDC	☐ EDC-LVI
☐ CLPESTPCB	☐ PEST	☐ PCB	☐ OPPEST
☐ VOA-GCMS	☐ NWTPH-GX	☐ NWTPH-DX	☐ NWTPH-HCID
☐ BUTYL TIN	☐ HERB		
☒ Other: *PAH*			
☐ Subcontracted:			

II. Instrument

GC/ICP/MS: ☐ P

GC/MS: ☐ A ☐ J ☐ K ☐ L ☐ M ☐ N

GC ECD: ☐ F ☐ B ☐ C

GC FID: ☐ I ☐ D ☐ Q TCD/ECD

Extraction/Cleanup: ☐ PFE ☐ GPC

☒ Other: *7890E*

III. Type of Sample/Analytical Anomaly

☐ Values Outside of Control Limits:

1 ☐ Blank Contamination	8 ☐ Surrogate Spike Recoveries
2 ☐ SB/SBD Spike Recoveries	9 ☐ SB/SBD RPD
3 ☐ MS/MSD Spike Recoveries	10 ☐ MS/MSD RPD
4 ☐ LCS/SRM Recoveries	11 ☐ Sample/LD RPD
5 ☐ Initial Calibration	12 ☐ Continuing Calibration Checks
6 ☐ Performance Checks	13 ☐ Tuning Criteria
7 ☐ ISTD %Differences	14 ☐ Interferences in Sample Matrix

15 ☒ Holding time exceeded by: *unknown*
16 ☐ Insufficient sample amount.
17 ☒ Inappropriate storage, container or preservation.
18 ☐ Other

Anomaly Description:

15. and 17. Samples were received in improper containers for organics analyses. Samples were extracted past the 14 day hold time.

IV. Type of Project Anomaly

- ☐ SAP/Work Plan specified MDLs not met.
- ☐ SAP/Work Plan specified QC frequency or QC type not met.
- ☐ SAP/Work Plan specified methodology not used.
- ☐ Sample exceeds regulatory and/or hazardous waste limits.
- ☐ Sample data results are unusual or inconsistent with expected results.
- ☐ Other

Anomaly Description:

V. Corrective Action Taken

- ☐ Sample(s) re-analyzed
- ☐ Sample(s) re-prepared and re-analyzed
- ☒ Sample(s) reported "AS IS"
- ☐ Asterisk(s) applied to QC Report outlier(s)
- ☐ Sample(s) Diluted
- ☒ Data qualified with the following flags: *H*
- ☐ Other

Corrective Action Description:

15. and 17. There was no corrective action possible.

VI. Potential Effects on Data Quality (mandatory):

15. and 17. Samples were flagged "H" for all analytes as standard lab procedure. Data bias could not be determined.

	Signatures	Signature Dates
Reported By: Mike Doubrava		
Reviewer: Colin Elliott		
Supervisor: Diane McElhany		
QA Officer: *Colin Elliott* (For QA1 only)		
cc: LPM:		

Data Validation Summary

Project Name:	KC Maury Island	**Sampling Dates:**	8/11/13 and 8/12/13
Project Number:	19897-99064	**Matrices:**	Blackberries
Site Location:	Maury Island	**Contract Laboratory:**	KC Environmental Lab
		Lab Report ID:	Project 421422-100
Analytical Methods:	Arsenic, Cadmium, Lead (Method PSEP 1997/ICP-MS)		

Sample ID/Date:	8/11/2013	8/12/2013
	BB-1	5-BB-2
		3c-BB-3
		1a-BB-4
		3e-BB-5

Quality assurance data reviewed:

	Organic				Inorganic			
	Reported		Results Qualified		Reported		Results Qualified	
	Yes	No	Yes	No	Yes	No	Yes	No
Method Blank		NA			X			X
Matrix Spike		NA			X			X
Laboratory Duplicate		NA			X			X
Laboratory Control Sample/LCS Duplicate		NA			X			X
Initial and Continuing Calibration		NA				X		X
Surrogate Spikes		NA				NA		

Notes:
NA = Not applicable or Not analyzed

Comments:

None.

Data Validation Summary

Project Name:	KC Maury Island	**Sampling Dates:**	8/11/13 and 8/12/13
Project Number:	19897-99064	**Matrices:**	Blackberries
Site Location:	Maury Island	**Contract Laboratory:**	KC Environmental Lab
		Lab Report ID:	Project 421422-100
Analytical Methods:	Arsenic, Cadmium, Lead (Method PSEP 1997/ICP-MS)		

Other performance information:

	Reported		Results Qualified	
	Yes	No	Yes	No
Field Records		X		X
Chain of Custody	X			X
Holding Times	X			X
Reporting Limits	X			X
Equipment Rinsate		NA		
Trip Blanks		NA		
Field Duplicates		X		X

Summary of data qualifiers:

All data are considered quantitative except for the constituents listed below.

Sample ID	Constituent	Qualifier	Reason

Explanation:

No data are qualified.

Results reported above the method detection limit but below the reporting/quantitation limit may be used with a J qualifier to indicate that they are estimated values.

Validator: Dion Valdez Signed & Dated: Dion Valdez September 11, 2013

Note: Data validation was performed in accordance with EPA National Functional Guidelines for Organic and Inorganic Data Review

Data Validation Summary

Project Name:	KC Maury Island	**Sampling Dates:**	8/11/13 and 8/12/13
Project Number:	19897-99064	**Matrices:**	Blackberries
Site Location:	Maury Island	**Contract Laboratory:**	KC Environmental Lab
		Lab Report ID:	Project 421422-100
Analytical Methods:	Arsenic, Cadmium, Lead (Method PSEP 1997/ICP-MS)		

King County

Water and Land Resources Division
Environmental Laboratory
Department of Natural Resources and Parks
322 West Ewing Street
Seattle, WA 98119-1507
206-684-2300 Fax 206-684-2395
TTY Relay: 711

September 9, 2013

Pam Morrill
CDM Smith
14432 SE Eastgate Way, Suite 100
Bellevue, WA 98007

Dear Ms. Morrill:

Enclosed are the results for the plant tissue samples received on August 12, 2013. The samples were assigned the following lab ID numbers:

Lab Number	Cust. ID	Collect Date/Time	Plant Tissue
L58522-1	BB-1	8/11/2013 15:00	Blackberries
L58522-2	5-BB-2	8/12/2013 12:45	Blackberries
L58522-3	3c-BB-3	8/12/2013 13:35	Blackberries
L58522-4	1a-BB-4	8/12/2013 14:30	Blackberries
L58522-5	3e-BB-5	8/12/2013 14:30	Blackberries

The enclosed comprehensive report includes all the results along with data qualifier flags, MDL, RDL and concentration units. The enclosed matrix report contains only the amounts detected for the listed analytes. Blank cells in the spreadsheet indicate that the analyte was not detected. All results are reported on a dry weight basis.

The associated QC results are included with the report. Each analysis QC information includes a batch report (the samples associated with the batch) and an analytical QC report.

Please feel free to call me at 206-684-2327 should you have questions regarding the results.

Sincerely,

Fritz Grothkopp

Fritz Grothkopp
Laboratory Project Manager

Enclosures

L58522 Vashon Maury Tissue.doc

1202M

King County Environmental Lab Analytical Report

	L58522-1	L58522-2	L58522-3
Project:	421422-100	421422-100	421422-100
Locator:	NONE	NONE	NONE
Descrip:	UNKNOWN LOCATOR	UNKNOWN LOCATOR	UNKNOWN LOCATOR
Sample:	L58522-1	L58522-2	L58522-3
Matrix:	TC PLANT	TC PLANT	TC PLANT
ColDate:	8/11/13 15:00	8/12/13 12:45	8/12/13 13:35
TimeSpan:			
TotalSolid:	15.7	11.6	17
ClientLoc:	BB-1	5-BB-2	3c-BB-3
SampDepth:			
DRY Weight Basis			

Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**
CV SM2540-G															
Total Solids*	15.7		0.005	0.01	%	11.6		0.005	0.01	%	17		0.005	0.01	%
MT PSEP1997															
Arsenic, Total, ICP-MS	0.0096	<RDL	0.0089	0.0435	mg/Kg	0.016	<RDL	0.0086	0.0433	mg/Kg	0.024	<RDL	0.0088	0.0437	mg/Kg
Cadmium, Total, ICP-MS	0.0331		0.0022	0.0108	mg/Kg	0.145		0.0022	0.0109	mg/Kg	0.184		0.0022	0.0109	mg/Kg
Lead, Total, ICP-MS		<MDL	0.0043	0.0217	mg/Kg	0.014	<RDL	0.0043	0.0216	mg/Kg	0.015	<RDL	0.0044	0.0219	mg/Kg
* Not converted to dry weight basis															

King County Environmental Lab Analytical Report

	Sample L58522-4	Sample L58522-5
Project:	421422-100	421422-100
Locator:	NONE	NONE
Descrip:	UNKNOWN LOCATOR	UNKNOWN LOCATOR
Sample:	L58522-4	L58522-5
Matrix:	TC PLANT	TC PLANT
ColDate:	8/12/13 14:30	8/12/13 14:30
TimeSpan:		
TotalSolid:	13.5	14
ClientLoc:	1a-BB-4	3e-BB-5
SampDepth:		
DRY Weight Basis		

Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
CV SM2540-G										
Total Solids*	13.5		0.005	0.01	%	14		0.005	0.01	%
MT PSEP1997										
Arsenic, Total, ICP-MS	0.036	<RDL	0.0089	0.0437	mg/Kg	0.024	<RDL	0.0086	0.0433	mg/Kg
Cadmium, Total, ICP-MS	0.061		0.0022	0.011	mg/Kg	0.16		0.0021	0.0109	mg/Kg
Lead, Total, ICP-MS	0.016	<RDL	0.0044	0.0219	mg/Kg	0.01	<RDL	0.0044	0.0216	mg/Kg
* Not converted to dry weight basis										

King County Environmental Lab Analytical MATRIX Report

Owner: SWD
Matrix Class: SOLID/TISSUE
User select: DRY Weight Basis

LOCATOR	PROJECT	SAMPLE	*Total Solids %	Arsenic, Total, ICP-MS mg/Kg	Cadmium, Total, ICP-MS mg/Kg	Lead, Total, ICP-MS mg/Kg
BB-1	421422-100	L58522-1	15.7	0.0096	0.0331	
5-BB-2	421422-100	L58522-2	11.6	0.016	0.145	0.014
3c-BB-3	421422-100	L58522-3	17	0.024	0.184	0.015
1a-BB-4	421422-100	L58522-4	13.5	0.036	0.061	0.016
3e-BB-5	421422-100	L58522-5	14	0.024	0.16	0.01

* Not converted to dry weight basis

If a parameter/analyze appears twice in the column header, it implies that they were analyzed by two different method code

CDM Smith

CHAIN-OF-CUSTODY

Date 8/12/13 Page 1 of 1

PROJECT INFORMATION

Project Manager: Pam Morrill

Project Name: Maury Island

Project Number: 19897 - 99064

Site Location: Maury Island Sampled By: PJM

DISPOSAL INFORMATION

☑ Lab Disposal (return if not indicated)

Disposal Method:

Disposed by: Disposal Date:

QC INFORMATION (check one)

☐ SW-846 ☐ CLP ☐ Screening ☐ CDM Std. ☐ Special

Laboratory Number:

SAMPLE ID	DATE	TIME	MATRIX	LAB ID
BB-1	8-11-13	1500	bernes	58522-1
5-BB-2	8-12-13	1245	bernes	-2
3c-BB-3	8-12-13	1335	bernes	-3
1a-BB-4	8/12/13	~~1330~~	bernes	-4
3e-BB-5	8/12/13	1430	bernes	-5

ANALYSIS REQUEST

SAMPLE ID	PETROLEUM HYDROCARBONS: TPH-HCID State:	TPH-G State:	TPH-D State:	TPH-418.1 State:	8015M Fuel Hydrocarbon	TPH Special Instructions	ORGANIC COMPOUNDS: 8010 Halogenated VOCs	8020 Aromatic VOCs	8020M - BETX only	8260 GC/MS Volatiles	8270 GC/MS Semivolatiles	8310 PAHs	8040 Phenols	DWS - Volatiles and Semivolatiles	PESTS/PCBs: 8081 OC Pest/PCBs	8082 PCBs only	8141 OP Pesticides	8151 OC Herbicides	DWS - Herb/Pest	METALS: Selected Metals: list As, Cd, Pb	RCRA Metals (8)	TCL Metals (23)	Priority Poll. Metals (13)	DWS - Metals	MFSP - Metals (Wa)	LEACHING TESTS: TCLP - Volatiles (ZHE)	TCLP - Semivolatiles	TCLP - Pesticides	TCLP - Metals	OTHER					NUMBER OF CONTAINERS
BB-1																				X															1
5-BB-2																				X															1
3c-BB-3																				X															1
1a-BB-4																				X															1
3e-BB-5																				X															1

LAB INFORMATION

Lab Name: King County

Lab Address:

Via:

SAMPLE RECEIPT

Total Number of Containers:

Chain-of-Custody Seals: Y/N/NA

Intact?: Y/N/NA

Received in Good Condition/Cold:

Turn Around Time: ☑ Standard ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 1 wk.

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA

Special Instructions:

Do wash bernes first

	1.	2.	3.
RELINQUISHED BY: Signature / Time	Pam Morrill / 1630		
Printed Name / Date	Pandora Morrill / 8/12/13		
Company	CDM Smith		
RECEIVED BY: Signature / Time	[signature] / 1630		
Printed Name / Date	Jason Kinned / 8-12-13		
Company	KCEL		

CDM Smith Bellevue: (425) 519-8300

Rev. 01/2012

DISTRIBUTION: White, Canary to Analytical Laboratory; Pink to Project

Chain of Custody.indd

WG128447 Total Solids

Sample	Project	Project Description	List Type	Matrix	Collect Date	Prep Date	Anal Date	QC Association	Comments
L58477-7	421298A	BIOSOLIDS CHARACTERIZATION	CVTOTS	SLUDGE	8/13/2013 7:00	8/19/2013 16:40	8/20/2013 13:57	WG128447-3,-4,-1	
L58522-1	421422-100	SWD , Brownfield Program	CVTOTS	PLANT	8/11/2013 15:00	8/19/2013 16:40	8/20/2013 13:54	WG128447-2	
L58522-2	421422-100		CVTOTS	PLANT	8/12/2013 12:45	8/19/2013 16:40	8/20/2013 13:55		
L58522-3	421422-100		CVTOTS	PLANT	8/12/2013 13:35	8/19/2013 16:40	8/20/2013 13:56		
L58522-4	421422-100		CVTOTS	PLANT	8/12/2013 14:30	8/19/2013 16:40	8/20/2013 13:56		
L58522-5	421422-100		CVTOTS	PLANT	8/12/2013 14:30	8/19/2013 16:40	8/20/2013 13:56		
L58537-1	423589-335-4	LDW Green River, Suspended Solids	CVTOTS	FILTER SED	8/13/2013 0:00	8/19/2013 16:40	8/20/2013 13:57	WG128447-3,-4,-1	
WG128447-1	MB		CVTOTS	OTHR SOLID		8/19/2013 16:40	8/20/2013 13:54		MB1 8/19/13
WG128447-2	LD		CVTOTS	PLANT		8/19/2013 16:40	8/20/2013 13:55	WG128447-2	L58522-1
WG128447-3	LD		CVTOTS	SLUDGE		8/19/2013 16:40	8/20/2013 13:57	WG128447-3,-4,-1	L58477-7
WG128447-4	LD		CVTOTS	FILTER SED		8/19/2013 16:40	8/20/2013 13:58		L58537-1

Workgroup: WG128447 Total Solids

MB:WG128447-1 Matrix: OTHR SOLID Listtype:CVTOTS Method:SM2540-G Project: Pkey:STD
(Method Blank)

Parameter	MDL	RDL	Units	MB Value	Qual
Total Solids	0.005	0.01	%	<MDL	

LD:WG128447-2 L58522-1 Matrix: PLANT Listtype:CVTOTS Method:SM2540-G Project:421422-100 Pkey:STD
(Lab Duplicate)

Parameter	MDL	RDL	Units	SAMP Value	LD Value	RPD	Qual	Lab Limit
Total Solids	0.005	0.01	%	15.7	15.7	0		0--20

LD:WG128447-3 L58477-7 Matrix: SLUDGE Listtype:CVTOTS Method:SM2540-G Project:421298A Pkey:STD
(Lab Duplicate)

Parameter	MDL	RDL	Units	SAMP Value	LD Value	RPD	Qual	Lab Limit
Total Solids	0.005	0.01	%	25.9	25.9	0		0--20

LD:WG128447-4 L58537-1 Matrix: FILTER SED Listtype:CVTOTS Method:SM2540-G Project:423589-335-4 Pkey:STD
(Lab Duplicate)

Parameter	MDL	RDL	Units	SAMP Value	LD Value	RPD	Qual	Lab Limit
Total Solids	0.005	0.01	%	36.8	32.9	11		0--20

WG128510 Total Metals

Sample	Project	Project Description	List Type	Matrix	Collect Date	Prep Date	Anal Date	QC Association	Comments
L58522-1	421422-100	SWD , Brownfield Program	MTICPMS-TISS	PLANT	8/11/2013 15:00	8/26/2013 13:00	8/28/2013 12:30	WG128510-1,-2,-3,-4,-5,-6	
L58522-2	421422-100		MTICPMS-TISS	PLANT	8/12/2013 12:45	8/26/2013 13:00	8/28/2013 12:35		
L58522-3	421422-100		MTICPMS-TISS	PLANT	8/12/2013 13:35	8/26/2013 13:00	8/28/2013 12:49		
L58522-4	421422-100		MTICPMS-TISS	PLANT	8/12/2013 14:30	8/26/2013 13:00	8/28/2013 12:54		
L58522-5	421422-100		MTICPMS-TISS	PLANT	8/12/2013 14:30	8/26/2013 13:00	8/28/2013 13:08		
WG128510-1	MB		MTICPMS-TISS	TISS BLANK		8/26/2013 13:00	8/28/2013 12:11		METHOD BLANK
WG128510-2	SB		MTICPMS-TISS	TISS BLANK		8/26/2013 13:00	8/28/2013 12:16		WG128510-1 MS-100 SPIKE BLANK
WG128510-3	SRM		MTICPMS-TISS	PLANT		8/26/2013 13:00	8/28/2013 12:21		PEACH LEAVES SRM
WG128510-4	SRMD		MTICPMS-TISS	PLANT		8/26/2013 13:00	8/28/2013 12:25		WG128510-3 PEACH RPD-TISS
WG128510-5	LD		MTICPMS-TISS	PLANT		8/26/2013 13:00	8/28/2013 12:39		L58522-2 RPD-TISS LAB DUPLICATE
WG128510-6	MS		MTICPMS-TISS	PLANT		8/26/2013 13:00	8/28/2013 12:44		L58522-2 MS-100 MATRIX SPIKE

Workgroup: WG128510 Total Metals

MB:WG128510-1 Matrix: TISS BLANK Listtype:MTICPMS-TISS Method:PSEP1997 Project: Pkey:STD
(Method Blank)

Parameter	MDL	RDL	Units	MB Value	Qual
Arsenic, Total, ICP-MS	0.0038	0.0192	mg/Kg	<MDL	
Cadmium, Total, ICP-MS	0.0019	0.00962	mg/Kg	<MDL	
Lead, Total, ICP-MS	0.0038	0.0192	mg/Kg	<MDL	

SB:WG128510-2 MB:WG128510-1 Matrix: TISS BLANK Listtype:MTICPMS-TISS Method:PSEP1997 Project: Pkey:STD
(Spike Blank, Method Blank)

Parameter	MDL	RDL	Units	MB Value	True Value	SB Value	% Rec.	Qual	Lab Limit
Arsenic, Total, ICP-MS	0.0038	0.0192	mg/Kg	<MDL	0.769	0.668	87		85--115
Cadmium, Total, ICP-MS	0.0019	0.00962	mg/Kg	<MDL	0.769	0.705	92		85--115
Lead, Total, ICP-MS	0.0038	0.0192	mg/Kg	<MDL	0.769	0.757	98		85--115

SRMD:WG128510-4 SRM:WG128510-3 Matrix: PLANT Listtype:MTICPMS-TISS Method:PSEP1997 Project: Pkey:STD
(Std Reference Material Duplicate, Std Reference Material)

Parameter	MDL	RDL	Units	True Value	SRM Value	% Rec.	Qual	Lab Limit	True Value	SRMD Value	% Rec.	Qual	RPD	Qual	Lab Limit
Lead, Total, ICP-MS	0.019	0.0973	mg/Kg	0.87	0.823	95		65--105	0.87	0.779	90		6		0--20

LD:WG128510-5 L58522-2 Matrix: PLANT Listtype:MTICPMS-TISS Method:PSEP1997 Project:421422-100 Pkey:STD
(Lab Duplicate)

Parameter	MDL	RDL	Units	SAMP Value	LD Value	RPD	Qual	Lab Limit
Arsenic, Total, ICP-MS	0.001	0.00502	mg/Kg	0.0019	0.0018			0--20
Cadmium, Total, ICP-MS	0.00025	0.00126	mg/Kg	0.0168	0.0161	4		0--20
Lead, Total, ICP-MS	0.0005	0.00251	mg/Kg	0.0016	0.0015			0--20

MS:WG128510-6 L58522-2 Matrix: PLANT Listtype:MTICPMS-TISS Method:PSEP1997 Project:421422-100 Pkey:STD
(Matrix Spike)

Parameter	MDL	RDL	Units	SAMP Value	True Value	MS Value	% Rec.	Qual	Lab Limit
Arsenic, Total, ICP-MS	0.001	0.00502	mg/Kg	0.0019	0.101	0.119	116		75--125
Cadmium, Total, ICP-MS	0.00025	0.00126	mg/Kg	0.0168	0.101	0.104	87		75--125
Lead, Total, ICP-MS	0.0005	0.00251	mg/Kg	0.0016	0.101	0.0911	89		75--125

Appendix H

XRF QA Data and Statistical Technical Memorandums

Table H-1
XRF Duplicate Sampling Results
Maury Island Glacier Pit/Remedial Investigation
Maury Island, Washington

Decision Unit	Sample ID	Sample Type	Arsenic mg/kg	Arsenic RPD	Lead mg/kg	Lead RPD	Cadmium mg/kg	Cadmium RPD
1A								
	1a-fd-84	Forest Duff	62	11%	201	8%	2	-67%
	1a-fd-84 (d)	Forest Duff	69		218		1	
	1a-s-06-0-i	Surface Soil	214	17%	488	-31%	7	-150%
	1a-s-06-0-i(d)	Surface Soil	254		356		1	
	1a-s-07-0	Surface Soil	106	-3%	50	-11%	3	50%
	1a-s-07-0 (d)	Surface Soil	103		45		5	
	1a-s-07-0-i	Surface Soil	24	0%	151	-1%	ND	NC
	1a-s-07-0-i(d)	Surface Soil	24		149		0	
	1a-fd-77	Forest Duff	35	-12%	119	-2%	3	NC
	1a-fd-77(d)	Forest Duff	31		117		ND	
	1a-s-79-0	Surface Soil	218	3%	381	-1%	12	-18%
	1a-s-79-0(d)	Surface Soil	224		376		10	
	1a-s-82-0-i	Surface Soil	110	7%	150	1%	ND	NC
	1a-s-82-0-i(d)	Surface Soil	118		152		10	
	1a-s-89-0	Surface Soil	35	8%	38	0%	3	-40%
	1a-s-89-0(d)	Surface Soil	38		38		2	
1B								
	1b-s-96-0-i	Surface Soil	215	0%	63	0%	2	NC
	1b-s-96-0-i(d)	Surface Soil	216		63		ND	
	1b-s-g2-5	Surface Soil	161	1%	221	-2%	ND	NC
	1b-s-g2-5(d)	Surface Soil	162		217		3	
3A								
	3a-s-16-0	Surface Soil	45	-12%	26	4%	ND	NC
	3a-s-16-0(d)	Surface Soil	40		27		2	
	3a-s-19-0-e	Surface Soil	4	0%	7	-15%	2	NC
	3a-s-19-0-e(d)	Surface Soil	4		6		ND	
	3a-s-24-0	Surface Soil	43	-2%	32	3%	ND	NC
	3a-s-24-0(d)	Surface Soil	42		33		9	
3B								
	3b-fd-30	Forest Duff	18	-25%	51	-2%	ND	NC
	3b-fd-30(d)	Forest Duff	14		50		2	
	3b-s-g1-9	Surface Soil	103	3%	108	-2%	ND	NC
	3b-s-g1-9(d)	Surface Soil	106		106		ND	
3D								
	3d-s-100-0	Surface Soil	23	-4%	33	14%	ND	NC
	3d-s-100-0(d)	Surface Soil	22		38		ND	
4C								
	4c-s-40-0-e	Surface Soil	9	11%	13	-17%	ND	NC
	4c-s-40-0-e(d)	Surface Soil	10		11		4	

Notes:
XRF data are on wet weight basis, unadjusted for dry weight.
RPD - Relative Percent Difference.
Green shading indicates RPD is greater than 20%.
(d) - duplicate sample.
mg/kg - milligrams per kilogram.
NC - not calculated.
ND - not detected.

Table H-2
XRF Replicate Sampling Results
Maury Island Glacier Pit/Remedial Investigation
Maury Island, Washington

Decision Unit	Sample ID	Sample Type	Arsenic mg/kg	Arsenic RSD	Lead mg/kg	Lead RSD	Cadmium mg/kg	Cadmium RSD
1A								
	1a-s-86-0	Surface Soil	40	3%	23	8%	ND	88%
	1a-s-86-0(d)	Surface Soil	42		20		8	
	1a-s-86-0(d)	Surface Soil	41		21		9	
	1a-s-86-0(d)	Surface Soil	44		18		ND	
	1a-s-86-0(d)	Surface Soil	41		23		ND	
	1a-s-86-0(d)	Surface Soil	43		21		1	
	1a-s-86-0(d)	Surface Soil	43		20		0	
	1a-s-86-0(d)	Surface Soil	43		20		5	
1B								
	1b-s-g2-16	Soil	134	2%	109	2%	ND	70%
	1b-s-g2-16(d)	Soil	127		108		7	
	1b-s-g2-16(d)	Soil	131		108		4	
	1b-s-g2-16(d)	Soil	131		106		ND	
	1b-s-g2-16(d)	Soil	126		110		ND	
	1b-s-g2-16(d)	Soil	131		109		ND	
	1b-s-g2-16(d)	Soil	131		108		ND	
	1b-s-g2-16(d)	Soil	129		112		3	
2A								
	2a-s-66-0	Surface Soil	8	6%	9	23%	3	47%
	2a-s-66-0(d)	Surface Soil	8		4		ND	
	2a-s-66-0(d)	Surface Soil	8		6		ND	
	2a-s-66-0(d)	Surface Soil	8		6		ND	
	2a-s-66-0(d)	Surface Soil	7		7		6	
	2a-s-66-0(d)	Surface Soil	8		6		ND	
	2a-s-66-0(d)	Surface Soil	7		8		ND	
	2a-s-66-0(d)	Surface Soil	8		6		ND	
2C								
	2c-s-50-0	Surface Soil	44	3%	120	5%	3	55%
	2c-s-50-0(d)	Surface Soil	43		126		1	
	2c-s-50-0(d)	Surface Soil	45		119		ND	
	2c-s-50-0(d)	Surface Soil	43		111		ND	
	2c-s-50-0(d)	Surface Soil	42		111		1	
	2c-s-50-0(d)	Surface Soil	41		110		ND	
	2c-s-50-0(d)	Surface Soil	43		124		ND	
	2c-s-50-0(d)	Surface Soil	43		121		2	
3A								
	3a-tp9-9	Test Pit Soil	8	17%	4	34%	4	69%
	3a-tp9-9(d)	Test Pit Soil	5		5		4	
	3a-tp9-9(d)	Test Pit Soil	6		1		ND	
	3a-tp9-9(d)	Test Pit Soil	6		4		ND	
	3a-tp9-9(d)	Test Pit Soil	5		4		ND	
	3a-tp9-9(d)	Test Pit Soil	6		3		1	
	3a-tp9-9(d)	Test Pit Soil	5		5		ND	
	3a-tp9-9(d)	Test Pit Soil	6		4		1	
3B								
	3b-s-31-0-i	Surface Soil	95	2%	209	1%	ND	NC
	3b-s-31-0-i(d)	Surface Soil	95		204		ND	
	3b-s-31-0-i(d)	Surface Soil	92		210		ND	
	3b-s-31-0-i(d)	Surface Soil	95		209		ND	
	3b-s-31-0-i(d)	Surface Soil	96		206		ND	
	3b-s-31-0-i(d)	Surface Soil	94		203		ND	
	3b-s-31-0-i(d)	Surface Soil	91		207		ND	
	3b-s-31-0-i(d)	Surface Soil	91		203		4	

Table H-2
XRF Replicate Sampling Results
Maury Island Glacier Pit/Remedial Investigation
Maury Island, Washington

Decision Unit	Sample ID	Sample Type	Arsenic mg/kg	Arsenic RSD	Lead mg/kg	Lead RSD	Cadmium mg/kg	Cadmium RSD
3C								
	3c-tp6-18	Test Pit Soil	2	27%	5	30%	ND	NC
	3c-tp6-18(d)	Test Pit Soil	4		2		ND	
	3c-tp6-18(d)	Test Pit Soil	4		4		ND	
	3c-tp6-18(d)	Test Pit Soil	2		3		5	
	3c-tp6-18(d)	Test Pit Soil	4		6		ND	
	3c-tp6-18(d)	Test Pit Soil	3		5		ND	
	3c-tp6-18(d)	Test Pit Soil	3		5		ND	
	3c-tp6-18(d)	Test Pit Soil	3		5		ND	
3D								
	3d-s-99-0	Surface Soil	48	4%	109	3%	ND	77%
	3d-s-99-0(d)	Surface Soil	48		112		ND	
	3d-s-99-0(d)	Surface Soil	45		111		1	
	3d-s-99-0(d)	Surface Soil	49		118		ND	
	3d-s-99-0(d)	Surface Soil	50		115		1	
	3d-s-99-0(d)	Surface Soil	47		117		ND	
	3d-s-99-0(d)	Surface Soil	51		118		5	
	3d-s-99-0(d)	Surface Soil	50		120		ND	
	3d-s-99-0(d)	Surface Soil	52		119		3	
3E								
	3e-p1-48	Pile Soil	25	7%	43	4%	ND	62%
	3e-p1-48(d)	Pile Soil	30		44		ND	
	3e-p1-48(d)	Pile Soil	28		40		5	
	3e-p1-48(d)	Pile Soil	30		44		ND	
	3e-p1-48(d)	Pile Soil	27		46		4	
	3e-p1-48(d)	Pile Soil	28		45		ND	
	3e-p1-48(d)	Pile Soil	26		42		ND	
	3e-p1-48(d)	Pile Soil	25		44		1	
4C								
	4c-s-40-0	Surface Soil	23	9%	42	7%	ND	115%
	4c-s-40-0(d)	Surface Soil	27		36		3	
	4c-s-40-0(d)	Surface Soil	21		38		3	
	4c-s-40-0(d)	Surface Soil	25		39		ND	
	4c-s-40-0(d)	Surface Soil	25		35		0	
	4c-s-40-0(d)	Surface Soil	27		35		0	
	4c-s-40-0(d)	Surface Soil	23		40		ND	
	4c-s-40-0(d)	Surface Soil	22		37		ND	

Notes:
XRF data are on wet weight basis, unadjusted for dry weight.
RSD - Relative Standard Deviation.
Green shading indicates RSD is greater than 20%.
(d) - replicate sample.
mg/kg - milligrams per kilogram.
NC - not calculated.
ND - not detected.

TECHNICAL MEMORANDUM

TO: CDM Maury Island Project Team

FROM: Rick W. Chappell, Ph.D.
Environmental Science Solutions LLC

DATE: December 18, 2010

SUBJECT: XRF Data Confirmation

1.0 INTRODUCTION

This technical memorandum (TM) provides an evaluation of field portable X-Ray Fluorescence (XRF) analyses of soil and forest duff samples collected at the Maury Island site; in particular, assessment of the usability of XRF data based on confirmatory sample analyses for arsenic, cadmium, and lead.

2.0 CONFIRMATORY ANALYSES

The USEPA provides guidance for field portable XRF analysis of soil and sediment samples (USEPA 1998). Section 9.7 of the guidance ("Confirmatory Samples") recommends evaluating confirmatory data (samples analyzed by both XRF and by conventional laboratory methods) using: (1) least squares regression analysis and (2) if appropriate, statistical comparison tests of the XRF and laboratory data groups. The objective of the confirmatory analysis is to assess the comparability of the XRF data and to assign a level of data quality. Per USEPA guidance, confirmatory data with correlation coefficients between 0.7 and 0.9 (regression analysis) indicate that the XRF data are acceptable as screening level data, whereas confirmatory data with correlation coefficients greater than 0.9 and that exhibit no statistically significant difference between the XRF and laboratory groups (comparison tests) could potentially meet definitive level data criteria (i.e., usable for remedial investigation, feasibility study, and human/ecological risk assessment).

2.1 <u>Data Summary</u>

In the Maury Island investigation, 40 samples were analyzed by both XRF and conventional laboratory methods (henceforth referred to as "LAB"). Of the 40 samples, 29 were soils and 11 were forest duff. The LAB also provided two sets of analytical results: (1) concentrations measured on a dry-weight (DW) basis and (2) concentrations measured on a wet-weight (WW) basis. Wet-weight basis data are considered more appropriate for comparison with XRF data because the XRF analyses are conducted on samples containing moisture (i.e., on a wet-weight basis). Hence only the wet-weight basis LAB data are evaluated in this TM.

The confirmatory sample data are provided in the attached Microsoft Excel ™ workbook:

Maury_XRF_Confirmation_2.xls

The workbook also contains an application developed specifically to perform XRF confirmation analyses using standard statistical methods (USEPA 1989). The measured concentration ranges are summarized in Table 2-1.

Table 2-1
Confirmatory Data Summary

Arsenic (ppm)	**Minimum**	**Maximum**
XRF	2	218
LAB-WW	2.4	240
LAB-DW	2.5	320
Cadmium (ppm)	**Minimum**	**Maximum**
XRF	<1	12
LAB-WW	<0.15	8.9
LAB-DW	<0.16	11
Lead (ppm)	**Minimum**	**Maximum**
XRF	4	588
LAB-WW	2.4	530
LAB-DW	2.6	970

Of note is that there are no arsenic or lead data with results measured below method detection limits (MDLs). On the other hand, cadmium contains the following numbers of below MDL (nondetect) values: XRF (14), LAB-WW (4), and LAB-DW (4). For cadmium, confirmatory evaluation is limited due to the relatively high numbers of nondetects (especially for XRF) combined with the overall low measured concentration range.

2.2 Regression Analyses

2.2.1 Soil and Forest Duff

Since the measured concentrations (Table 1) spanned more than one order of magnitude, they were log-transformed (per USEPA guidance). Scatter plots of the log-transformed data are provided in Figures 2-1 through 2-3 for the entire 40 sample confirmatory dataset (soil and forest duff).

For arsenic and lead, Pearson correlation coefficients were $r = 0.973$ (arsenic) and 0.970 (lead). These high correlations indicate a high degree of comparability, warranting group comparison analysis to assess usability.

For cadmium, the Pearson correlation coefficient was $r = 0.576$, which is below the minimum 0.7 considered indicative of screening level data.

2.2.2 Soil Only

Scatter plots are provided in Figures 2-4 through 2-6 for the 29 sample soil only confirmatory subset.

For arsenic and lead, Pearson correlation coefficients were r = 0.989 (arsenic) and 0.970 (lead). These high correlations indicate a high degree of comparability, warranting group comparison analysis to assess usability.

For cadmium, the Pearson correlation coefficient was r = 0.695, which is below the minimum 0.7 considered indicative of screening level data.

Generally, restricting the analysis to soils only improved overall comparability, though not significantly.

2.2.3 Forest Duff Only

Scatter plots are provided in Figures 2-7 through 2-9 for the 11 sample forest duff only confirmatory subset.

For arsenic and lead, Pearson correlation coefficients were r = 0.924 (arsenic) and 0.945 (lead). These high correlations indicate a high degree of comparability, warranting group comparison analysis to assess usability.

For cadmium, the Pearson correlation coefficient was r = -0.187, which is below the minimum 0.7 considered indicative of screening level data.

Generally, restricting the analysis to forest duff only reduced overall comparability.

2.3 Group Comparisons

Since the measured correlation coefficients for arsenic and lead exceeded the 0.9 criterion, additional parametric, equal variance t-test comparisons were conducted.

2.3.1 Soil and Forest Duff

The results of the comparison testing conducted on the soil + forest duff log-transformed data indicated no statistically significant difference between the XRF and LAB-WW groups: two-sided p-values were 0.849 (arsenic) and 0.720 (lead). These results strongly support use of the XRF arsenic and lead data as definitive level data.

2.3.2 Soil Only

The results of the comparison testing conducted on the soil only log-transformed data indicated no statistically significant difference between the XRF and LAB-WW groups: two-sided p-values were 0.840 (arsenic) and 0.725 (lead). These results strongly support use of the XRF arsenic and lead data as definitive level data.

2.3.3 Forest Duff Only

The results of the comparison testing conducted on the forest duff only log-transformed data indicated no statistically significant difference between the XRF and LAB-WW groups: two-sided p-values were 0.999 (arsenic) and 0.885 (lead). These results strongly support use of the XRF arsenic and lead data as definitive level data.

3.0 REFERENCES

USEPA, 1989. Methods for Evaluating the Attainment of Cleanup Standards, Volume 1: Soils and Solid Media, EPA 230/02-89-042.

USEPA, 1998. Method 6200, Field Portable X-Ray Fluorescence Spectrometry for the Determination of Elemental Concentrations in Soil and Sediment. January 1998.

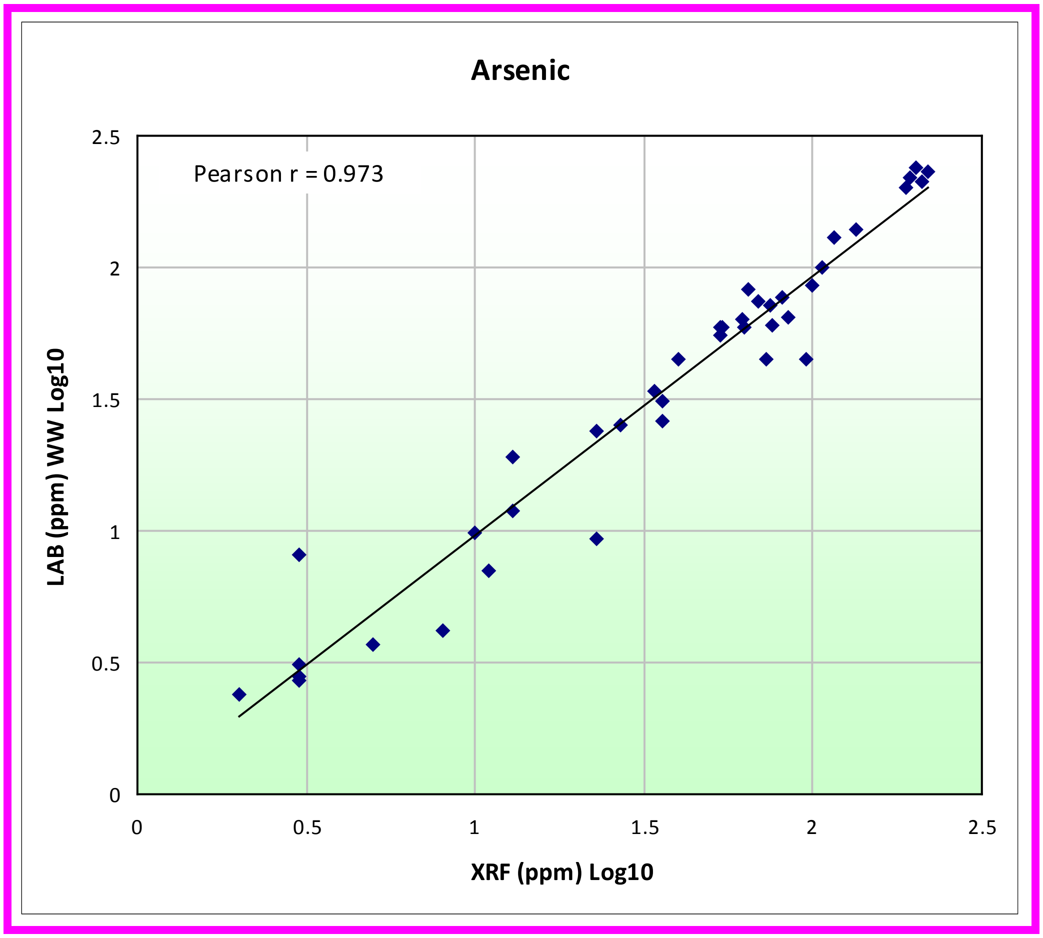

Figure 2-1 – Scatter plot of confirmatory data for arsenic for soil + forest duff.

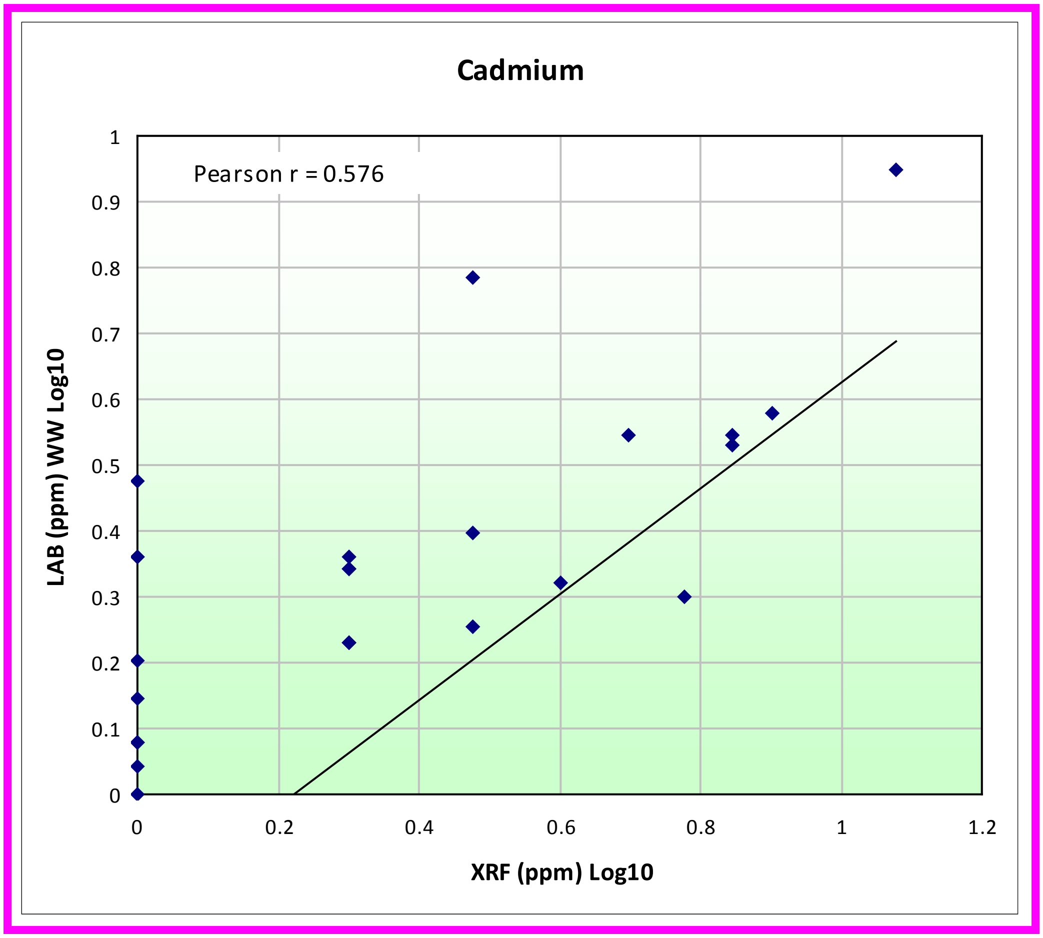

Figure 2-2 – Scatter plot of confirmatory data for cadmium for soil + forest duff.

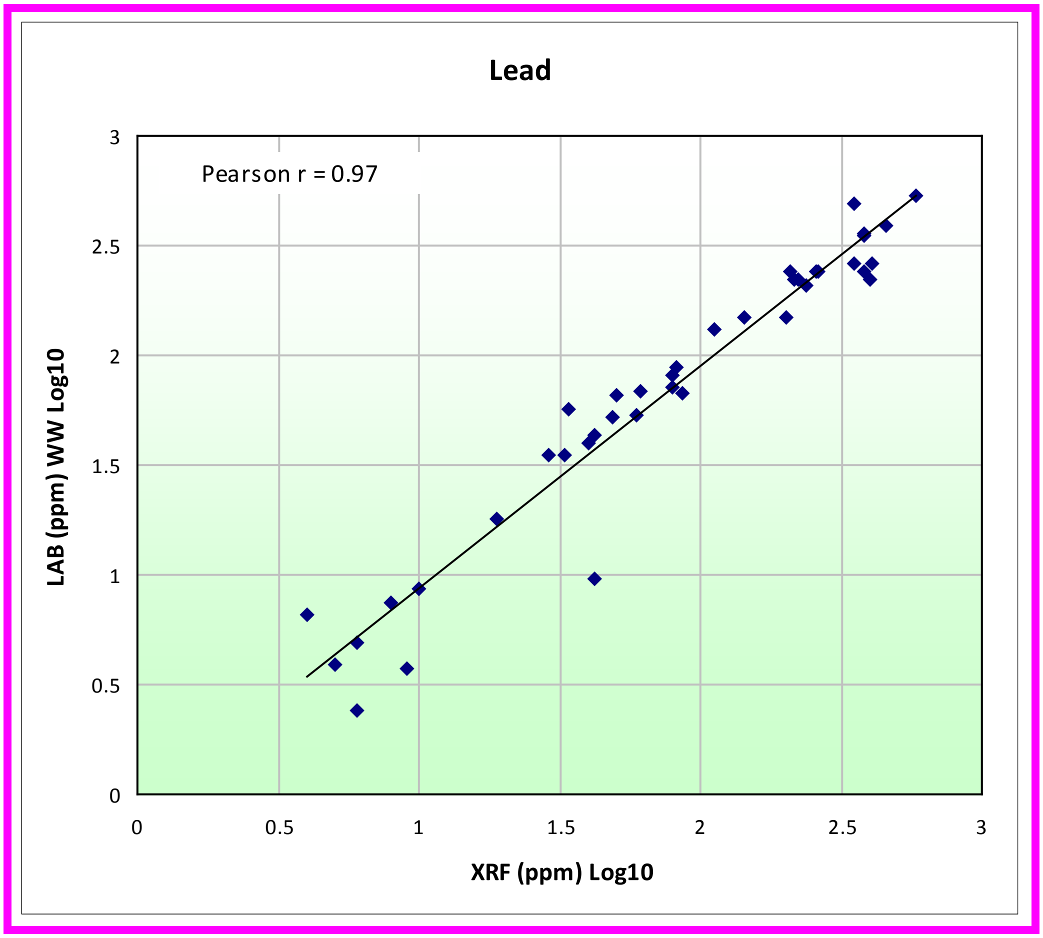

Figure 2-3 – Scatter plot of confirmatory data for lead for soil + forest duff.

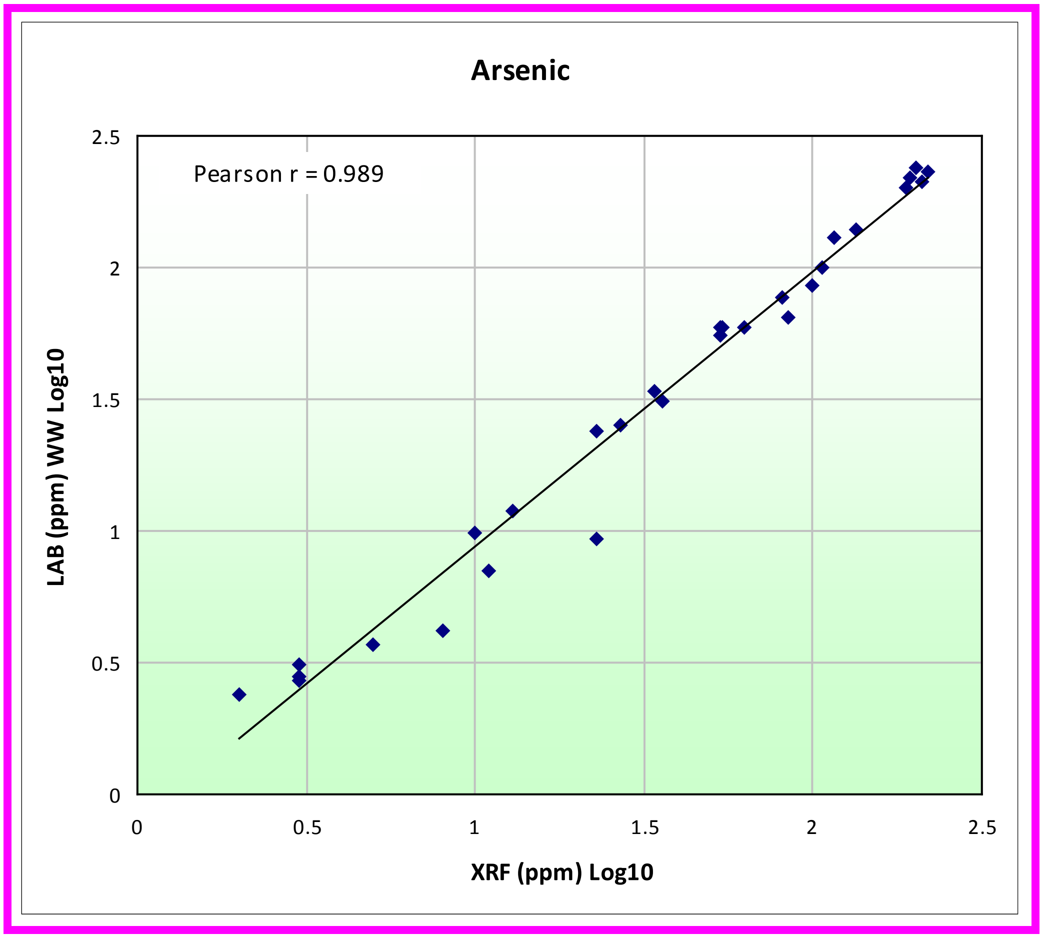

Figure 2-4 – Scatter plot of confirmatory data for arsenic for soil only.

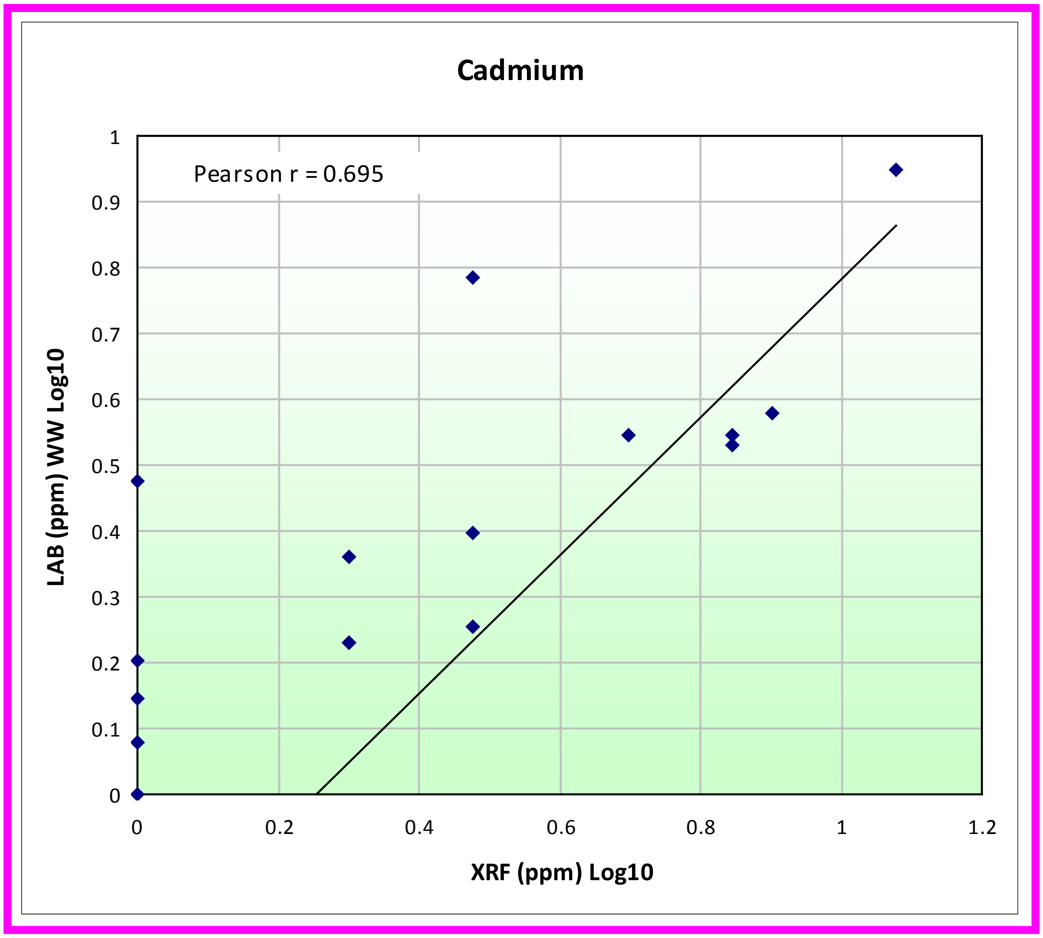

Figure 2-5 – Scatter plot of confirmatory data for cadmium for soil only.

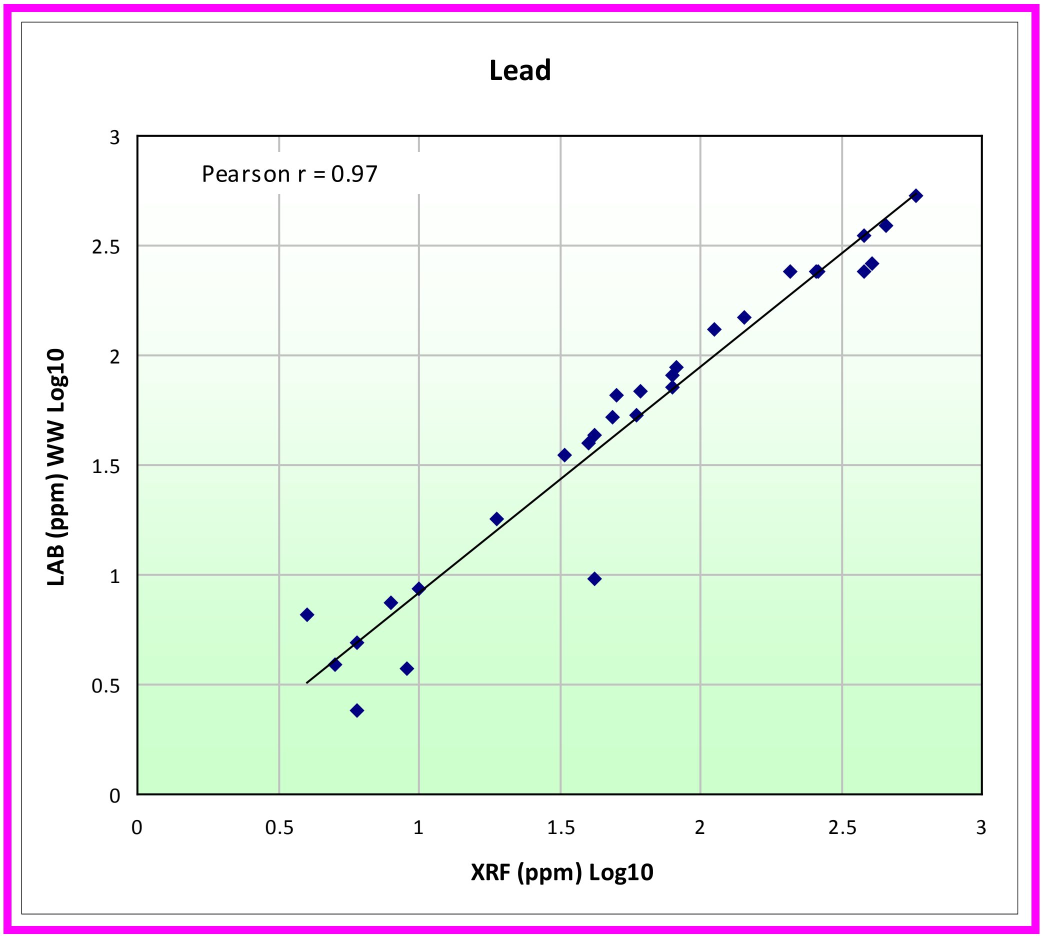

Figure 2-6 – Scatter plot of confirmatory data for lead for soil only.

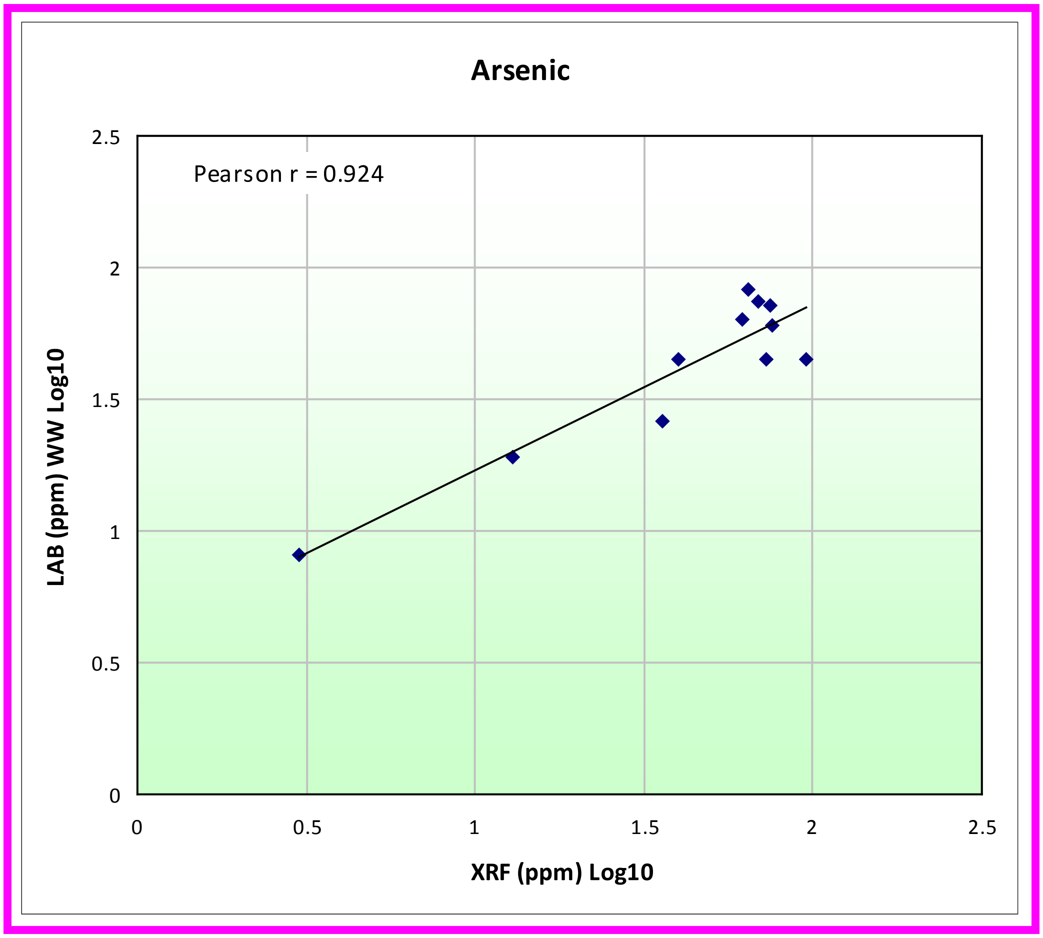

Figure 2-7 – Scatter plot of confirmatory data for arsenic for forest duff only.

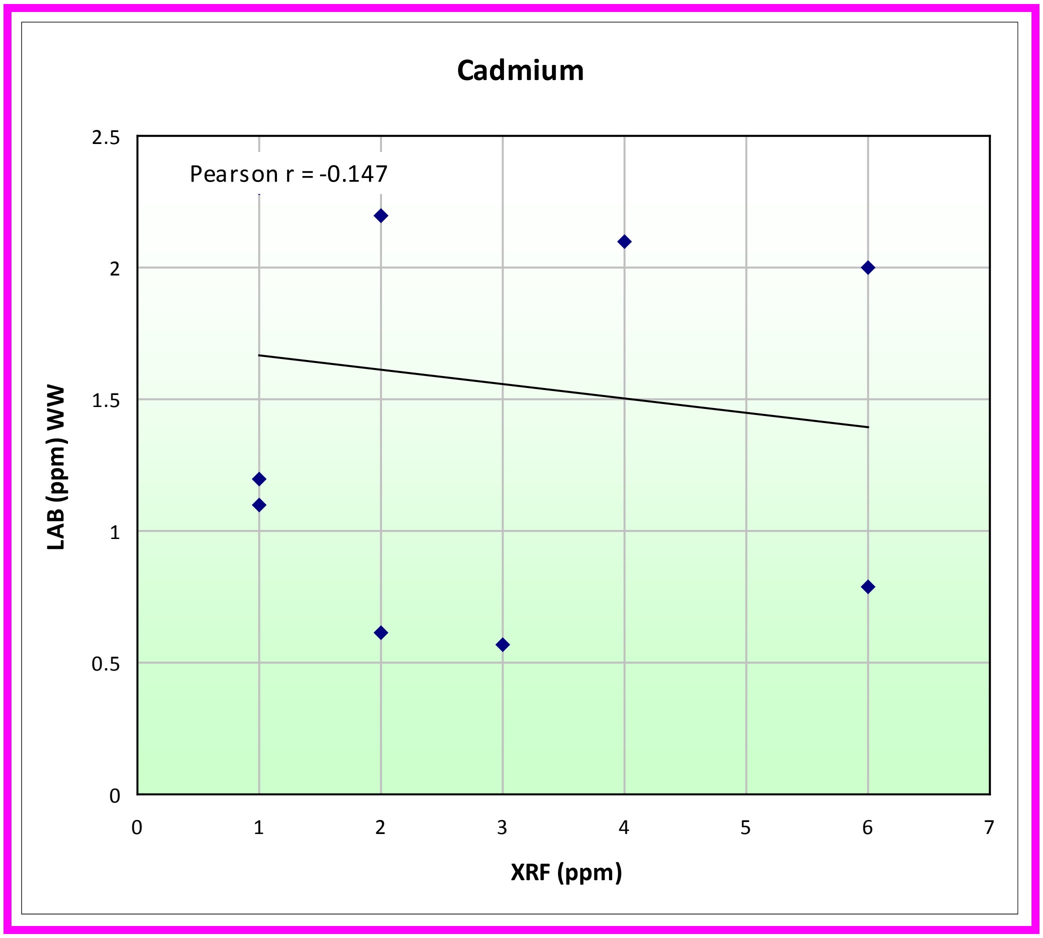

Figure 2-8 – Scatter plot of confirmatory data for cadmium for forest duff only.

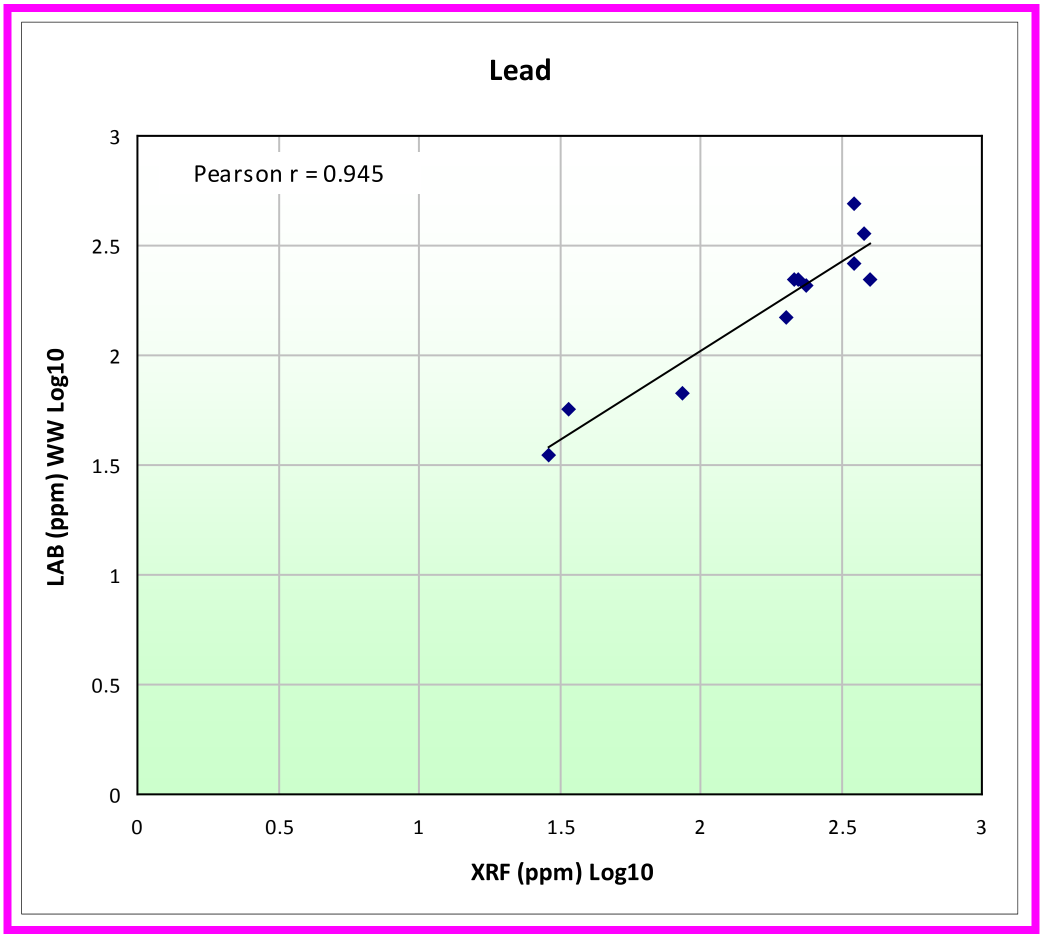

Figure 2-9 – Scatter plot of confirmatory data for lead for forest duff only.

TECHNICAL MEMORANDUM

TO: CDM Smith Maury Island Project Team

FROM: Rick W. Chappell, Ph.D.
Environmental Science Solutions LLC

DATE: August 27, 2013

SUBJECT: Evaluation of Deep Confirmation Samples

1.0 INTRODUCTION

Nine of the original samples collected from the 9-inch depth were found to contain arsenic concentrations that were higher than would be anticipated. Interestingly, seven of the nine samples were collected by Terra Associates (TA). The consistency of the higher arsenic concentrations in TA's deeper samples were thought to indicate cross contamination. This technical memorandum (TM) provides an evaluation of the original and confirmation data.

2.0 ARSENIC

Table 2-1 in Attachment A provides the original and confirmation data for arsenic. These data are plotted in Figure 2-1, where the diagonal line would represent perfect 1:1 correspondence. As shown, the surface data appear to be distributed relatively evenly about the 1:1 line, whereas the original values for the 9-inch depth data appear to be relatively higher.

Table 2-2 provides relevant statistical results for comparisons of the paired data for arsenic. As shown, the correlation coefficient for the paired surface data is statistically significant (p-value < 0.05), whereas the correlation coefficient for the paired 9-inch depth data is not. Also, both the paired t test and the sign test indicate a statistically significant difference (p-value < 0.05) for the 9-inch depth data, but no significant difference for the surface data (p-value > 0.05).

3.0 LEAD

Table 3-1 in Attachment A provides the original and confirmation data for lead. These data are plotted in Figure 3-1, where the diagonal line would represent perfect 1:1 correspondence. As shown, the original values appear to be relatively higher than the confirmation values for the surface data, and also relatively higher for the 9-inch depth data, though the values are generally lower.

Table 3-2 provides relevant statistical results for comparisons of the paired data for lead. As shown, the correlation coefficients for both the paired surface and 9-inch depth data are not statistically significant. The paired t test for the surface data indicate a statistically significant difference (p-value < 0.05), though the sign test was not statistically significant. No statistically significant difference was identified for the 9-inch depth data (p-value > 0.05).

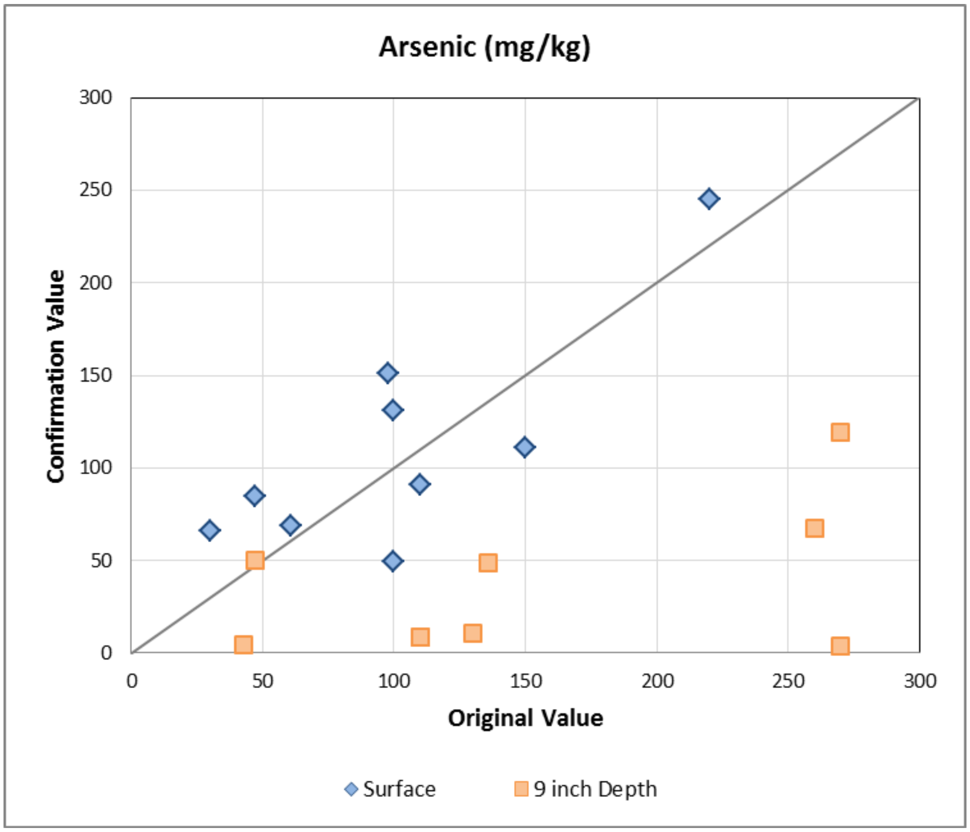

Figure 2-1

Table 2-2
Confirmation Data – Arsenic (mg/kg)

Statistic[1]	Surface	9-inch Depth
Correlation Coefficient	0.8034	0.4868
p-value (Correlation)	0.0091	0.1839
p-value (Paired t Test)	0.4785	0.0023
p-value (Sign Test)	0.5078	0.0391

[1] Obtained via program R version 2.15.2 (R Development Core Team, 2012).

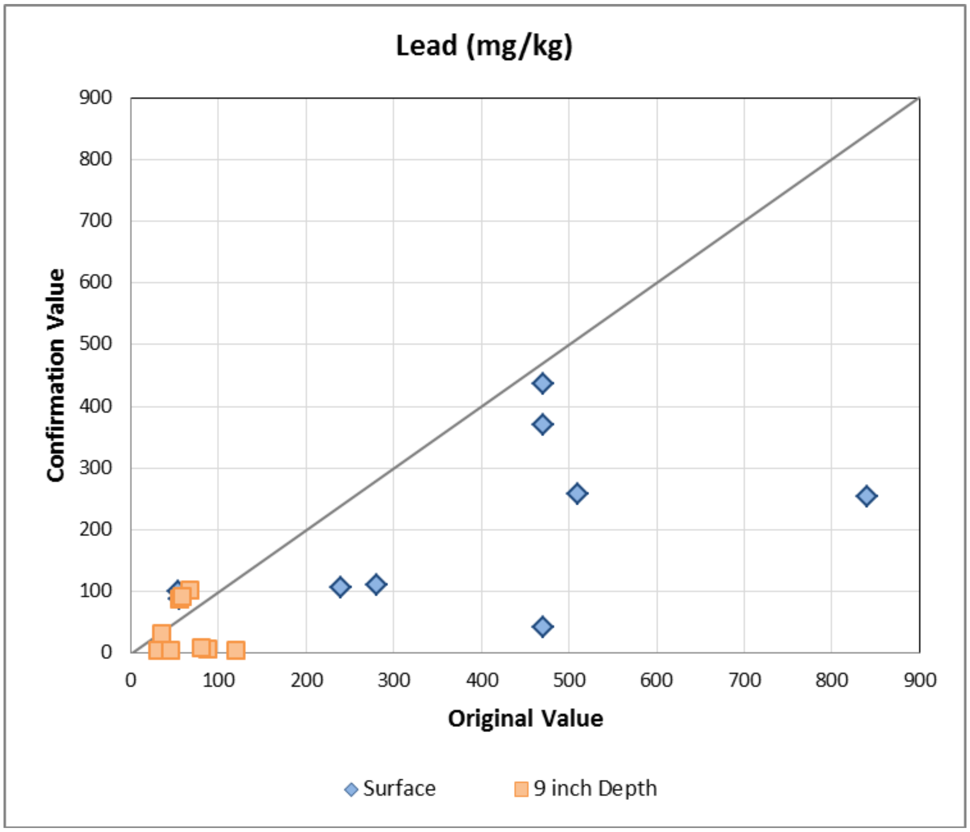

Figure 3-1

Table 3-2
Confirmation Data – Lead (mg/kg)

Statistic[1]	Surface	9-inch Depth
Correlation Coefficient	0.5261	-0.1661
p-value (Correlation)	0.1457	0.6693
p-value (Paired t Test)	0.0338	0.1906
p-value (Sign Test)	0.1797	0.5078

[1] Obtained via program R version 2.15.2 (R Development Core Team, 2012).

4.0 CONCLUSIONS

The following conclusions are made based on the statistical analyses presented herein:

1. Arsenic in the 9-inch depth samples is statistically lower in the confirmation samples than in the original samples, confirming a possible cross contamination problem in the original samples.

2. Also, lead in the surface samples is statistically lower in the confirmation samples than in the original samples.

3. Based on these results, the original sample results for both arsenic and lead are considered suspect, and therefore they should be replaced by the confirmation sample results in the project database for purposes of all subsequent statistical analyses, mapping, and risk-based assessments.

5.0 REFERENCES

R Development Core Team (2012). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. ISBN 3-900051-07-0, URL http://www.R-project.org/.

Attachment A
Confirmation Data

Table 2-1
Confirmation Data – Arsenic (mg/kg)

Original ID	Confirmation ID	Original Value	Confirmation Value	Difference
Surface				
TA-09	1a-S-146-0	98	151	-53
TA-13	1a-S-147-0	220	245	-25
TA-17	1a-S-148-0	61	69	-8
TA-19	1a-S-153-0	100	131	-31
SS-2	1b-S-165-0	110	91.2	18.8
#11	3a-S-158-0	30	65.9	-35.9
TA-05	3a-S-159-0	47	84.45	-37.45
TA-06	3a-S-160-0	100	49.5	50.5
TA-03	3b-S-169-0	150	111	39
9-inch Depth				
TA-09	1a-S-146-9	110	8.77	101.23
TA-13	1a-S-147-9	130	10.9	119.1
TA-17	1a-S-148-9	260	67.2	192.8
TA-19	1a-S-153-9	270	119	151
SS-2	1b-S-165-9	136	48.4	87.6
#11	3a-S-158-9	43	4.1	38.9
TA-05	3a-S-159-9	47	49.9	-2.9
TA-06	3a-S-160-9	270	3.5	266.5
TA-03	3b-S-169-9	110	8.48	101.52

Table 3-1
Confirmation Data – Lead (mg/kg)

Original ID	Confirmation ID	Original Value	Confirmation Value	Difference
Surface				
TA-09	1a-S-146-0	510	259	251
TA-13	1a-S-147-0	470	437	33
TA-17	1a-S-148-0	240	107	133
TA-19	1a-S-153-0	470	371	99
SS-2	1b-S-165-0	840	254	586
#11	3a-S-158-0	56	87.2	-31.2
TA-05	3a-S-159-0	54	100.1	-46.1
TA-06	3a-S-160-0	470	42.1	427.9
TA-03	3b-S-169-0	280	111	169
9-inch Depth				
TA-09	1a-S-146-9	30	5.6	24.4
TA-13	1a-S-147-9	45	5.9	39.1
TA-17	1a-S-148-9	35	31.8	3.2
TA-19	1a-S-153-9	67	102	-35
SS-2	1b-S-165-9	56	87.4	-31.4
#11	3a-S-158-9	87	6.94	80.06
TA-05	3a-S-159-9	59	91.35	-32.35
TA-06	3a-S-160-9	120	5.97	114.03
TA-03	3b-S-169-9	81	8.22	72.78

TECHNICAL MEMORANDUM

TO: CDM Maury Island Project Team

FROM: Rick W. Chappell, Ph.D.
Environmental Science Solutions LLC

DATE: September 17, 2013

SUBJECT: Small-Scale Grid versus Property-wide Variability

1.0 Introduction

This technical memorandum (TM) provides an evaluation of soil samples collected at the Maury Island site; in particular, comparison of the variability of small-scale grid data and property-wide data in Units 1A, 1B and 3B. Property-wide data included all Off Trail samples (minus the small-scale grid samples) and Historical data. Data were evaluated for arsenic (Section 2.0) and lead (Section 3.0).

Visual comparisons were made using box plots, where the end of the lower whisker indicates the minimum value, the end of the upper whisker the maximum value, the lower box edge the 25th percentile, the upper box edge the 75th percentile, the heavier interior line the 50th percentile (median), and the solid diamond symbol the arithmetic mean. For the comparisons, two datasets with similarly sized and shaped box plots would indicate essentially no discernible difference in variability.

The statistical significance of the differences in variability was determined using an F test. The F test is a test of the null hypothesis that the variances (a measure of variability) of the two datasets are equal. Two-tailed probabilities (p-values) that the variances are not significantly different were determined. To allow for distributions that are positively skewed, two sets of p-values are provided: one set for concentrations in original units and the other for natural log transformed concentrations. Actual p-values for assessing differences in variability would likely fall between these two end-member p-values in most cases, depending on the degree of skewness.

2.0 Arsenic

Box plots for arsenic are shown in Figure 2-1. Visual examination indicates general comparability in within-area variability between the small-scale grid and property-wide datasets. This is supported by the F test results provided in Table 2-1, where p-values generally exceed the critical level of 0.05 for either the original untransformed data or the natural log (Ln) transformed data in all cases. The case nearest to failing the F test (p-value < 0.05, indicating a significant difference in variance) is Unit 1B Forest Duff, which may have a lower variance in the small-scale grid dataset relative to the property-wide dataset.

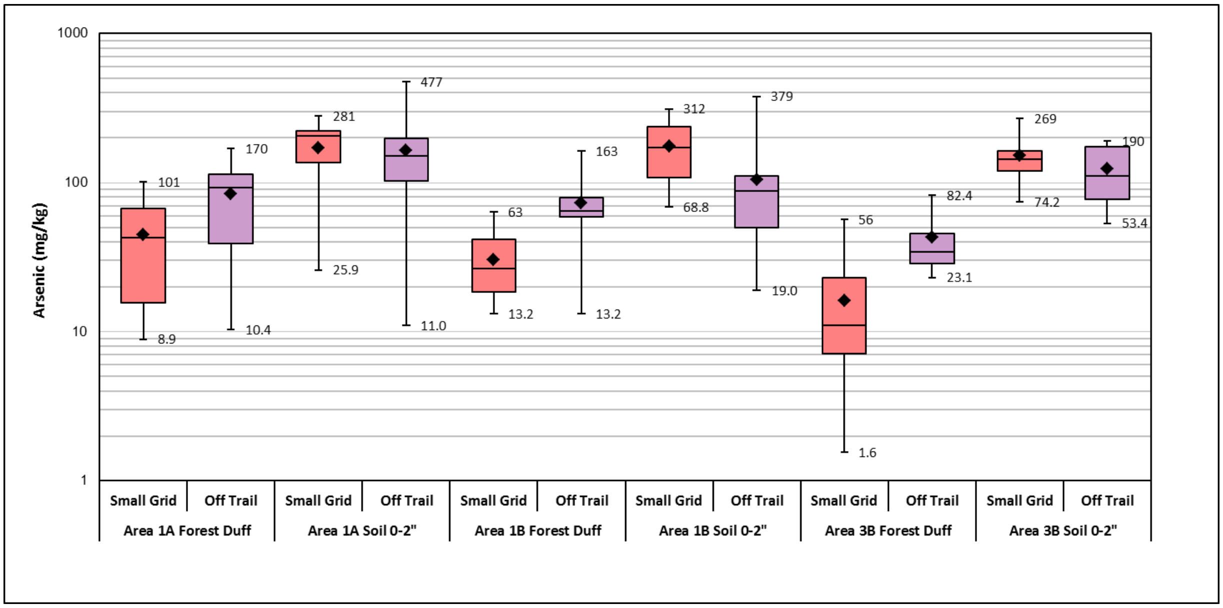

Figure 2-1 – Box plots of small-scale grid and property-wide datasets for arsenic.

Table 2-1
F Test Results - Arsenic

Unit	Small Grid Count	Off Trail Count	Arsenic p-value (2-sided)	Ln Arsenic p-value (2-sided)
Unit 1A Forest Duff	10	20	0.132200	0.801760
Unit 1A Soil 0-2"	10	32	0.651160	0.775980
Unit 1B Forest Duff	16	10	0.000229	0.106524
Unit 1B Soil 0-2"	16	30	0.761877	0.175133
Unit 3B Forest Duff	16	5	0.103638	0.275727
Unit 3B Soil 0-2"	16	9	0.859419	0.458401

3.0 Lead

Box plots for lead are shown in Figure 3-1. Visual examination indicates general comparability in within-area variability between the small-scale grid and property-wide datasets. This is supported by the F test results provided in Table 3-1, where p-values generally exceed the critical level of 0.05 for either the original untransformed data or the natural log (Ln) transformed data in all cases.

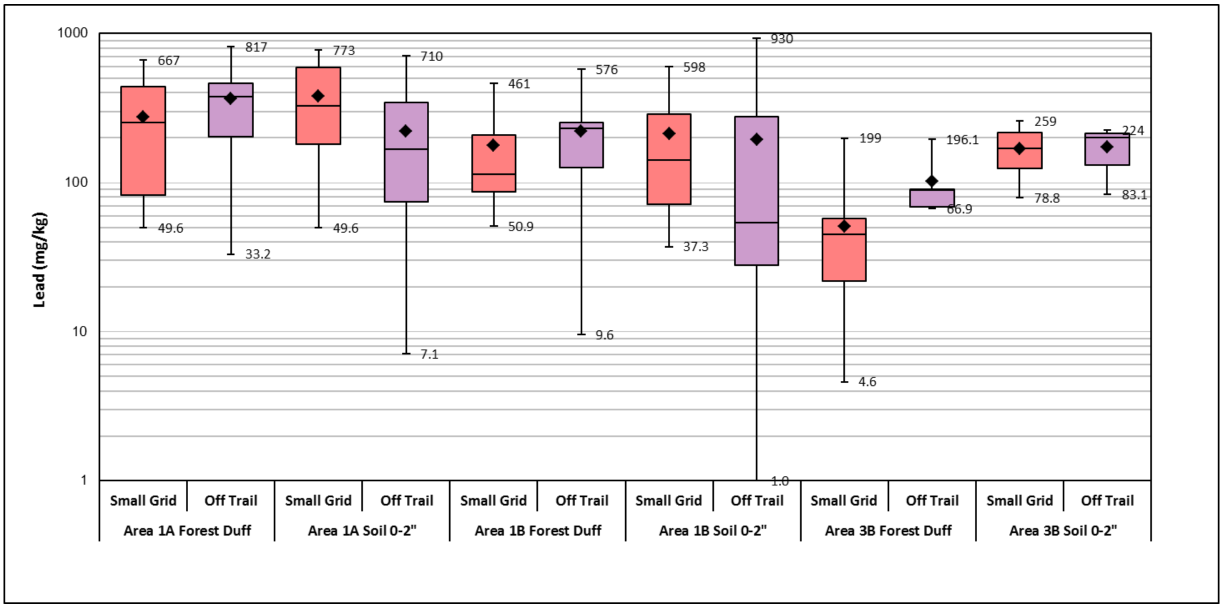

Figure 3-1 – Box plots of small-scale grid and property-wide datasets for lead.

Table 3-1
F Test Results - Lead

Unit	Small Grid Count	Off Trail Count	Lead p-value (2-sided)	Ln Lead p-value (2-sided)
Unit 1A Forest Duff	10	20	0.972574	0.462560
Unit 1A Soil 0-2"	10	27	0.187288	0.583988
Unit 1B Forest Duff	16	10	0.554908	0.072473
Unit 1B Soil 0-2"	16	20	0.136718	0.010741
Unit 3B Forest Duff	16	5	0.620417	0.157147
Unit 3B Soil 0-2"	16	6	0.865141	0.712741

4.0 Conclusions

Results provided in this evaluation indicate no significant difference in variability between the small-scale grid and property-wide off trail datasets. The result of no significant difference means that the spatial variability in both arsenic and lead at the site is essentially the same at either scale (small-scale and property-wide), hence supporting a conclusion that no additional property-wide sampling is required in order to evaluate and/or map arsenic and lead concentrations at the site for risk assessment purposes.

Appendix I

Subtidal Survey Report

BALLARD DIVING

OTAK Engineering

Bottom Survey

Report Date: July 19, 2013

Prepared For:
Doug Starkkinen
Douglas.Starkkinen@OTAK.com

Prepared By:
Ballard Diving & Salvage
Justin Costello, Diving Supervisor
BDS Project Number 213119

BALLARD DIVING

July 19, 2013

Douglas Starkkinen
OTAK Engineering
Douglas.Starkkinen@OTAK.com

RE: Bottom survey

Mr Starkkinen,
Attached is our report summarizing the findings of the survey Ballard Diving performed on Vashon Island on July 16, 2013. Underwater video was recorded during the course of the project and a copy of the DVD is included with this report.

Should you have any questions and/or comments please feel free to contact myself or Michael Eakin at the phone numbers and/or emails listed below. Thank you for allowing us to provide these services for you and we look forward to working with you again in the near future.

Sincerely,

Justin Costello
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Introduction

Ballard Diving (BDS) performed underwater survey diving operations on July 16, 2013 on Vashon Island in general accordance with the U.S. Coast Guard (USCG)-accepted Association of Diving Contractors International, Inc. (ADCI) *Consensus Standards for Commercial Diving and Underwater Operations* (6th Ed.), the U.S. Occupational Safety and Health Administration (OSHA) 29 CFR Part 1910, *Subpart T – Commercial Diving Operations* (Dir. CPL 02-00-151; 2011), Washington State's *Standards for Commercial Diving Operations* (Chapter 296-37 WAC; 2008), and the *U.S. Navy Dive Manual*, Rev. 6 (April 2008).

Project Location

The area to be surveyed consisted of a 1000' section centered on a concrete structure at N 47˚21'59.67" W 122˚26'59.2" off the coast of Vashon Island, WA. The area was to be surveyed to a depth of 40 feet of seawater or to a distance of 200 feet from the mean lower low tide mark.

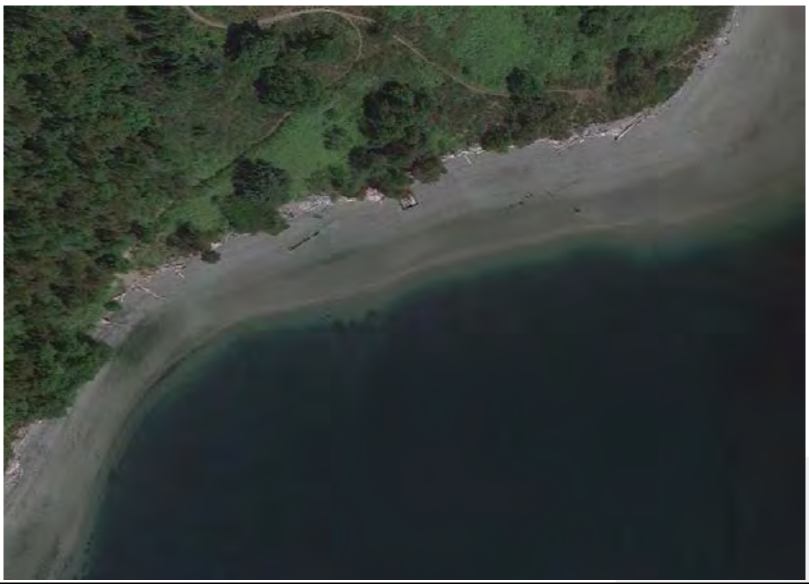

Figure 1: Project Location

Scope of Work

BDS's scope of work consisted of providing a three person diving crew and equipment to perform a bottom survey of a predetermined area. BDS was to transect the bottom by performing "sweeps" of the diver with their hose. The diver was to commence the inspection at a known point and "sweep" left and right on their dive hose. When the diver came to the boundary the diver was to face their hose and come in a determined distance and "sweep" the opposite direction and repeating again. In the event that something was found the divers location was to be marked with a GPS. Documentation of the underwater work was done using an underwater video system and recorded on DVD for subsequent viewing by the project Dive Supervisor, Justin Costello, and the client, Douglas Starkkinen.

Inspection Methods

BDS identified the "platform" from images provided by the client. Upon arrival at the location, workers went ashore and measured 500' in each direction along the beach using tape measures. An additional 50' was added in each direction to provide a safety margin. The endpoints were marked using landmarks on the beach. The workers then began at the Northeastern end of the search area and set anchor approximately 150' offshore. Diving operations commenced from the anchored vessel. The diver ran out 240' of umbilical to the Southwest. Sweeps to the inshore and offshore sides were done with each subsequent sweep on a smaller radius. The sweeps terminated when the diver arrived at areas shallow enough to have been surveyed from the land, and when the diver arrived at 40 feet of seawater. 40 feet of seawater was set by the client as a maximum depth prior to the inspection. Upon encountering deleterious debris on bottom, the diver set a buoy. Upon completion of each search, the diver was recalled to the boat and anchors were pulled. Each buoy was approached by the boat and the GPS coordinates for it were taken. The boat moved approximately 200’ down range and anchors were set again. Additional sweeps were performed in this way until the entire area had been searched.

Inspection Findings
10 locations were identified as targets. Some of these targets contained more than one item, but due to the proximity of the items, only one buoy was set. All targets encountered were piles. All but one of the piles were driven into the bottom.

Target	GPS Latitude	GPS Longitude	Target Description
A	N 47˚21’59.2”	W 122 ˚26’06.8”	2 piles, 5’ apart
B	N 47˚21’59.4”	W 122 ˚26’06.3”	2 piles, 18” apart
C	N 47˚21’58.1”	W 122 ˚26’06.8”	1 pile
D	N 47˚21’58.5”	W 122 ˚26’08.7”	1 pile
E	N 47˚21’58.2”	W 122 ˚26’08.4”	Row of 5 piles parallel to shore, 2 horizontal walers, 9 piles parallel to shore
F	N 47˚21’58.2”	W 122 ˚26’08.4”	7 piles
G	N 47˚21’58.1”	W 122 ˚26’08.1”	1 pile
H	N 47˚21’58.2”	W 122 ˚26’08.0”	3 piles
I	N 47˚21’57.7”	W 122 ˚26’11.0”	2 piles
J	N 47˚21’57.1”	W 122 ˚26’12.1”	1 pile laying horizontal on bottom

Please see Figure #1 for map of debris locations.

Summary & Recommendations

For review of the entire video footage, please refer to the DVD provided with this report. BDS thanks you for your business and please don't hesitate to contact me should you have any questions or comments.

Sincerely,

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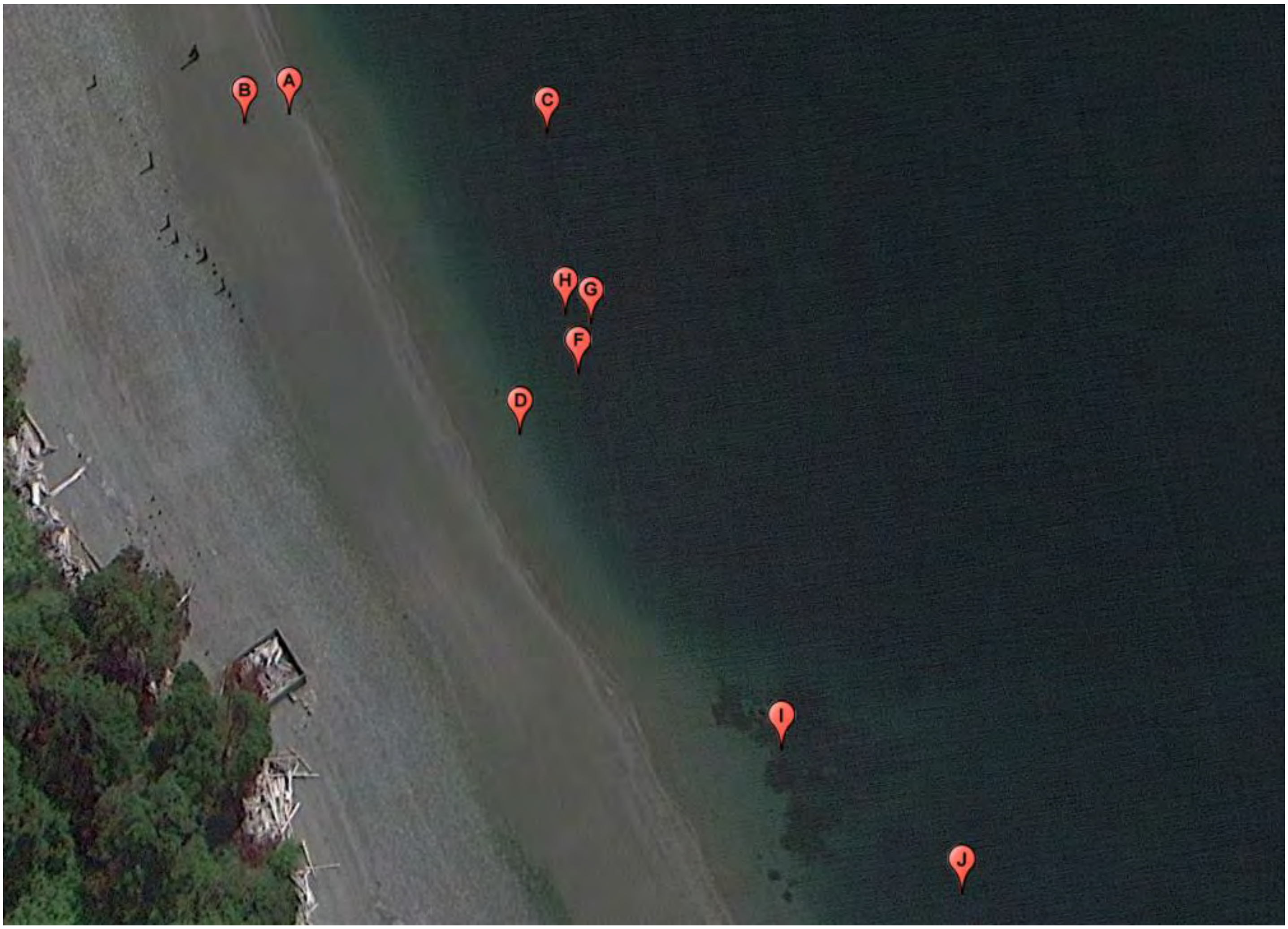

Figure #1: Map of located debris
NOTE: Targets E and F are at the same coordinates