UPPER COLUMBIA RIVER

FINAL Plant Tissue Study Data Summary Report

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In Association and Consultation with AECOM Parametrix, Inc.

June 2019

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Ramboll

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ACRONYMS AND ABBREVIATIONS

Agreement	June 2, 2006, Settlement Agreement
ACG	analytical concentration goal
ALS	ALS Environmental
CCT	Confederated Tribes of the Colville Reservation
COC	chain-of-custody
DL	detection limit
DQO	data quality objective
EPA	U.S. Environmental Protection Agency
ESI	Environmental Standards, Inc.
FSR	field summary report
GPS	global positioning system
HHRA	human health risk assessment
ID	identification
ICP	inductively coupled plasma
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
Lodestone	Lodestone Environmental Consulting
MDL	method detection limit
MRL	method reporting limit
MQO	measurement quality objective
MS	matrix spike
MSD	matrix spike duplicate
PARCC	precision, accuracy or bias, representativeness, completeness, and comparability
QA	quality assurance
QAPP	quality assurance project plan
QC	quality control
RBC	risk-based concentration
RI/FS	remedial investigation and feasibility study
RL	reporting limit
RPD	relative percent difference
SA	sampling area
SD	standard deviation
Site	Upper Columbia River site

SOP	standard operating procedure
SRM	standard reference material
TAI	Teck American Incorporated
TAL	target analyte list
UCR	Upper Columbia River

UNITS OF MEASURE

°C	degree(s) Celsius
cm	centimeter(s)
dw	dry weight
ft	foot or feet
g	gram(s)
in.	inch(es)
m	meter(s)
m ²	square meter
mg/kg	milligram(s) per kilogram
mm	millimeter(s)
ng/g	nanogram(s) per gram
μm	micron(s)

1 INTRODUCTION

This report presents the results of the 2018 field sampling effort for the plant tissue study (hereafter, the study) conducted for the Upper Columbia River (UCR) Site (hereafter, the Site).¹ The study was designed to characterize the concentrations of metals in the tissues of wild upland plants sampled from tribal allotments in the study area. Sampling and chemical analyses were conducted under the U.S. Environmental Protection Agency (EPA)-approved plant tissue study quality assurance project plan (QAPP) (Ramboll 2018). This study represents one of the tasks being completed as part of the remedial investigation and feasibility study (RI/FS) and baseline human health risk assessment (HHRA) being completed for the Site under the June 2, 2006 Settlement Agreement (USEPA 2006) between Teck American Incorporated (TAI) and EPA. The objective of the RI/FS is to investigate the nature and extent of contamination and potential for risk to humans and the environment. EPA is conducting the HHRA. TAI is conducting the RI/FS and this study with EPA oversight.

TAI collected plant tissue and co-located soil samples from the Site during three sampling events in 2018: April (April 24 through May 2), June (June 18 through June 20), and August (August 20 through August 28) (hereafter, the Spring, June, and August sampling events, respectively). Upon completion of sample collection during each field event, samples were sent to ALS Environmental (ALS) in Kelso, Washington, for chemical analysis. ALS analyzed the samples for target analyte list (TAL) metals (except calcium, magnesium, potassium, and sodium) and mercury.

1.1 STUDY PURPOSE AND DATA QUALITY OBJECTIVES

The primary objective of this study is to collect data to characterize the levels of lead, arsenic, and other metals in wild upland plants sampled from tribal allotments in the study area that are ingested or mouthed or otherwise used by Confederated Tribes of the Colville Reservation (CCT) members. Chemistry data for plant tissues will be used in the HHRA to evaluate the potential human exposure to metals and mercury by ingestion, mouthing, or other uses that may result in ingestion of the plant parts analyzed in this study. Mercury was only analyzed in stem and leaf tissue due to research demonstrating that mercury was highest in these tissues (Li et al. 2017). The development of the requirements and design rationale for data collection activities were

¹ The Site, as defined in the June 2, 2006, Settlement Agreement (USEPA 2006) is "the areal extent of hazardous substances contamination within the United States in or adjacent to the Upper Columbia River, including the Franklin D. Roosevelt Lake ("Lake Roosevelt"), from the border between the United States and Canada downstream to the Grand Coulee Dam, and all suitable areas in proximity to such contamination necessary for implementation of the response actions...."

guided by meetings and telephone calls with EPA's team on June 22, September 28, and November 9, 2017, and by the following additional documents or communications:

- A letter dated December 8, 2016, from Laura C. Buelow, EPA, to Kris McCaig, TAI, directing TAI to fund a UCR plant study and attached "Data Quality Objectives (DQO) for the Sampling of Terrestrial Plants and Laboratory Analysis of Tissues for Metals" for DQO steps 1 through 5 (USEPA 2016).
- A letter dated February 17, 2017, from Kris McCaig, TAI, to Laura C. Buelow, EPA, notifying EPA of TAI's dispute of the December 8, 2016, letter directive for TAI to fund a UCR plant study and documenting TAI's technical concerns regarding EPA's "Data Quality Objectives for the Sampling of Terrestrial Plants and Laboratory Analysis of Tissues for Metals" (TAI 2017).
- A letter dated June 14, 2017, from Laura C. Buelow, EPA, to Kris McCaig, TAI, documenting TAI's agreement to conduct limited plant tissue sampling focused on collection of plant tissue from the three tribal allotments sampled in the 2014 Residential Soil Study that had concentrations of lead above 700 mg/kg in the soil, in addition to a reference area (USEPA 2017a).
- An undated letter and table transmitted via email on September 5, 2017, from Laura C. Buelow, EPA, to Kris McCaig, TAI, documenting EPA's responses to the technical concerns raised in TAI's dispute letter regarding EPA's directive to TAI to fund plant sampling (USEPA 2017b).
- Memoranda pertaining to prior plant reconnaissance efforts and cultural plant sampling recommendations prepared by Lodestone Environmental Consulting (Lodestone 2016a,b and 2017a,b) for the CCT.
- The UCR RI/FS Tribal Consumption and Resource Use Survey (Westat 2012).
- UCR Final Field Reconnaissance Plan: Upper Columbia River Site Plant Tissue Study (Ramboll Environ 2017a).
- Field Reconnaissance Summary Report: Upper Columbia River Plant Tissue Study (AECOM 2017).
- Personal communication (e-mail correspondence with Kris McCaig, TAI, regarding responses from Don Matheny, USEPA, to follow-up questions for EPA regarding the UCR Plant Study). USEPA. December 21, 2017 (Tonel 2017).
- Personal communication between D. Johnson, Ramboll Environ, and M. Stifelman, EPA, during a November 28, 2017, conference call approving removal of essential elements

(calcium, magnesium, potassium, and sodium) in addition to mercury from the target analyte list (TAL²) (Johnson 2017).

- Personal communication between D. Mills, TAI, and M. Tonel, EPA, via an April 3, 2018, email documenting the addition of total mercury analysis for selected plant targets (kinnikinnick leaves, wild rose leaves and stems, wild mint, willows, and tules only) and co-located soil/sediment samples when sufficient plant material is available to support analysis of both TAL metals (except calcium, magnesium, potassium, and sodium) and mercury³ (Mills 2018).
- Various literature and online sources as cited in this QAPP.

The questions developed to meet the study objectives were initially presented in the QAPP (Ramboll 2018). The principal study question was:

Does exposure to total concentrations of TAL metals in wild plant tissues pose unacceptable risk to human consumers?

A secondary study question to be addressed by this work was:

Do the chemical concentrations of TAL metals in wild plant tissues collected across a range of soil lead concentrations vary with concentrations of TAL metals in soil?

After the study objectives had been approved, mercury analysis in stem and leaf target plant tissues was added. This change was based on research showing that mercury could be sequestered in those tissues (Li et al. 2017).

1.2 **REPORT ORGANIZATION**

This report is organized into the following sections:

- Section 1—Introduction. This section provides background information, identifies the purpose of the study, and outlines the organization of the report.
- Section 2—Study Design and Methods. This section describes the study design, field sampling methods, sample compositing approach, and laboratory methods, including tissue processing and chemical analytical methods.
- Section 3—Quality Assurance Project Plan Deviations. This section discusses deviations from the QAPP.

² The original TAL for the study was provided in Table 5 of USEPA (2016).

³ Where the quantity of plant material is limited, allocation of sample mass collected will be prioritized for analysis of TAL metals (except calcium, magnesium, potassium, and sodium).

- Section 4—Data Validation Assessment. This section provides a summary of the validation assessment of the analytical results.
- **Section 5–Results.** This section presents a summary of the analytical results.
- **Section 6–Summary.** This section presents a summary and results of the study.
- Section 7—References. This section presents bibliographic information for the documents cited in this report.

Figures, maps, and data tables are provided following Section 7. Data tables presented herein are also provided in electronic format, including raw data (provided on CD-ROM). Data may also be obtained directly from the project database, accessible at http://teck-ucr.exponent.com.

2 STUDY DESIGN AND METHODS

This section summarizes the study design and methods (including field collection and laboratory methods). Additional details are presented in the QAPP (Ramboll 2018).

2.1 STUDY DESIGN

The following sections describe the study design, including sampling areas and numbers of samples, and chemical analyses for tissue samples.

2.1.1 Sampling Areas

Plants were collected from 12 of 16 sampling areas (SAs) at the Site. The SAs sampled during the three field events included three 'high lead' SAs (SA01, SA02, and SA03) and nine 'lower lead' SAs (SA04, SA05, SA06, SA07, SA08, SA09, SA14, SA15, and SA16) (Map 2-1) per the EPA-approved QAPP (Ramboll 2018). The designation of high lead and lower lead SAs was initially established and utilized for the reconnaissance study, in accordance with the EPA-approved Field Reconnaissance Plan for the Plant Tissue Study (Ramboll Environ 2017a). High lead SAs were based on three tribal allotment decision units from the 2014 Residential Soil Study (CH2M Hill 2016) where incremental composite samples yielded lead concentrations greater than the time-critical removal action level of 700 mg/kg. Lower lead SAs were selected based on consideration of a range of lead concentrations at tribal allotments where other decision units have been sampled during one of the three soil studies conducted as part of the UCR RI/FS (2014 Residential Soil Study, 2014 Upland Soil Study, or 2016 Residential Soil Study).

Sixteen SAs were originally targeted for sampling in the QAPP (Ramboll 2018); however, four SAs were not sampled because these areas were either inaccessible, did not have the target plant species, or an adequate number of samples had already been collected at one or more of the other SAs and no more samples were needed to meet the study objectives. Of the SAs that were sampled, two lower lead SAs (SA15 and SA16) were exclusively sampled for willows because the habitat in those locations was unsuitable for other target plant species. All the other SAs were sampled for upland plant species. The SAs were located within the boundaries of soil or sediment sampling decision units established for previous soil studies at the Site (Integral 2014; Windward et al. 2015; CH2M HILL 2016; Ramboll Environ 2017b). The following factors were considered when selecting the sampling areas, as detailed in the QAPP (Ramboll 2018).

• **Inclusion of high lead and lower lead sampling areas.** High lead sampling areas were identified based on agreement between EPA and TAI (USEPA 2017a), which identified SA01, SA02, and SA03 as high lead SAs where soil lead concentrations were >700 mg/kg based on the 2014 residential soil study and the beach sediment study (Integral 2014;

CH2M HILL 2016; Ramboll Environ 2017b). Lower lead SAs were selected based on a range of lead concentrations lower than 700 mg/kg reported during prior UCR RI/FS soil studies (Integral 2014; Windward et al. 2015; CH2M HILL 2016; Ramboll Environ 2017b).

• **Presence of target plant species.** The 2017 plant tissue study reconnaissance results (AECOM 2017) informed the selection of SAs. The target species list was developed based on parts of plants consumed, mouthed, or otherwise utilized by CCT members (Westat 2012; Lodestone 2016a,b and 2017a,b). Based on the results of the 2017 plant tissue study field reconnaissance survey (AECOM 2017), a flow chart was developed as a guide to select the order of SAs to visit during each sampling event. Information from the Spring and June sampling events was used to refine the flow charts for the June and August events, respectively. The flow charts guided sample collection to further the goal of collecting the target number samples for the highest number of plant species.

2.1.2 Sample Collection

A total of six high lead and six lower lead plant tissue and soil co-located samples were targeted for each plant species and tissue type, as specified in the QAPP (Ramboll 2018). Sample collection was conducted during the Spring, June, and August sampling events to collect the maximum number of plant tissues on the target species list (QAPP Table A7-4), and to evaluate different plant tissues when multiple plant tissues from the same species are used by CCT members (e.g., rose leaves and stems in Spring and fruit from the same plants in August). Plant tissues targeted for collection were determined based on their expected stage of growth in each season, typical CCT collection times (Lodestone 2017b), and field observations during reconnaissance and sampling events. The Spring sampling event took place from late April to early May of 2018. The first summer sampling event took place in late June 2018, and the second summer event in late August 2018.

The locations of plant tissue and co-located soil samples collected for the study are presented by SA in Maps 2-2 through 2-13. Table 2-1 summarizes the number of samples collected at each SA.

2.1.3 Field Quality Control Samples

Field quality control (QC) samples included field replicate samples and split samples, as indicated on Tables 2-1 and 2-2. In accordance with the QAPP (Ramboll 2018), 18 field replicates were collected (a minimum of 5 percent frequency) across both the high lead and lower lead SAs to assess the variability associated with sample processing.

2.1.4 EPA Split Samples

Sixteen split samples were collected (a minimum of 5 percent frequency) for possible analysis by EPA's laboratory, pending EPA's selection of which samples to analyze as splits as part of its quality assurance (QA)/QC program. During sample collection, when there was sufficient plant tissue to comprise a split sample twice as much tissue mass was collected to supply the amount of material needed for split sample analysis, as required by the QAPP (Ramboll 2018). These samples were logged as having sufficient mass for an EPA split sample, with the expectation that these samples would be the only samples with sufficient mass for split sample analysis. However, after sample preparation and all analyses were completed by ALS, it was discovered that most of the samples contained enough remaining mass for analyses by EPA's laboratory. Thus, EPA was able to select split samples from a broader group of samples, rather than being constrained to only the plant materials collected in larger quantity. Samples collected and identified in the field as potential split samples and the samples that were selected by EPA for split sample analysis are both identified in Table 2-2.

2.1.5 Chemical Analyses

All of the plant tissue samples and co-located soil samples were analyzed for TAL metals (except calcium, magnesium, potassium, and sodium) and total solids. Selected plant tissues (kinnikinnick leaves, wild rose leaves and stems, wild mint leaves, willow branches, and tule culms) and the associated co-located soil samples were also analyzed for total mercury. The methods used for the tissue and soil chemical analyses are listed in Table 2-3.

2.2 FIELD SAMPLING METHODS

This section summarizes field methods used for the collection, labeling, and transport of the plant tissue and soil samples. A field survey was conducted in each SA by a scouting team at the beginning of each sampling event to verify that the target plants and plant parts were present and at the growth stage targeted for sampling, and to select individual plants for potential sampling. Plant species were identified to the lowest practical taxonomic level and flagged by the survey team as candidate sampling locations. When possible, selected plants were in good health and physically dispersed throughout the SA.

As stated earlier in Section 2.1.2, sample collection was conducted in accordance with the QAPP (Ramboll 2018), as described in the field summary report (FSR) (Appendix A). The minimum sample mass and target sample mass required for each plant tissue type, as discussed in the following sections, were specified in the QAPP (Ramboll 2018). These quantities were estimates of the amount of plant tissue required for chemical analyses. Cultural resource monitors and EPA technical oversight personnel were present during all three sampling events.

Co-located soil samples were collected next to small plants or below the crown of larger bushes and trees in accordance with the QAPP. For individual plant samples, one co-located individual soil sample was collected. For composite plant samples, a co-located soil sample was collected for each individual plant sampled and soil was composited in the field proportionally to the weight of the plant tissue from each plant in the composite. The collection of soil for black tree lichen was an exception and is further described in Section 2.2.1 below.

2.2.1 Spring 2018 Sample Collection

The following plant tissue and co-located soil samples were collected during the Spring sampling event (April 25 to May 2, 2018).

- Camas (*Camassia quamash*) sampling was conducted in SA01, SA03, SA05, and SA07. Camas bulbs were collected using hand spades until the target sample mass (4.5 g) was obtained. If all the bulbs of a single plant did not meet the target sample mass, bulbs from the closest camas plant or plants were also collected to create a composite sample.
- Lomatium (*Lomatium triternatum*) sampling was conducted in SA02, SA03, SA05, and SA08. Lomatium roots were also collected by hand spade until the total sample weight met the minimum sample mass (4.1 g). If a single root weighed less than the minimum sample weight, the root of the next closest lomatium plant or plants were added to the sample to create a composite sample.
- Spring beauty/Indian potatoes (*Claytonia lanceolate*) were sampled in SA01, SA02, SA03, SA04, SA05, and SA08. The corms of Indian potato plants were collected by hand until the minimum sample mass (1.9 g) was exceeded. If the combined mass of corms did not meet the minimum sample mass, corms from the closest Indian potato plant were added to the sample until the minimum mass was met to create a composite sample.
- Black tree lichen (*Bryoria fremontii*) was sampled by hand from SA01, SA05, and SA08. At the locations sampled, 20-m-diameter circles (65.6-ft) were selected as "plots," from which black tree lichen was picked from trees in that area to make a composite sample. Lichen was added to the sample until the target sample mass of 2.3 g was obtained. Soil samples were taken from the center of the 20-m circular plot in each SA.
- Kinnikinnick (*Arctostaphylos uva-ursi*) was sampled by hand from SA02, SA03, SA04, and SA06. Kinnikinnick grows in large patches, forms roots from multiple branches, and an individual plant can spread up to 15 ft. Therefore, it is difficult to determine what constitutes an individual plant based on field observation. To avoid sampling the same individual multiple times, kinnikinnick samples were taken from different patches of plants when possible. If a site had only one patch of kinnikinnick, "individual" samples

were collected at least 20 ft apart. In order to avoid damaging plants by over picking, only up to one-third of an individual plant's leaves was collected.

• Willow (*Salix exigua*) collection was conducted in SA16. Branches measuring up to 0.5 in. in diameter were selected and cut off from individual trees using hand-held clipping shears. Branches were collected from individual trees for each sample until the combined branch length was 189 cm.

2.2.2 June 2018 Sample Collection

The following plant tissue samples were collected during the June sampling event (June 18 to June 20, 2018; early summer):

- Lomatium (*Lomatium triternatum*) sampling was conducted only in SA03. Lomatium roots were collected using a hand spade until the minimum sample mass (4.1 g) was obtained. If a single root weighed less than the minimum sample weight, the root of the next closest lomatium plant or plants were added to the sample to create a composite sample.
- Wild rose stems and leaves (*Rosa* sp.) were collected from *Rosa gymnocarpa*, *R. nutkana*, and *R. woodsi*. Wild rose sampling was conducted in SA01, SA03, SA04, and SA06. Wild rose stems and leaves were collected individually by hand until the target sample length of 48.5 cm was obtained. Samples included young tender stems and leaves attached to the stems. To increase the likelihood of rose hips being available to sample in August, the tops of large plants and plants with flower buds were not snipped if sufficient mass could be collected without snipping.
- Huckleberry (*Vaccinium cespitosum*) sampling was conducted in SA04. Whenever possible, individual plants with abundant berries were selected for sampling. Berries were picked individually by hand until at least the minimum sample mass of 16 g was obtained. If more berries were available on the plant, more berries were added to the sample until either the target sample mass (31 g) was obtained or until all the berries (both ripe and immature) were collected.

2.2.3 August 2018 Sample Collection

The following plant tissue samples were collected during the August sampling event (August 20 to August 28, 2018; late summer):

• Chokecherry (*Prunus virginiana*) sampling was conducted in SA01, SA03, SA07, and SA09. Whenever possible, individual plants with abundant berries were selected for sampling. Chokecherries were picked by hand until the target sample mass of 62 g was obtained.

- Hazelnut (*Corylus cornuta var. californica*) was sampled by hand from SA02, SA03, SA04, SA06, and SA09. Hazelnuts were picked by hand from the bushes. All available nuts on each bush were included in the sample; nuts that were visually determined to have insect damage or were rotten were discarded.
- Ponderosa pine (*Pinus ponderosa*) was sampled from SA01, SA02, SA03, SA04, and SA07. Cones were picked up from the ground, from the branches of individual trees by hand, or from the branches of individual trees with landscaping tree trimmers. The distance between trees targeted for sampling was more than 1.5 times the estimated height of the tallest tree sampled. Pine cones that had visible pine nuts were preferentially selected for the samples. A trial pinecone dissection at the beginning of the field effort did not find a characteristic that strongly predicted the number of seeds per cone (such as being closed, whole, humid, etc.). Instead, the field sampling team simply tried to find cones where some seeds were visible. Pine nuts had a target sample mass of 1.4 g.
- Sarvisberry (*Amelanchier alnifolia*) was sampled from SA01, SA03, SA07, SA08, and SA14. Whenever possible, individual plants with abundant berries were selected for sampling. Berries were picked by hand until the target sample mass of 3.1 g was obtained.
- Tule (*Schoenoplectus acutus*) was sampled from SA14. Since tule grows in large patches, it is difficult to determine what constitutes an "individual" plant. In SA14, the entire area that contained tule was roughly 30 m x 23 m (100 ft x 75 ft); individual patches were typically 1 m² or less. Within the larger area, individual tule culms as far from one another as possible were selected for different samples. Individual culms no more than 0.5 in. in diameter were selected and cut close to the rhizome. The reproductive parts were removed and discarded near mature plants. The specimen was then measured. The soil was dry when collected; no sediment sampling was necessary.
- Willow (*Salix exigua*) was sampled from SA15. Branches measuring up to 1.3 cm (0.5 in.) in diameter were selected and cut off from individual trees using hand-held clipping shears. Branches were collected from individual trees for each sample until the combined branch length was 189 cm (74.4 in.). A soil sample was collected from beneath the crown of the willow tree.
- Wild rose hips (*Rosa spp.*) were collected from *Rosa gymnocarpa, R. nutkana,* and *R. woodsi* in SA06, SA09, and SA14. Rose hips were handpicked from individual rose bushes until the mass exceeded the minimum sample mass of 4.4 g. If there were many rose hips on a bush, more hips were added until the sample met or exceeded the 8.7 g target sample mass. When an individual plant did not have enough rose hips for a single sample, the next closest plant or plants were collected for a composite sample.

• Wild mint (*Mentha arvensis*) was collected from SA14. Since wild mint grows in patches, it is difficult to differentiate individual plants. One individual plant usually did not have enough leaves for a whole sample, so leaves from the next closest plant were collected to add to the sample. Since nearby mint plants are likely the same individual, this sample was not considered a composite sample. One soil sample was taken from the middle of the wild mint plant sample area. Mint samples were collected approximately 6 m (20 ft) apart to minimize repeated collection of the same individual.

2.2.4 Sample Identification, Labeling, and Shipping

The sampling team documented sample locations using a handheld global positioning system (GPS) unit and took digital photographs before sampling at each sampling location. Plants were sampled as described in Sections 2.2.1, 2.2.2, and 2.2.3. (The procedures for collecting composite samples are discussed in Section 2.2.5.) Sampled plants were photographed and weighed or, when applicable, the length was measured, in accordance with the plant species-specific standard operating procedure (SOP). Plant tissue samples were double-bagged in resealable plastic bags with a label containing the specific sample identification (ID). After removing the organic duff layer, soil samples were collected from 0 to 3 in. below the ground surface using a decontaminated auger, coring, or spade tool. The 0- to 3-in. depth interval was selected as all plants have roots that pass through that depth range, and because this depth was consistent with previous soil studies conducted as part of the RI/FS. Soil samples were inspected by a cultural resource monitor following collection, as required by the Cultural Resource Coordination Plan (Appendix C of the QAPP). Following this inspection, the soil sample was hand mixed in a resealable plastic bag and transferred to a laboratory-supplied sample jar with the appropriate sample ID. Packaged plant tissue and soil samples were stored in coolers with ice in the field and transferred to freezers or coolers with dry ice at 4 ±2 °C until shipment to the laboratory. Samples were hand-delivered to ALS by field personnel.

Each sample ID contained a unique sampling location identifier followed by an individual organism identifier. Sampling location identifiers consisted of the following:

- Four-digit sampling area code—SA01 to SA16
- Two-digit sample event designation—SP for spring, JU for late June, and AU for late August⁴
- Two-digit sequential number to indicate location of sample

⁴ See Section 3.1.2.3 for QAPP modification.

- One-digit code to designate a plant or co-located soil/sediment sample—P for plant, S for soil/sediment
- Two-digit number to indicate if more than one specimen was collected from that location.

Examples are:

- SA04-SP05-P01 = Plant tissue sample collected from lower lead SA number 4, sampled in the spring from location 5
- SA01-JU03-S01 = Co-located soil sample collected in high lead SA number 1 sampled in late June from location 3.

Sample IDs did not contain species-specific codes, so plant species information was matched to sample IDs using field records.

2.2.5 Sample Compositing

When an individual plant did not meet the sample mass requirement for laboratory analysis, a composite sample was collected as described in the QAPP (Ramboll 2018). Briefly, plant tissue from an individual plant was weighed in the field to determine if it met the mass required for analysis. If not, additional plants of the same species were weighed and sampled until the desired sample mass was obtained. Plants included in the composite sample were sampled within a 3-m (9.8-ft) radius of the original plant when possible. This is because plants in close proximity are more likely to be genetically related (seeds fall nearby more often than farther away), are more likely to be sharing nutrients through connected root networks, and are more likely to obtain nutrients from soil with similar contaminant of interest concentrations. A single GPS point was recorded for plants in the composite if the plants were within a 3-m radius. If additional plants had to be included in the composite sample that were located outside the initial 3-m radius to collect the minimum mass required, a separate GPS point was collected for those plants, and a centroid coordinate was calculated for the composite sampling location as described in Appendix B.

A co-located composite soil sample was collected for each composite plant tissue sample. A 0-to-3-in.-deep soil sample was collected from the location of each plant that was part of the composite sample. The amount of soil from each individual sample included in the final composite sample was proportional to the relative mass contributed by its co-located plant sample to the composite plant tissue sample (i.e., two-thirds, one-third). The number of units that compose each composite sample are identified in Table 2-2, along with average plant sample mass/length, and total sample mass/length.

2.3 LABORATORY METHODS

The plant tissue samples were received by ALS and stored frozen at or below -20 °C until processing. Plant tissue samples were processed, dried, and homogenized prior to chemical analysis. Soil samples specified for mercury analysis were frozen at or below -15 °C until processing. Soil samples not specified for mercury analysis were stored at room temperature until processing. All soil samples were dried and sieved prior to analysis.

2.3.1 Sample Processing

The plant tissue samples were processed in accordance with the ALS tissue processing SOP presented in Appendix B of the QAPP. Additional laboratory processing not specified in the QAPP was required for chokecherries, hazelnuts, pine cones, and willows. Additional processing included removing portions of the sample that were not consumed or used by CCT members (i.e., pits, shells, leaves). After processing, plant tissue samples were freeze-dried. After freeze drying, the plant tissue samples were homogenized with a stainless-steel grinder or a mortar and pestle depending on tissue type. Additional sample mass was stored frozen at -20 °C to be available for re-analysis, if necessary. None of the collected plant tissue samples resulted in low sample mass, so prioritization of metals analyses due to low mass was not needed. In the event that samples had low mass, analysis for TAL metals would have taken priority over mercury testing as specified in the QAPP.

The soil samples were processed in accordance with the ALS soil processing SOP presented in Appendix B of the QAPP. Soil samples were air dried and passed through a No. 100 sieve to isolate the target particle size of <150 μ m. This particle size fraction is intended to represent the fraction expected to adhere to skin via dermal contact (Ruby and Lowney 2012). If laboratory duplicate samples were required from a particular sample, an additional 2 g of soil was placed in each jar. Additional sample mass was stored at room temperature to be available for re-analysis, if necessary.

EPA split samples were taken from a subset of samples for TAL metals analysis, as discussed earlier in Section 2.1.4 (see Table 2-2).

2.3.2 Chemical Analyses

Samples were analyzed in accordance with the QAPP (Ramboll 2018) for TAL metals and total solids using the methods listed in Table 2-3. Analytical procedures used for this study were standard EPA-approved methods with method detection limits (MDLs) sufficiently low to provide concentration data below risk-based concentrations (RBCs) when possible (Table 2-4). A comparison of actual MDLs to analytical concentration goals (ACGs) is provided in Section 5.2.

Mercury was analyzed in a subset of plant tissues identified as having a higher potential for mercury bioaccumulation (Li et al. 2017; Table 2-2) and the associated co-located soil samples. For the subset of plants selected for mercury analysis, the QAPP specified an analytical priority of TAL metals over mercury, in the event that the sample mass required for mercury analysis could not be obtained; however, the target sample mass was met in all cases, which allowed for mercury analysis in all of the samples where it was intended.

3 QUALITY ASSURANCE PROJECT PLAN DEVIATIONS

This section describes deviations from the QAPP (Ramboll 2018) that occurred during field sampling and chemical analyses.

3.1 FIELD SAMPLING

Procedures presented in the QAPP (Ramboll 2018) were followed to the extent possible during field sampling. Deviations from the QAPP were categorized as either "changes" or "modifications". Changes would have occurred prior to sampling and would have been approved by EPA and recorded on the change request form (included in Appendix A of the QAPP). Modifications were usually minor procedural adjustments (e.g., to increase sampling efficiency) made in the field during sampling based on the feasibility of plant tissue collection and recorded in AECOM's field logbook. In the field, suggested modifications were approved by representatives from TAI, EPA, and CCT before the modification was implemented.

3.1.1 QAPP Changes

No change requests were made during the three field sampling events.

3.1.2 **QAPP Modifications**

Several procedure modifications happened over the course of the three field sampling events and are described below. For each of these, agreement was obtained from EPA, TAI, and CCT representatives before the modification was accepted and implemented. Discussions regarding changes and the individuals who agreed to the change for each entity are documented in AECOM's field logbook (see FSR, Appendix A).

The field team strived to collect the plant tissue and co-located soil samples within the boundaries of the SAs. However, when additional plant tissue mass was needed for a sample and there was an acceptable specimen within the tribal allotment near the SA, additional plant tissue was collected and added to the sample. Locations where samples or some of the sample mass was collected outside the designated SA boundaries are identified in the FSR and shown on Maps 2-3, 2-4, 2-6, 2-11, and 2-12; the affected SAs are SA02, SA03, SA05, SA14, and SA15.

3.1.2.1 Spring Sampling Event

• Wild rose (stems and leaves). Wild rose stems and leaves were targeted for collection in the Spring sampling event, but the roses that were found did not yet have leaves. According to CCT representatives, wild rose stems would not be collected without leaves, so collection was rescheduled for the June sampling event.

• **Red willow/red-osier dogwood.** CCT clarified that the species identified in the QAPP as "red willow" and, alternately, as "red-osier dogwood" (*Cornus sericea*) is not ingested or mouthed by CCT members. Therefore, this plant was not sampled.

3.1.2.2 June Sampling Event

- Sarvisberry. During the June sampling event, field teams found that sarvisberry was not ripe. According to CCT consultant Whitney Fraser from Lodestone, sarvisberry would not be collected if the berries were not ripe. Based on this information, TAI, EPA, and CCT agreed to wait and collect sarvisberry during the August sampling event, even though the berries would be desiccated. For the August event, the minimum and target sample weights for sarvisberry were changed to 1.5 and 3.1 g, respectively, to account for the desiccation of the berries.
- Huckleberry. During the June sampling event, the sampling team discovered ripe dwarf huckleberry on SA04. Huckleberry was originally scheduled for collection during the August sampling event in the QAPP. However, according to botanist Jeff Walker from AECOM, given that the huckleberry was ripe in June, it was unlikely to remain ripe through August. Therefore, the huckleberry samples were collected in June.

3.1.2.3 August Sampling Event

- **Sample IDs.** During the August sampling event at the first sampling location, it was noticed that the pre-printed labels for sample containers had been misprinted. The sample ID printed on the labels included the letters AU instead of LA, which was given in the QAPP (see Appendix A) as the identifier for the August sampling event. The decision was made to change the identifier for the August sampling event to AU to be able to use the pre-printed sample labels and reduce the number of field corrections that might be needed.
- **Ponderosa pine (pine nuts).** During the August sampling event, only 10 to 12 pine cones were collected per sample, not 20 as was stated in the QAPP. The number of cones to collect was refined following an experiment conducted at the start of the sampling event to get a better estimate of the number and weight of pine nuts per pine cone. Eighteen pine cones were opened for this assessment. The average mass of pine nuts per pine cone in the experiment was 0.578 g. Given the target sample mass of 1.4 g identified in the QAPP (Ramboll 2018), the minimum sample size was adjusted to 3 pine cones and the target sample mass adjusted to 6 pine cones. If additional pine cones were available at the sampling locations, 10 to 12 pine cones were collected per sample.

Hazelnuts. During the August sampling event, the method for collecting hazelnuts was modified from the methods recommended in SOP-4 steps 2 through 4. In the field, it was determined that shaking the hazelnut bush to collect ripe nuts had the potential to lose nuts in the underbrush, so this method was not used. Instead, hazelnuts were picked by hand. Another modification involved the assessment of the presence (or absence) and condition of nuts in the shells. During the August 2017 field reconnaissance survey (Ramboll Environ 2017a), AECOM collected hazelnuts for inspection and found that it was difficult to determine whether there were nuts inside the shells by examining the hazelnut shell. Therefore, a float test to help separate shells with nuts from hollow shells was found in the literature and included in the QAPP. Theoretically, hazelnuts that floated would not have nuts and could be discarded. The float test was used on hazelnuts collected from the first bush sampled. As an experiment, some of the hazelnuts that floated were opened by the field sampling team and found to contain nuts. This showed that the float test was not reliable. Therefore, it was decided to collect all intact nuts available from each bush sampled; nuts with visible rot or insect damage on the shells were discarded.

3.2 CHEMICAL ANALYSES

The following deviations from the QAPP occurred as a result of laboratory sample processing or analysis.

- Mercury analysis was performed on one rose hip sample (SA14-AU15-P01), three sarvisberry samples (SA08-AU01-P01, SA08-AU02-P01, and SA14-AU16-P01), and the four co-located soil samples (SA14-AU15-S01, SA08-AU01-S01, SA08-AU02-S01, and SA14-AU16-S01) although these samples were not specified for mercury analysis in the QAPP. This occurred because of errors on four chain-of-custody (COC) forms. ALS had already analyzed the four soil samples before the error was identified, so it was decided that the associated co-located plant tissue samples should also be analyzed for mercury for consistency. Because all soil samples were shipped on wet ice to ALS regardless of whether they were specified for mercury analysis, the accuracy of the mercury analysis was not affected.
- Total solids analysis was performed and reported by ALS for both the bulk and sieved (< 150 µm) soil sample fractions in sample delivery group K1804201. The sieved soil samples were air dried before analysis, the bulk samples were not. The sieved soil samples were the fraction intended for analysis. The total solids results from the bulk samples were not included in this data summary report. Therefore, the bulk sample results were retained in the project database as "Reportable = No" and were excluded from the data tables.

Soil samples were not passed through a No. 10 sieve (2 mm) prior to using the No. 100 sieve (150 μm) as specified in the QAPP due to time constraints at ALS.

4 DATA VALIDATION ASSESSMENT

Data validation was performed by Environmental Standards, Inc. (ESI) of Valley Forge, Pennsylvania, in accordance with the QAPP (Ramboll 2018) based on EPA guidance from applicable analytical methods and the following documents:

- Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use (EPA 540-R-08-005) (USEPA 2009)
- National Functional Guidelines for Inorganic Superfund Methods Data Review (EPA-540-R-2017-001) (USEPA 2017c)

Stage 2B validation was conducted for the majority of the chemistry data. Approximately 14 percent of the data underwent Stage 4 validation. Data were qualified, as needed, based on an evaluation of the following QC criteria:

- Holding times
- Condition of samples upon receipt by laboratory
- Sample preparation
- Initial and continuing calibration results
- Laboratory and equipment blank results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Standard reference material (SRM) results
- Laboratory control sample/laboratory control sample duplicate (LCS/LCSD) results
- Laboratory duplicate and field replicate relative percent differences (RPDs)
- Reporting limit (RL) standard results
- Interference check sample results
- Serial dilution results
- Internal standard performance
- Instrument sensitivity
- Instrument raw data and qualitative identification
- Analytical sequence.

The ESI data validation reports are available on the Downloads page of the project database (http://teck-ucr.exponent.com). The results of the data validation for overall data quality of

chemistry results, sample transport and holding times, and equipment blank data are summarized in Sections 4.1, 4.2, and 4.3, respectively. ESI reviewed laboratory QC samples as part of the data validation process. Specific data quality considerations identified by the data validator for the plant tissue and soil data are summarized in Sections 4.4 and 4.5, respectively.

4.1 OVERALL DATA QUALITY

Chemistry data for equipment rinsate blanks, plant tissues, and soils met quality requirements in the QAPP (Ramboll 2018). A summary of the qualifiers assigned by ESI to equipment blank, plant tissue, and soil sample results is presented in Tables 4-1 through 4-3, along with the original laboratory data qualifiers. All data were deemed usable with the qualifiers presented with no data rejected. The following data qualifiers were applied by ESI:

- J—The result was considered estimated. For this dataset, J flags were applied due to high field split RPD, low and high MS/MSD recovery, high serial dilution percent difference, laboratory duplicate imprecision, and/or concentration between the MDL and the RL.
- J- —The result was considered estimated and may be biased low. For this dataset, J- flags were applied due to low MS/MSD or standard reference material (SRM) recovery and negative instrument bias, according to the functional guidelines.
- J+ The result was considered estimated and may be biased high. For this dataset, J+ flags were applied due to inductively coupled plasma (ICP) interference, according to the functional guidelines.
- U—The analyte was not detected at or above the MDL.
- U*—The analyte was considered not detected because a similar concentration was detected in an associated blank sample. Values for the MDL and RL (if the reported result exceeded the RL) were replaced with the reported result.
- UJ—The analyte was not detected, and the MDL was considered approximate due to bias identified during the QA review. For this dataset, UJ flags were applied due to low SRM recovery and negative instrument bias, according to the functional guidelines.

Data quality indicators for precision, accuracy or bias, representativeness, completeness, and comparability (PARCC) were specified in the QAPP, and measurement quality objectives (MQOs) were listed in Table B5-2 of the QAPP (Ramboll 2018). The data validator used the project-specific MQOs to evaluate soil and tissue data for the quantitative components of PARCC (i.e., precision and accuracy or bias), and an additional MQO (\leq 40 RPD) for soil field replicates was added by ESI. Laboratory duplicates, MS/MSDs, and field replicates were used to assess precision. The evaluation of accuracy and bias was based on the results of QC samples such as

MSs, internal standards, and equipment and method blanks. The data validator also assessed sample handling, laboratory methods, and holding times to evaluate the representativeness and comparability of analytical data. Data were qualified as necessary by ESI when MQOs were not met. A data completeness goal of 90 percent was specified in the QAPP for the analysis of all composite samples (Ramboll 2018). Data completeness was 100 percent for all analytes.

Tables 4-1 through 4-3 show both the number of qualifiers applied by the analytical laboratory and the number of qualifiers applied by the data validator.⁵

4.2 SAMPLE TRANSPORT AND HOLDING TIMES

There were no issues related to sample transport or holding times. A holding time of 180 days was specified in the QAPP for TAL metals in plant tissue and soil samples, except mercury which had a holding time of 1 year. All samples were prepared and analyzed by the laboratory within the QAPP-specified holding times (Ramboll 2018).

4.3 EQUIPMENT BLANK DATA

Data qualifiers applied to equipment blank results are summarized in Table 4-1 (excluding the two laboratory duplicates). Six iron results were qualified due to negative instrument bias. Of these, three results were qualified as estimated (biased low, J- flagged),⁶ and the other three results were not detected and the MDL was considered approximate (UJ flagged).

Equipment blank concentrations were compared to the plant tissue data on a similar unit basis (i.e., parts per million) to evaluate contamination. Equipment blanks were not prepared for soil sample processing equipment. One plant tissue result for aluminum was qualified as not detected (U* flagged) due to equipment blank contamination.

4.4 PLANT TISSUE DATA

This section summarizes data quality considerations for the plant tissue analytical results (i.e., TAL metals and mercury) as qualified by ESI (Table 4-2). Qualifiers were applied based on an evaluation of various QC factors (e.g., calibration, LCS/LCSD and MS/MSD recoveries, laboratory blank concentrations, SRM results, interference checks, serial dilutions, and internal standards).

⁵ ESI validates and qualifies laboratory QC samples (e.g., laboratory duplicates) for all UCR datasets. However, laboratory duplicates are not included in the analyses of UCR Site data and thus are excluded from the qualifier counts tables (Tables 4-1, 4-2, and 4-3).

⁶ These results are J flagged (not J- flagged) in the database to account for an additional unknown direction of bias due to results being reported between the MDL and the RL.

Six laboratory QC samples were analyzed for total solids in plant tissue, none of which were qualified. There were no laboratory QC samples for TAL metals or mercury in plant tissue.⁷ Numbers of qualified plant tissue sample results are shown. Tissue data were qualified due to laboratory blank, MS/MSD, and SRM results, as detailed in the following subsections. All other QC parameters were within control limits.

No quality control indicator was applied to field replicate results for plant tissues because a set criterion is not biologically meaningful. Different portions of a plant likely draw nutrients from the roots that are closest to that part of the plant, because in many species sap does not circulate throughout the plant (Perry 1982). For example, different roots are likely to draw nutrients from soil with different chemical properties, so it is unlikely that different plant parts, such as wild rose stems on different sides of the plant, would contain the same concentrations of metals or mercury. Each side of the plant draws nutrients from the roots that are closest to that side of the plant. Instead of comparing these data to a set criterion for reproducibility, Section 5 includes a discussion of the variation in field replicates of plant tissue samples in the context of intra-plant variation in analyte concentrations.

4.4.1 Blanks

Tissue concentrations were qualified as not detected (U* flagged) due to the presence of the analyte at concentrations similar to those in the associated laboratory or equipment blanks for the following analytes and numbers of samples:

- Aluminum 12 of 174
- Antimony 3 of 174
- Lead 5 of 174
- Silver 25 of 174
- Thallium 5 of 174.

4.4.2 Matrix Spikes

Iron concentrations in 9 of 174 sample results were qualified as estimated (J flagged) due to a low recovery in the MS and a high recovery in the MSD.

Mercury concentrations in 19⁸ of 63 sample results were qualified as estimated (biased low, J-flagged) due to a low MS/MSD recovery.

⁷ Due to sample mass limitations.

⁸ One of these results is J flagged (not J- flagged) in the database to account for an additional unknown direction of bias due to results being reported between the MDL and the RL.

4.4.3 Standard Reference Materials

Tissue concentrations were qualified as estimated (biased low, J- flagged) due to low SRM recoveries for the following analytes and numbers of samples:

- Aluminum 144 of 174
- Nickel 48 of 174
- Vanadium 48 of 174.

In addition, 1 result for aluminum and 15 results for vanadium were not detected and the MDL was considered approximate (UJ flagged) due to low SRM results.

4.5 SOIL DATA

This section summarizes data quality considerations for the soil analytical results (i.e., TAL metals and mercury), including the seven laboratory duplicates (for TAL metals only, no laboratory duplicates analyzed for mercury), as qualified by ESI (Table 4-3). Qualifiers were applied based on an evaluation of various QC factors (e.g., calibration, LCS and MS/MSD recoveries, laboratory blank concentrations, laboratory duplicate and field replicate results, interference checks, serial dilutions, and internal standards). Numbers of qualified soil sample results (excluding laboratory QC samples) are shown, followed by numbers of qualified laboratory QC samples in parentheses.⁹ Soil data were qualified due to laboratory blank, MS/MSD, laboratory duplicate and field replicate, interference check, and serial dilution results, as detailed in the following subsections. All other QC parameters were within control limits.

4.5.1 Blanks

Thallium concentrations in 16 (1) of 174 (8) soil samples were qualified as not detected (U* flagged) due to the presence of the analyte at concentrations similar to those in the associated laboratory blanks in multiple sample delivery groups.

4.5.2 Matrix Spikes

Cadmium concentrations in 9 (1) of 174 (8) soil sample results were qualified as estimated (J flagged) due to a low MS recovery. Antimony concentrations in 166 (7) of 174 (8) sample results were qualified as estimated (J flagged) due to high and low MS recoveries.

⁹ ESI validates and qualifies laboratory QC samples (e.g., laboratory duplicates) for all UCR datasets. However, laboratory duplicates are not included in the analyses of UCR Site data and thus are excluded from the qualifier counts tables (Tables 4-1, 4-2, and 4-3).

4.5.3 Laboratory Duplicates and Field Replicate Samples

Soil concentrations were qualified as estimated (J flagged) due to laboratory and/or field replicate RPDs that were not within control limits for the following analytes and numbers of samples:

- Aluminum 2 of 174 (8)
- Antimony 4 of 174 (8)
- Arsenic 2 of 174 (8)
- Barium 2 of 174 (8)
- Beryllium 11 (1) of 174 (8)
- Cadmium 4 of 174 (8)
- Iron 2 of 174 (8)

- Lead 6 of 174 (8)
- Manganese 2 of 174 (8)
- Mercury 2 of 63
- Silver 11 (1) of 174 (8)
- Thallium 11(1) of 174 (8)
- Zinc 4 of 174 (8).

4.5.4 Interference Check Samples

Soil concentrations were qualified as estimated (J+ flagged) due to ICP interference for cobalt in 41¹⁰ of 174 (8) samples.

4.5.5 Serial Dilutions

Soil concentrations were qualified as estimated (J flagged) due to a high serial dilution percent difference for the following analytes and numbers of samples:

- Antimony 9 (1) of 174 (8)
- Barium 9 (1) of 174 (8)
- Beryllium 29 (1) of 174 (8)
- Cadmium 29 (1) of 174 (8)
- Chromium 9 (1) of 174 (8)

- Cobalt 9 (1) of 174 (8)
- Copper 16 (1) of 174 (8)
- Nickel 25 (2) of 174 (8)
- Silver 56 (3) of 174 (8)
- Thallium 20 of 174 (8).

¹⁰ Three of these results are J flagged (not J- flagged) in the database to account for additional unknown direction of bias identified in the serial dilution results.

5 RESULTS

This section summarizes the plant tissues found, analytical results for plant tissue and co-located soil samples, ACG screen, and field replicate RPD results for soils.

Summary statistics for all analytes are presented in Tables 5-1a through 5-1o for each plant part and associated soil samples for high lead and lower lead areas. The mean analyte concentration and standard deviation for plant tissue samples and soil samples within each SA are presented in Table 5-2 and Table 5-3, respectively. Total solids results are presented by SA in Figure 5-1 for the plant tissue samples, and in Figure 5-3 for soil. Metals concentrations are plotted by SA in Figures 5-2a through 5-2s for plants and Figures 5-4a through 5-4s for soil. Analyte concentrations are not compared to the human health RBCs in the figures or tables because updated RBCs are being developed for the HHRA that are more applicable to CCT exposures (USEPA 2016). ACGs are compared to the method reporting limits (MRLs) for nondetected concentrations of TAL metals in Table 5-4, and field replicate RPDs are summarized in Table 5-5 for plant tissue and Table 5-6 for soil. Co-located plant tissue and soil concentrations by metal are presented as scatterplots in Figures 5-5a through 5-5s.

5.1 PLANT SPECIES SAMPLED

Fifteen of 22 target plant tissues specified in the QAPP (Ramboll 2018) were collected during the study. One species (red willow/red osier-dogwood) was not sampled because it is not ingested or mouthed by CCT members, as discussed in Section 3.1.2.1. The 10 plant tissues listed below were sampled at both high lead and lower lead SAs:

- Black tree lichen
- Camas bulbs
- Chokecherry berries
- Hazelnuts
- Kinnikinnick leaves
- Lomatium roots
- Ponderosa pine nuts
- Sarvisberry berries
- Spring beauty/Indian potato corms
- Wild rose stems and leaves.

The following five plant tissues were only sampled at lower lead SAs:

- Huckleberry berries
- Tule culms
- Wild rose hips
- Wild mint leaves
- Willow branches¹¹.

The following six plant tissues were not sampled because they were not present in sufficient abundance to collect the minimum sample mass required for the minimum three samples:

- Bitterroot roots
- Indian carrot roots
- Morel mushrooms
- Puffball mushrooms¹²
- Shaggy mane mushrooms
- Wild strawberry berries.

5.2 TAL METALS, MERCURY, AND PERCENT SOLIDS

All soil and plant tissue samples were analyzed for TAL metals (except calcium, magnesium, potassium, and sodium) and total solids. Leaf and stem samples collected from kinnikinnick, willow, wild rose, tule, and wild mint plants, and the associated co-located soil samples were also analyzed for mercury. Mercury was only tested in leaves and stems due to research demonstrating that mercury was highest in these tissues (Li et al. 2017).

Summary statistics for TAL metals and mercury in plant tissues and soil are presented in Tables 5-1a through 5-1o, Table 5-2, and Table 5-3. Figures 5-1a through 5-1s and 5-4a through 5-4s present results for the plant tissue and soil samples, respectively.

¹¹ Willow was collected in SA15 and SA16 only, which are lower lead SAs. The average soil lead concentration reported in the 2014 upland soil study for SA15 was 389 mg/kg (Windward et al. 2015), and the average soil lead concentration reported for SA16 was 46 mg/kg based on the UCR 2010 beach sediment study (Integral 2014). These concentrations are below the time-critical removal action level of 700 mg/kg that was used to designate high lead SAs for this study.

¹² Puffballs were found during sampling, but they did not match the description and pictures provided by CCT showing the type of puffball that is consumed. When consulted and shown images of the puffballs found, CCT members said they would not consume that type of puffball. See Appendix G of the FSR for more detail.

Actual MRLs for nondetected TAL metals were compared to the ACGs specified in the QAPP (Ramboll 2018). All nondetected metals results for the plant tissue samples were below their respective ACGs (Table 5-4). Of the soil sample results, thallium was the only metal with nondetected results that exceeded the ACG (Table 5-4). These thallium results were U* qualified by the data validator because a similar concentration was detected in the associated laboratory blank. The maximum exceedance was 2.46 times the ACG.

Field replicate RPDs for plant tissue samples are summarized in Table 5-5, and in Table 5-6 for soil samples. As discussed in Section 4.4, plant tissue field replicate RPDs were not compared to a set QC criterion because it is not biologically meaningful. Mean plant tissue RPDs ranged from 2 to 59 percent. Plant tissue RPDs exceeded 100 percent for several metals in several plant species, with a maximum RPD of 168 percent for lead in chokecherry tissue. The mean RPD for mercury from plant tissue was 22.9 percent, and the highest RPD for mercury was 87.6 percent in wild rose stems and leaves. Based on these results, metals concentrations in plant tissue can vary widely within an individual plant.

Soil sample field replicate RPDs were compared to a control criterion of 40 percent. Metals results exceeded the control criterion of 40 percent in 22 out of 317 results—approximately 7 percent. These results indicate that the majority of soil field replicate RPDs are below 40 percent, but metals concentrations in soil can vary substantially in localized areas.

All plant species were tested for percent solids as part of chemical analyses. Black tree lichen collected in SA01 had particularly high moisture content as compared to black tree lichen sampled in SA05 and SA08 (Figure 5-1 and Table 5-1a). This is probably due to the fact that it was raining on the day that SA01 was sampled which wetted the lichen, likely increased the water content of the samples, and resulted in a reduction of the percent solids.

6 SUMMARY

TAI collected plant tissue from 12 of 16 SAs at the Site, including three high lead SAs (SA01, SA02, and SA03) and nine lower lead SAs (SA04, SA05, SA06, SA07, SA08, SA09, SA14, SA15, and SA16), with an objective to obtain samples of 22 types of plant tissue. A total of 174 plant tissue and 174 co-located soil samples were collected and analyzed for TAL metals, including 63 plant tissue and co-located soil samples which were analyzed for mercury in accordance with the QAPP (Ramboll 2018). Sampling took place during three separate sampling events (Spring, June, and August). During the Spring event, red willow (*Cornus sericea*) was taken off the target plant list because it is not usually ingested or mouthed by CCT members. Of the remaining 21 tissue types targeted for the study, 15 were collected: black tree lichen, camas bulbs, kinnikinnick leaves, lomatium roots, Indian potato corms, willow branches, huckleberry berries, wild rose (stems and leaves in June and rose hips in August), chokecherry berries, hazelnuts, ponderosa pine nuts, sarvisberry berries, tule culms, and wild mint leaves (Table 2-1). The plant tissues not collected were either not present or not present in high enough abundance to collect for this study.

Consistent with the QAPP (Ramboll 2018), all of the plant tissue and soil samples were analyzed for TAL metals (except calcium, magnesium, potassium, and sodium), and leaf and stem tissues collected from kinnikinnick, wild rose, willows, tule, and wild mint (59 plant tissue samples) and the associated soil samples were also analyzed for mercury. Additionally, as noted in Section 3.2, three sarvisberry samples and one wild rosehip sample were also analyzed for mercury, although this was not required per the QAPP. Data completeness was greater than the 90 percent goal specified in the QAPP. The ACGs specified in the QAPP were met for 100 percent of nondetected plant tissue results.

Of the soil sample results, only 16 results (thallium) were not detected. However, all 16 nondetected results exceeded the ACG. All exceedances were less than three times the ACG. No data were rejected as part of the data validation and all of the data are considered usable with the qualifiers presented.

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FIGURES

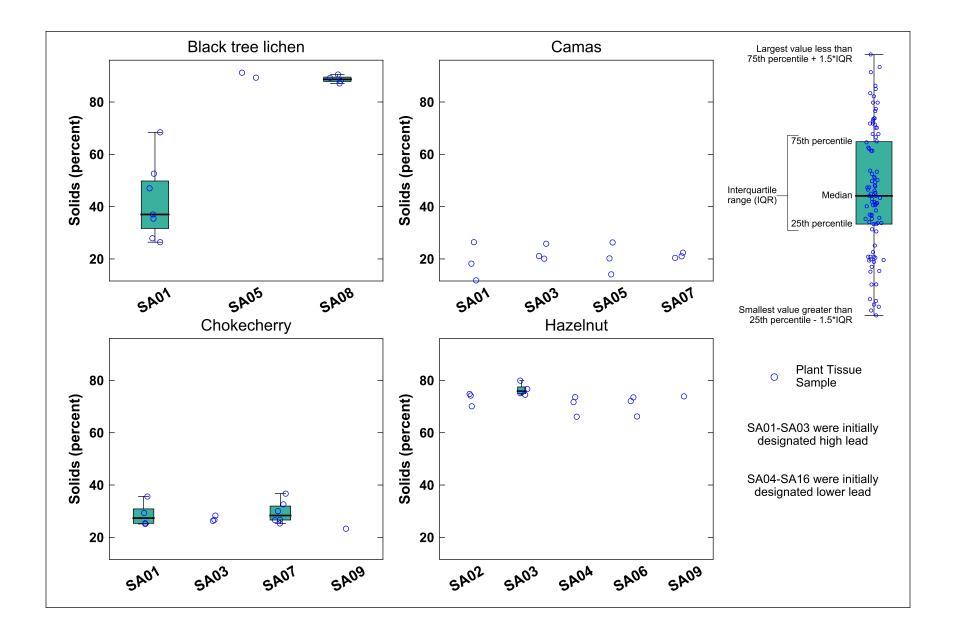


Figure 5-1a. Percent Solids in Plant Tissue Samples by Sample Area

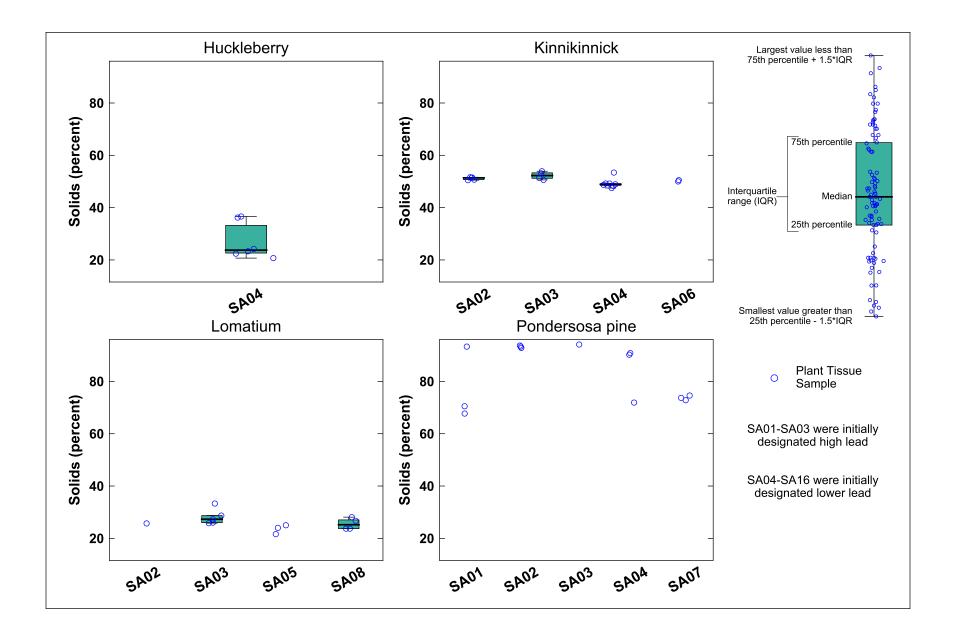


Figure 5-1b. Percent Solids in Plant Tissue Samples by Sample Area

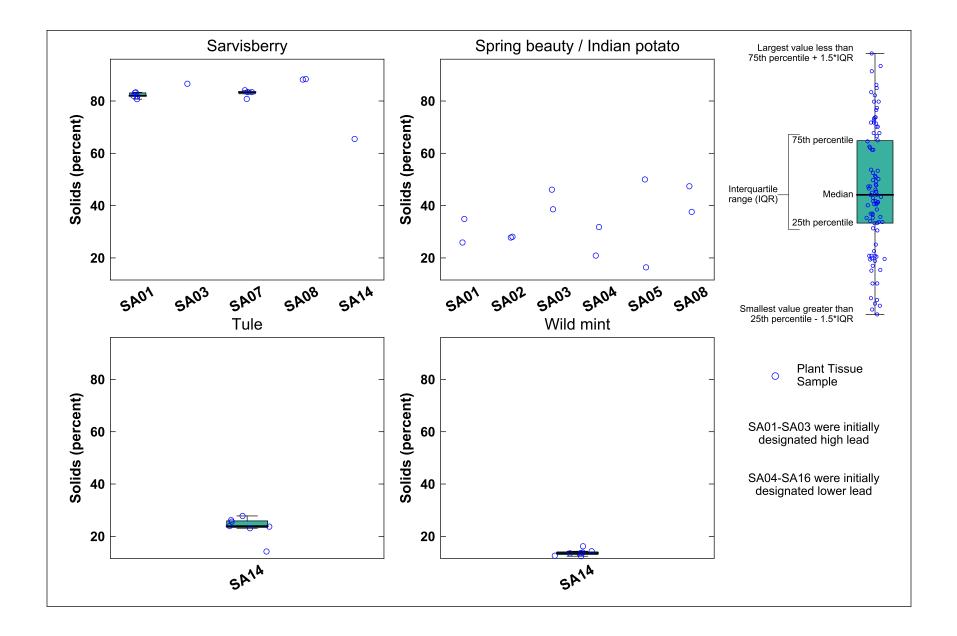
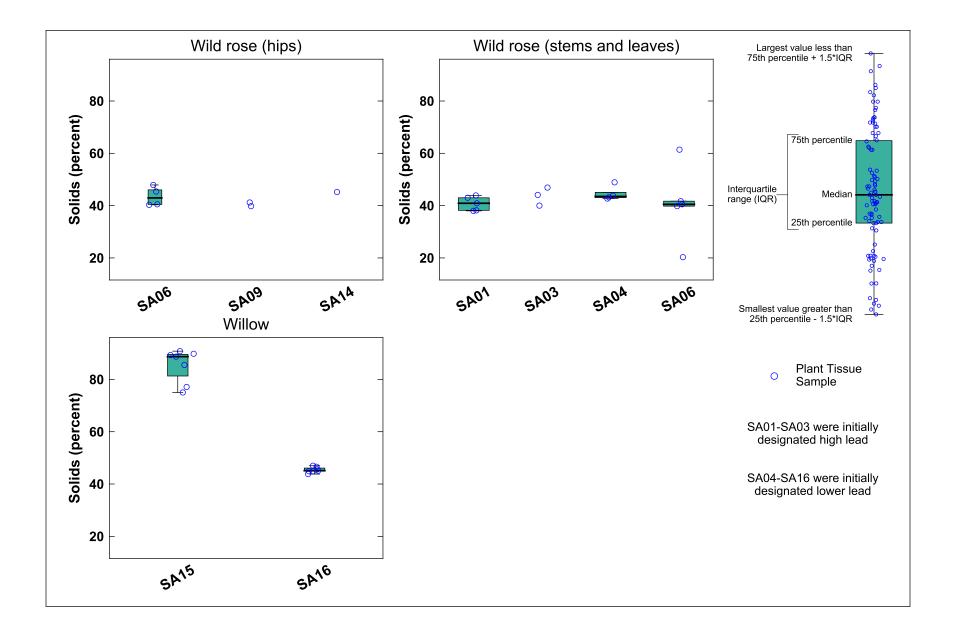


Figure 5-1c. Percent Solids in Plant Tissue Samples by Sample Area



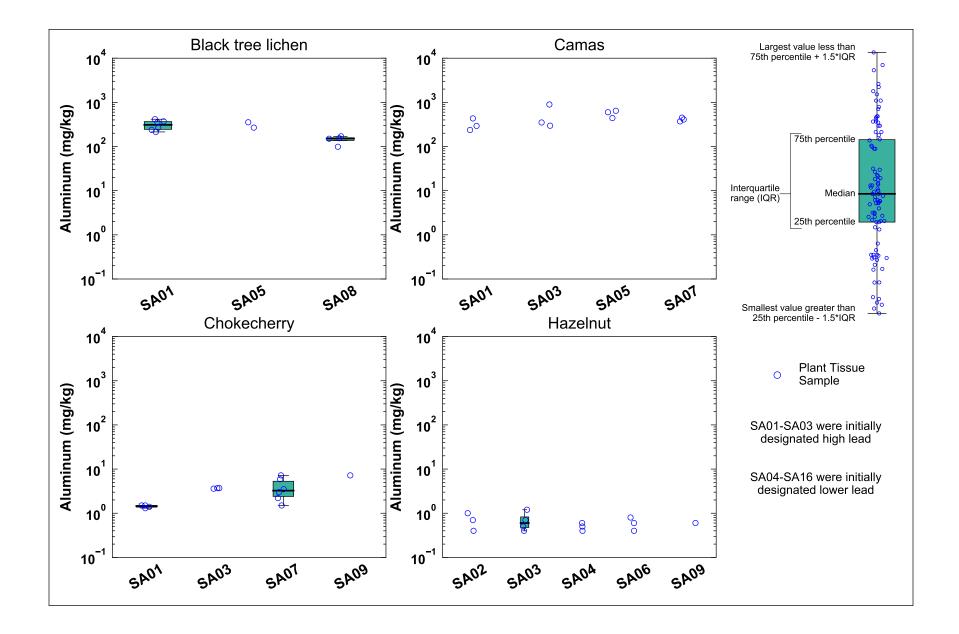


Figure 5-2a. Aluminum Concentrations in Plant Tissue Samples by Sample Area

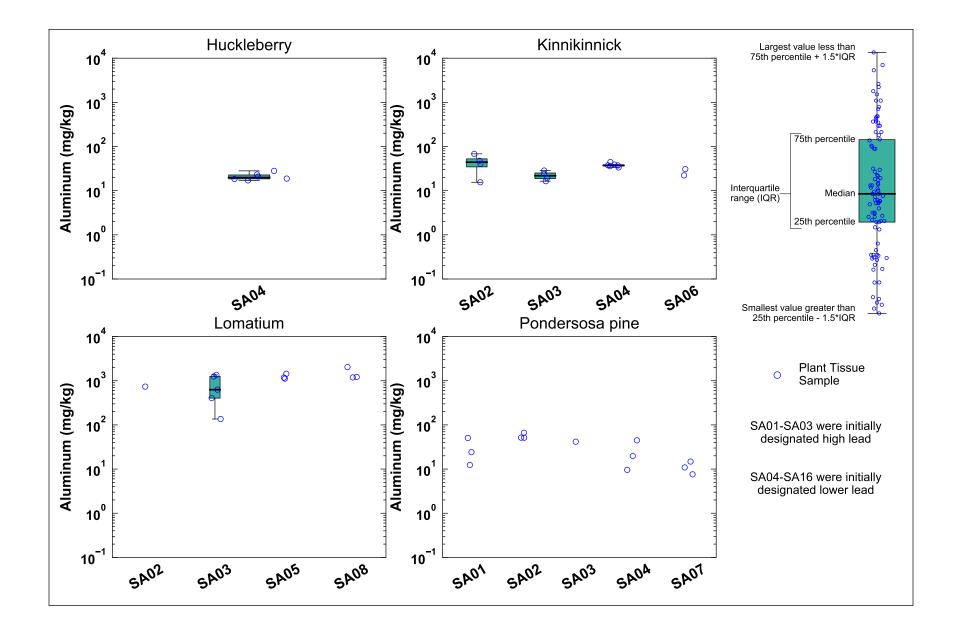


Figure 5-2b. Aluminum Concentrations in Plant Tissue Samples by Sample Area

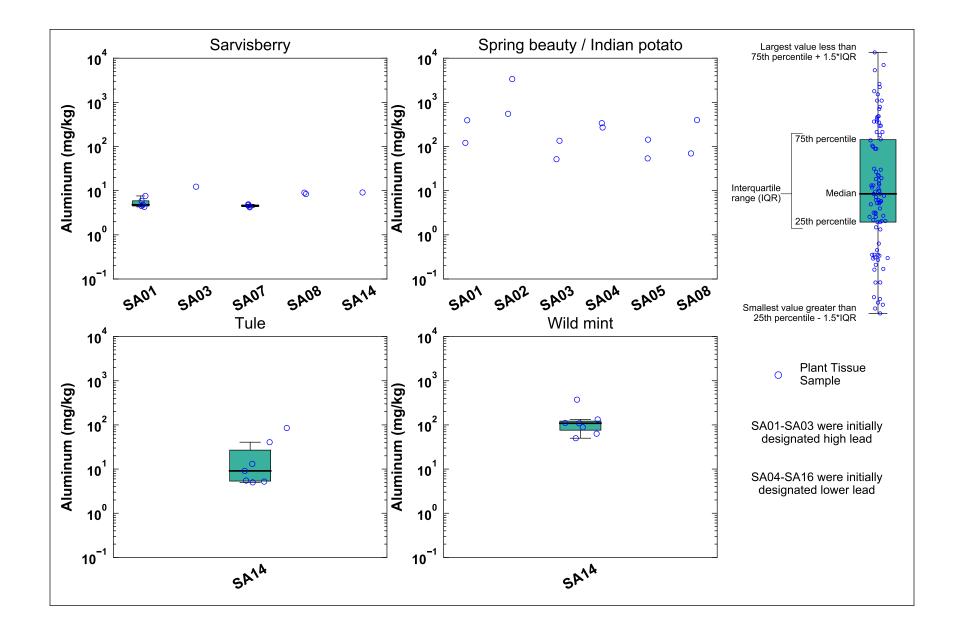


Figure 5-2c. Aluminum Concentrations in Plant Tissue Samples by Sample Area

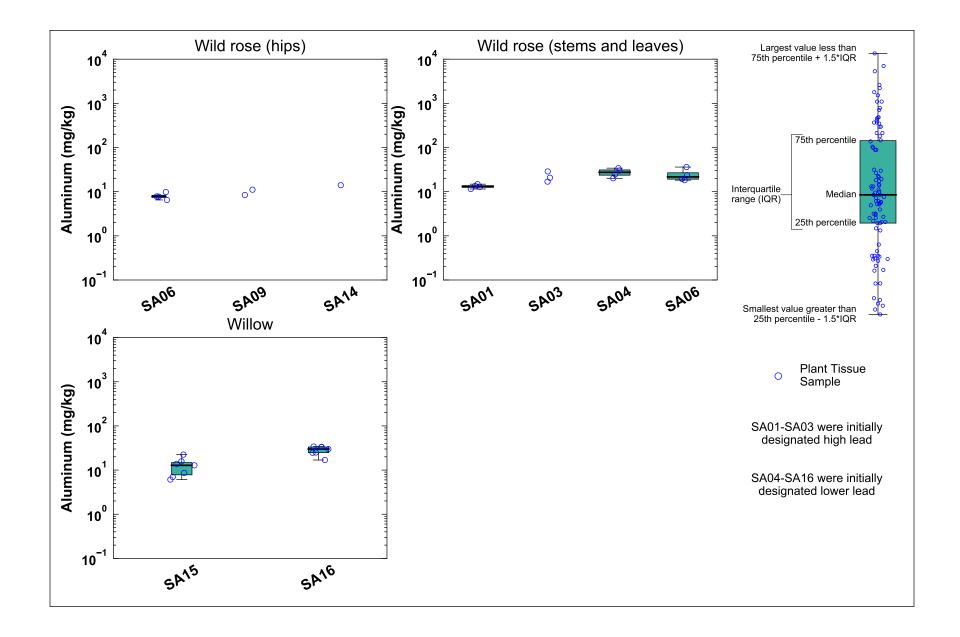


Figure 5-2d. Aluminum Concentrations in Plant Tissue Samples by Sample Area

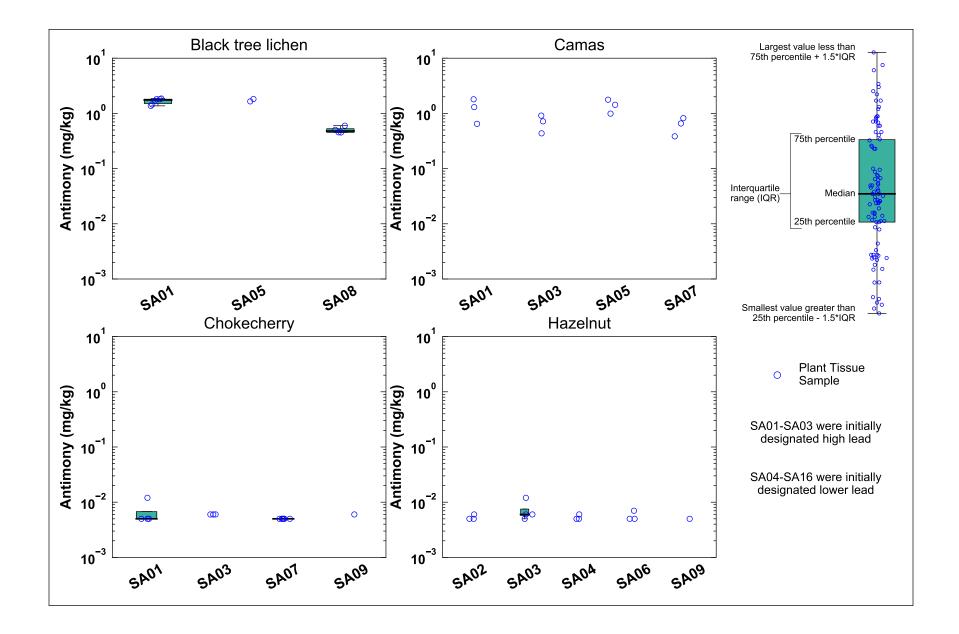


Figure 5-2e. Antimony Concentrations in Plant Tissue Samples by Sample Area

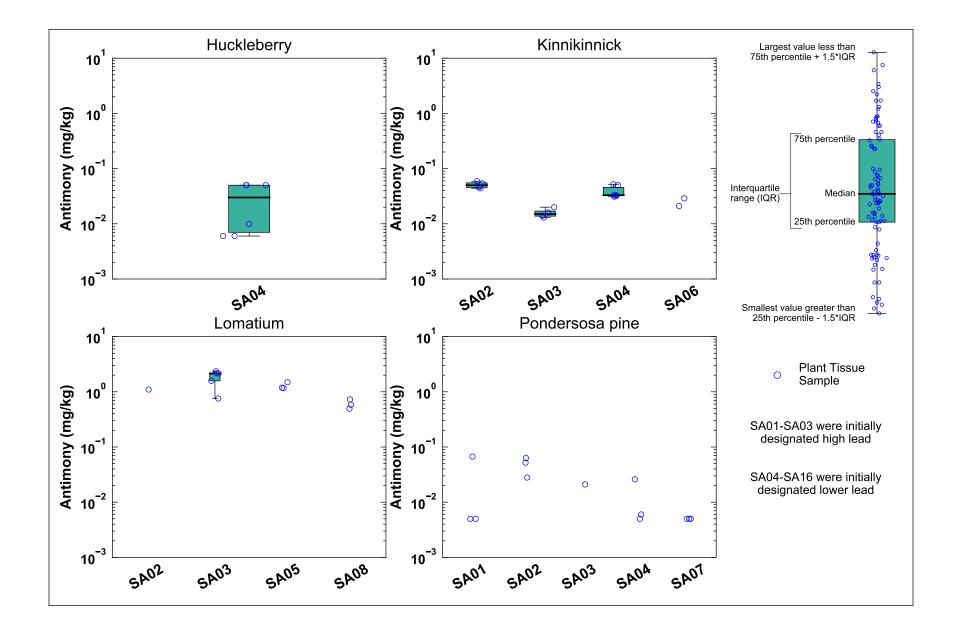


Figure 5-2f. Antimony Concentrations in Plant Tissue Samples by Sample Area

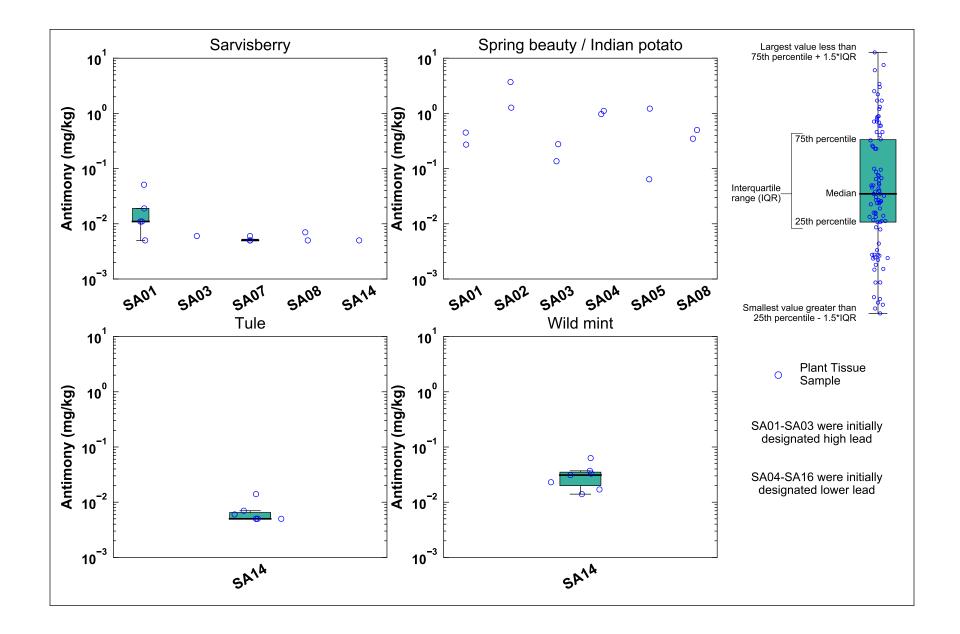


Figure 5-2g. Antimony Concentrations in Plant Tissue Samples by Sample Area

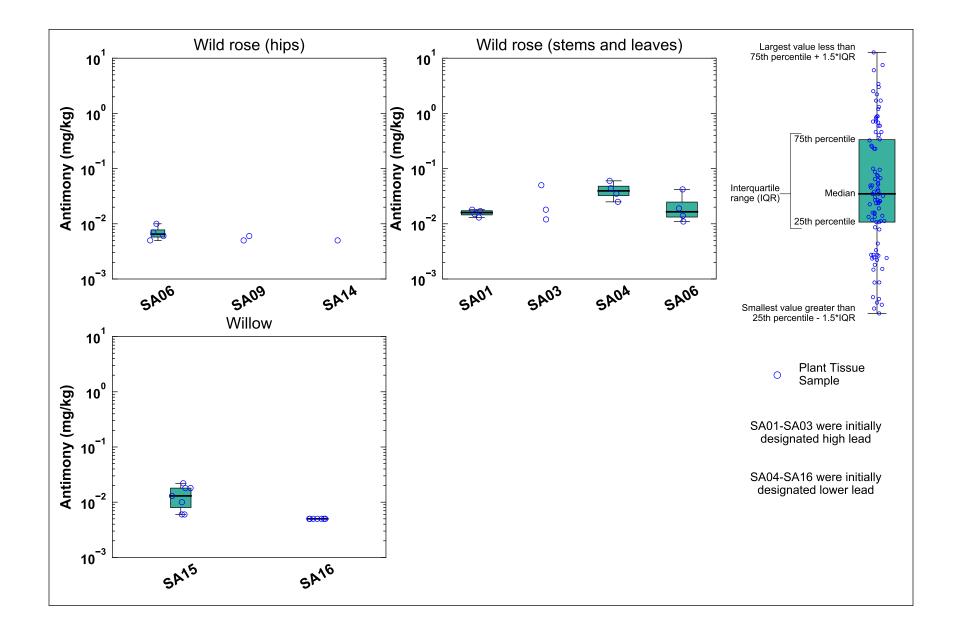


Figure 5-2h. Antimony Concentrations in Plant Tissue Samples by Sample Area

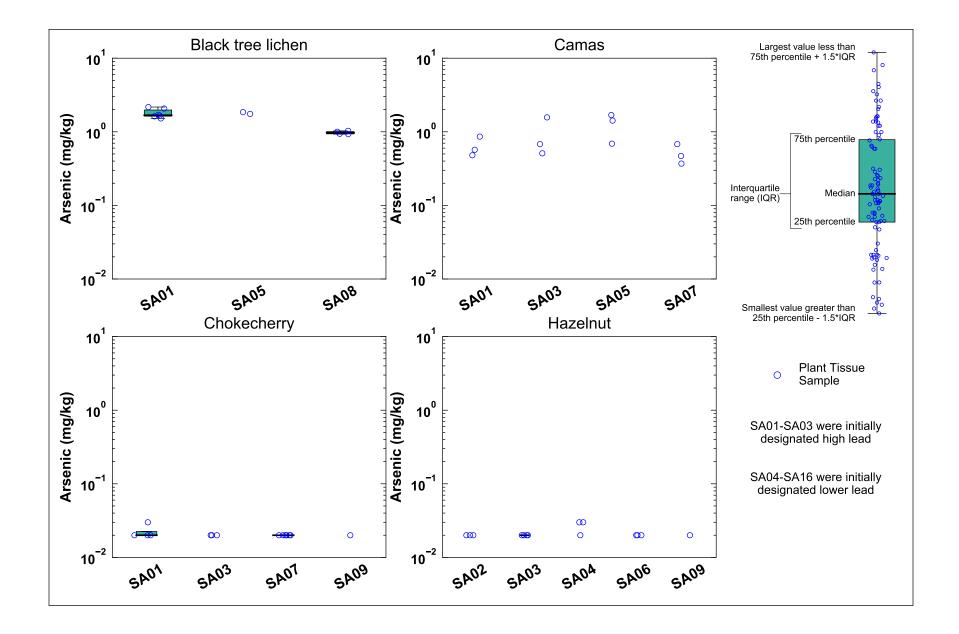


Figure 5-2i. Arsenic Concentrations in Plant Tissue Samples by Sample Area

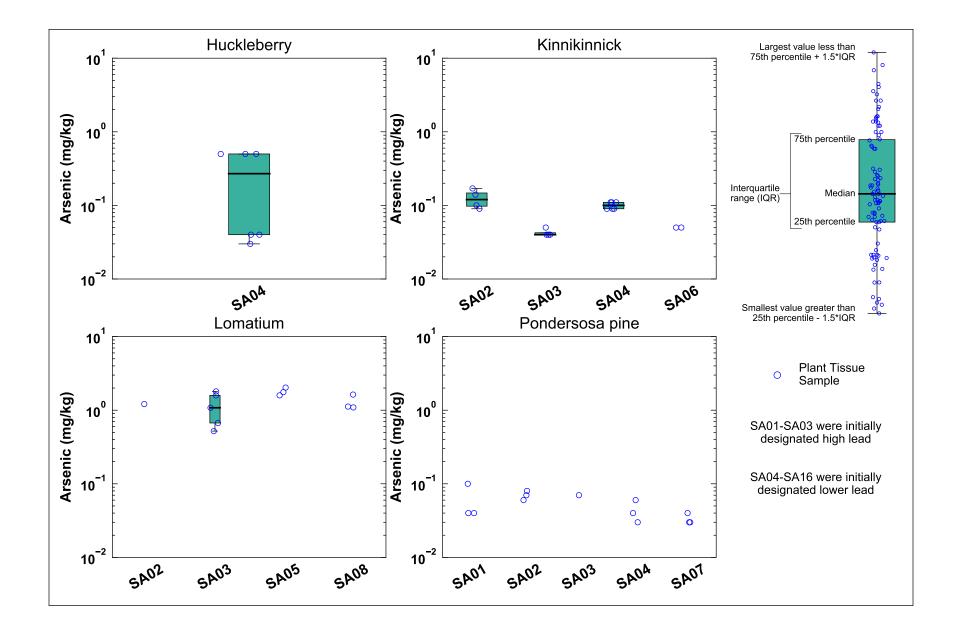


Figure 5-2j. Arsenic Concentrations in Plant Tissue Samples by Sample Area

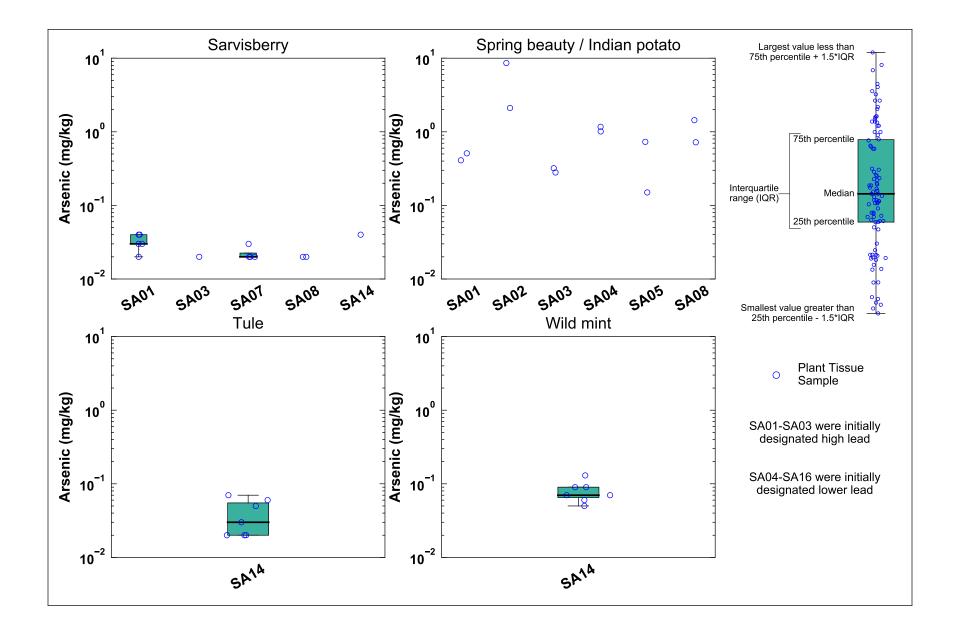
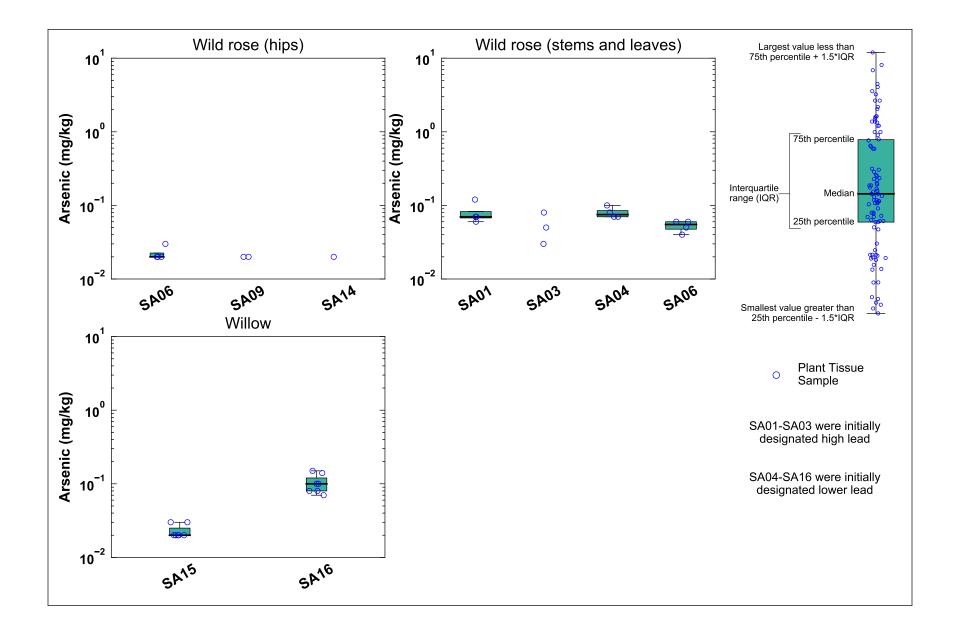


Figure 5-2k. Arsenic Concentrations in Plant Tissue Samples by Sample Area



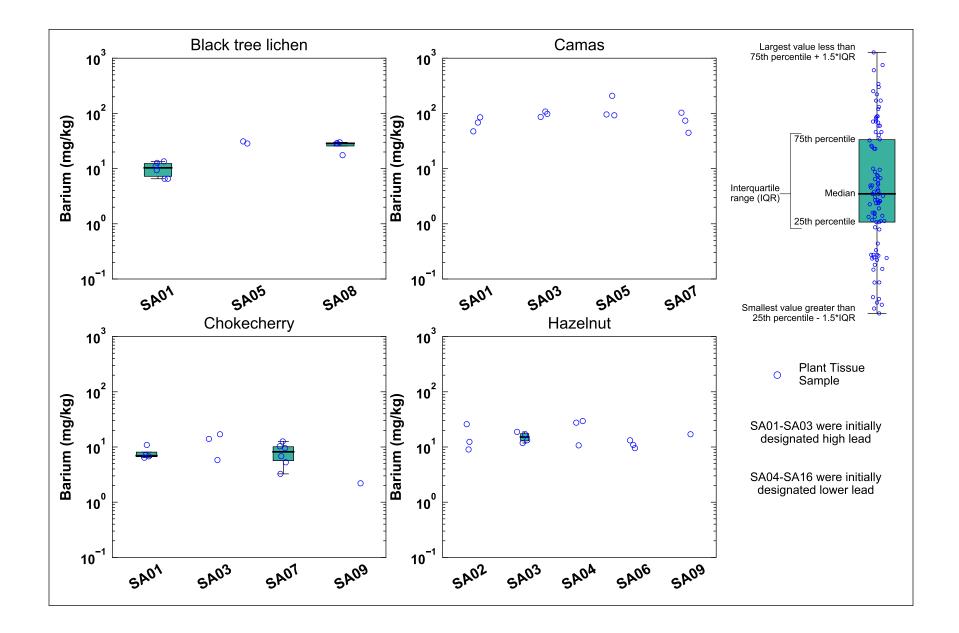


Figure 5-2m. Barium Concentrations in Plant Tissue Samples by Sample Area

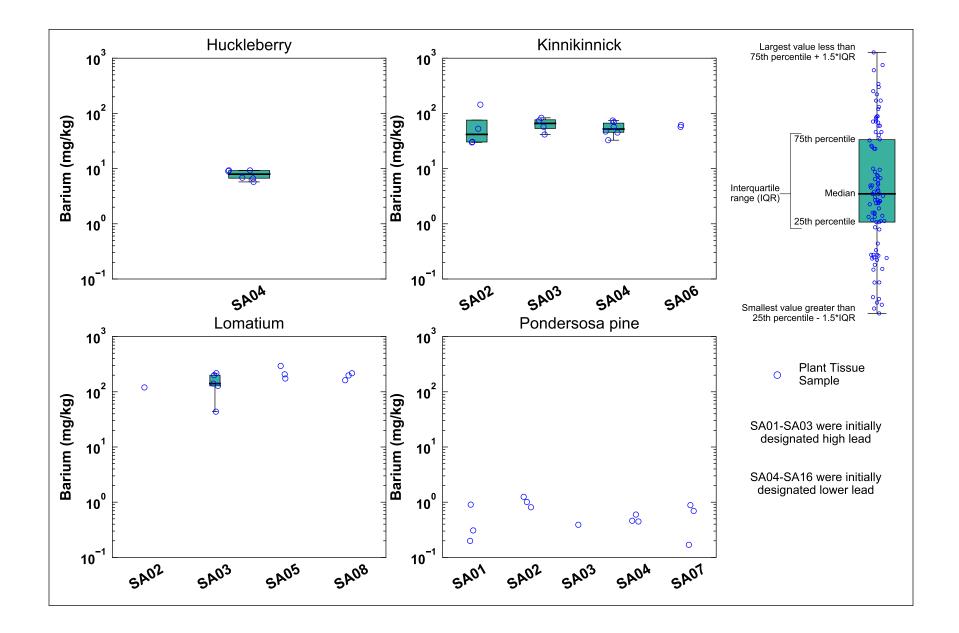


Figure 5-2n. Barium Concentrations in Plant Tissue Samples by Sample Area

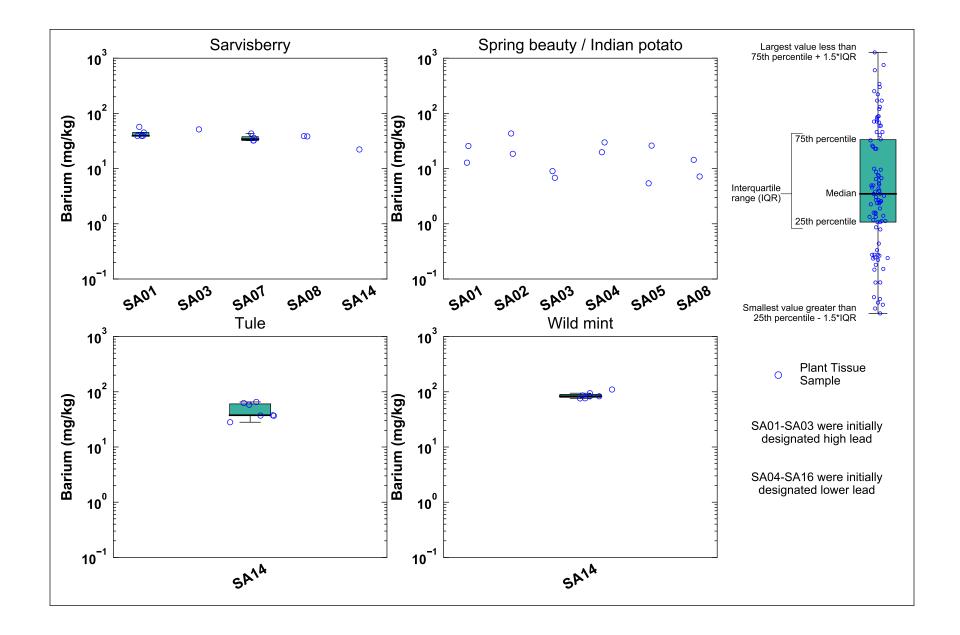


Figure 5-20. Barium Concentrations in Plant Tissue Samples by Sample Area

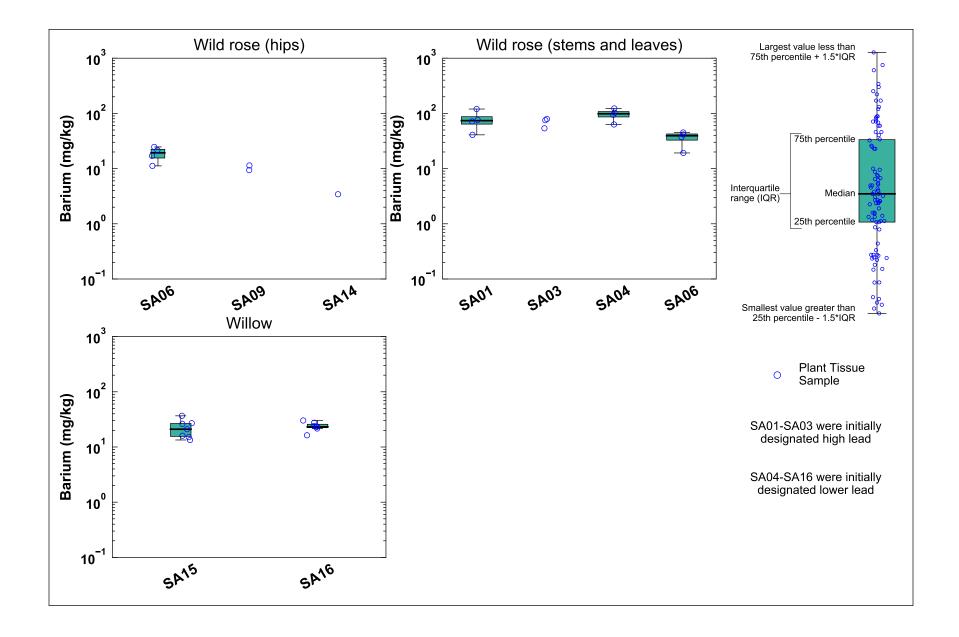


Figure 5-2p. Barium Concentrations in Plant Tissue Samples by Sample Area

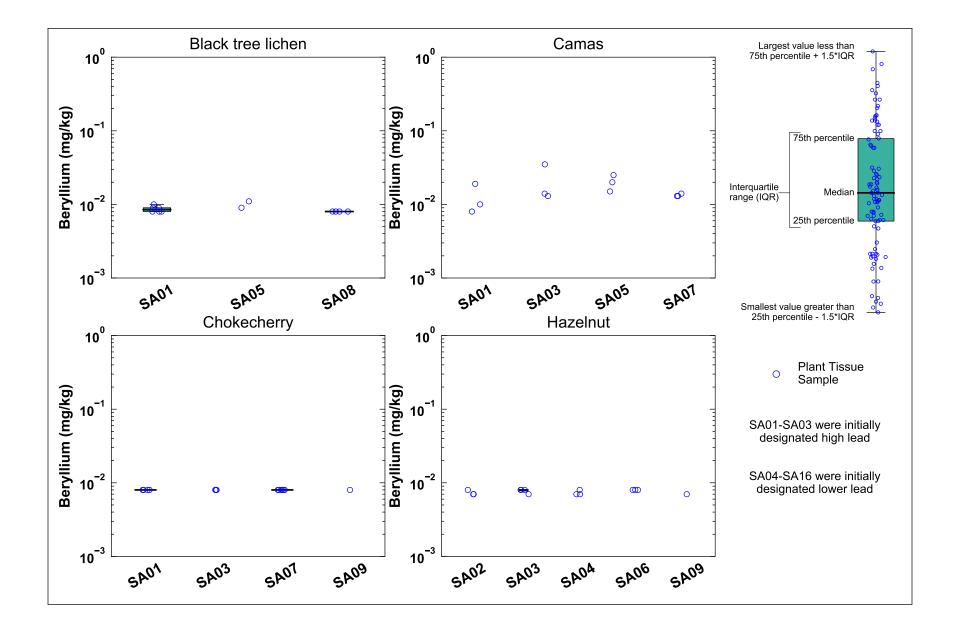


Figure 5-2q. Beryllium Concentrations in Plant Tissue Samples by Sample Area

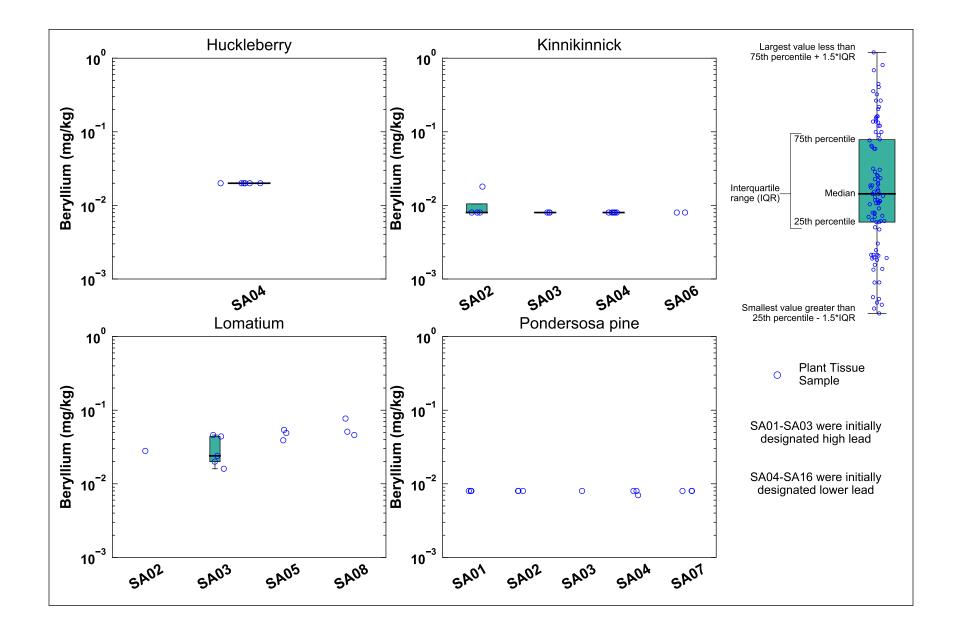


Figure 5-2r. Beryllium Concentrations in Plant Tissue Samples by Sample Area

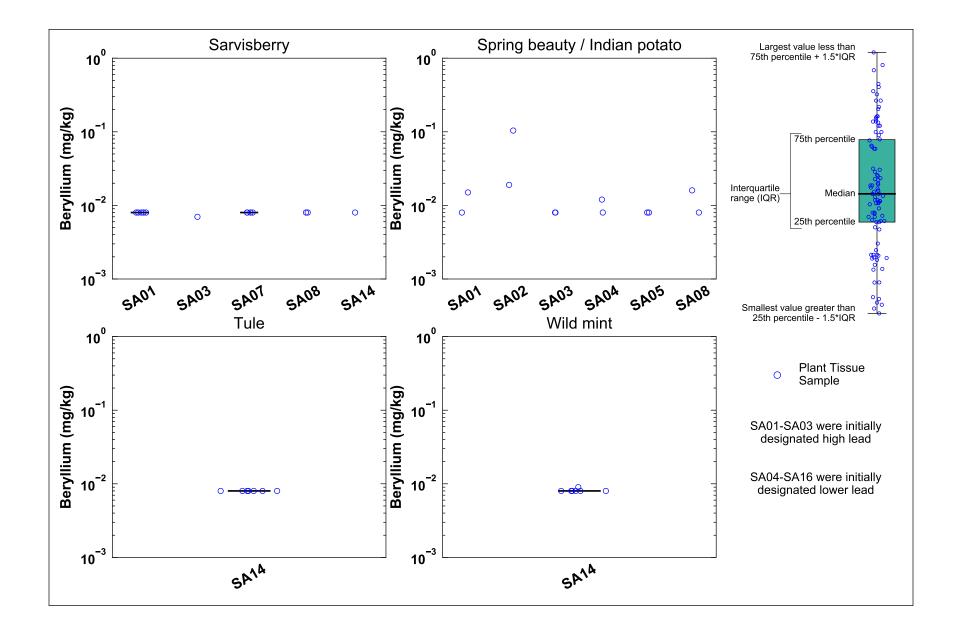


Figure 5-2s. Beryllium Concentrations in Plant Tissue Samples by Sample Area

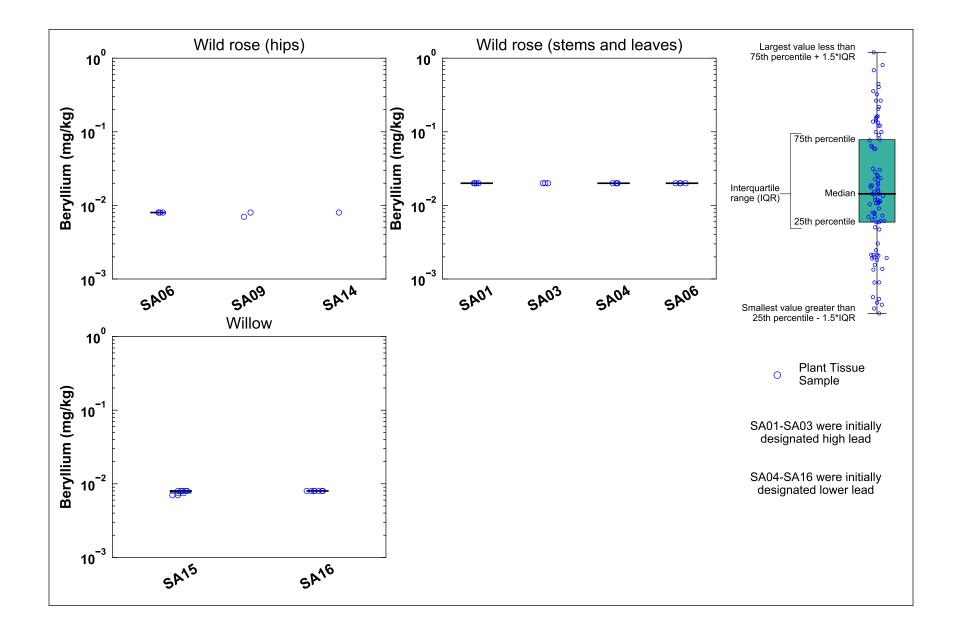


Figure 5-2t. Beryllium Concentrations in Plant Tissue Samples by Sample Area

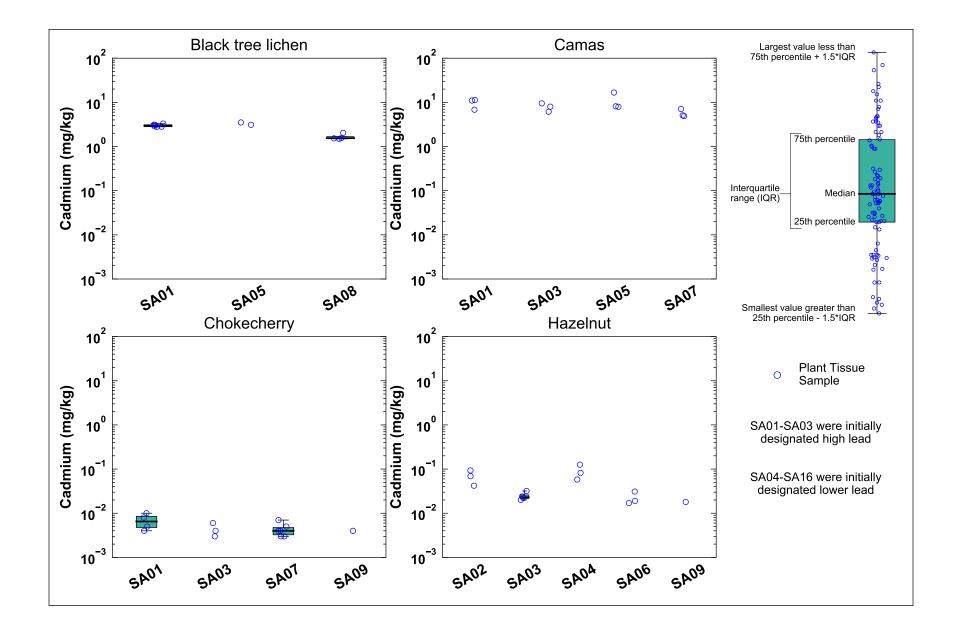


Figure 5-2u. Cadmium Concentrations in Plant Tissue Samples by Sample Area

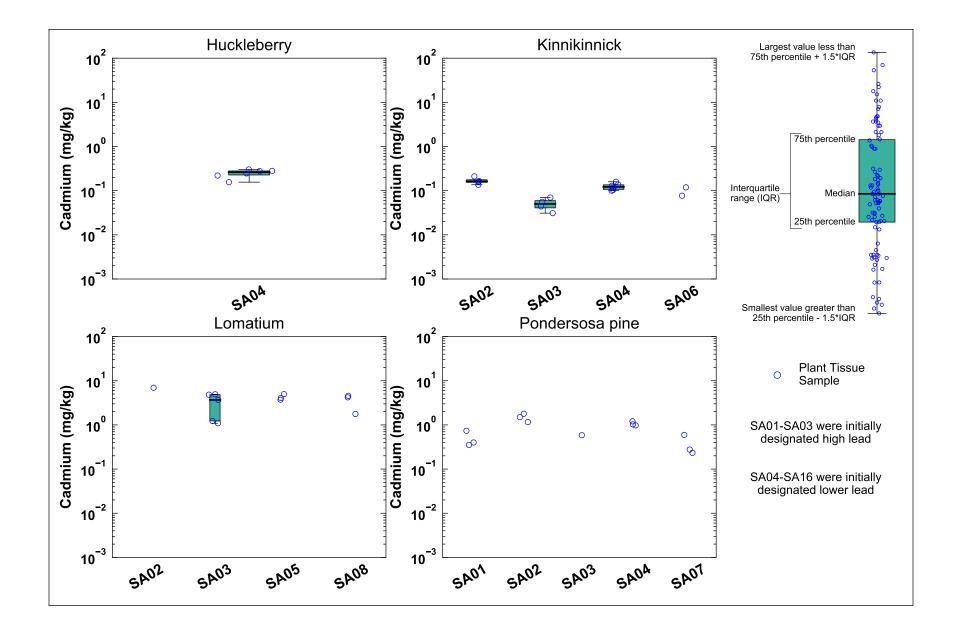


Figure 5-2v. Cadmium Concentrations in Plant Tissue Samples by Sample Area

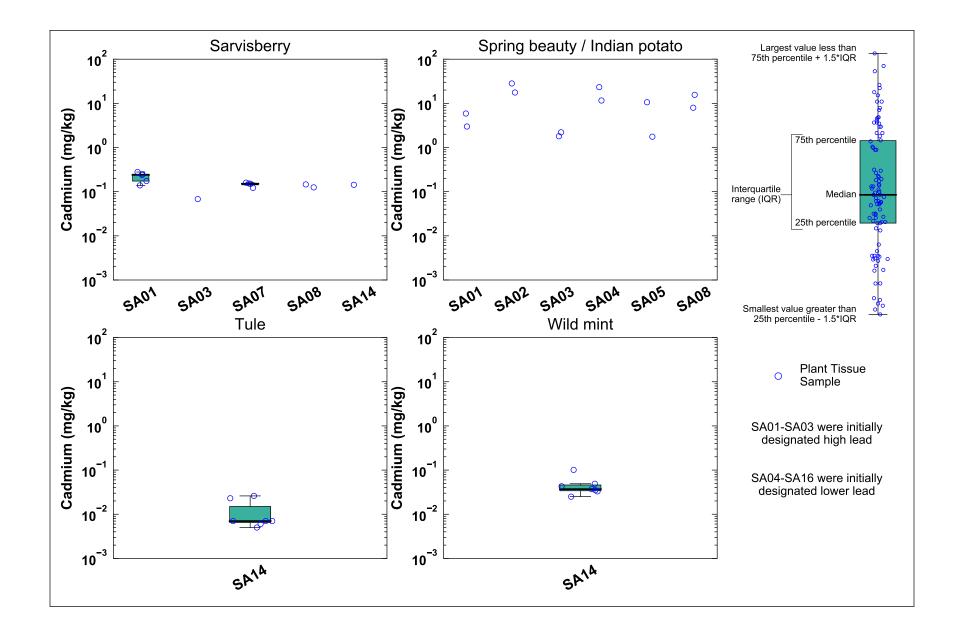


Figure 5-2w. Cadmium Concentrations in Plant Tissue Samples by Sample Area

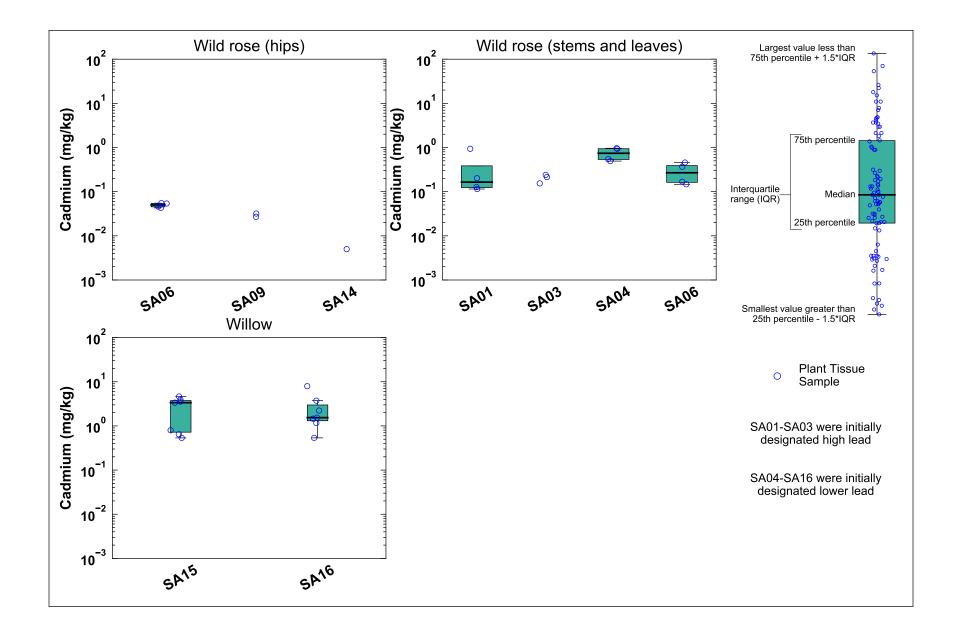


Figure 5-2x. Cadmium Concentrations in Plant Tissue Samples by Sample Area

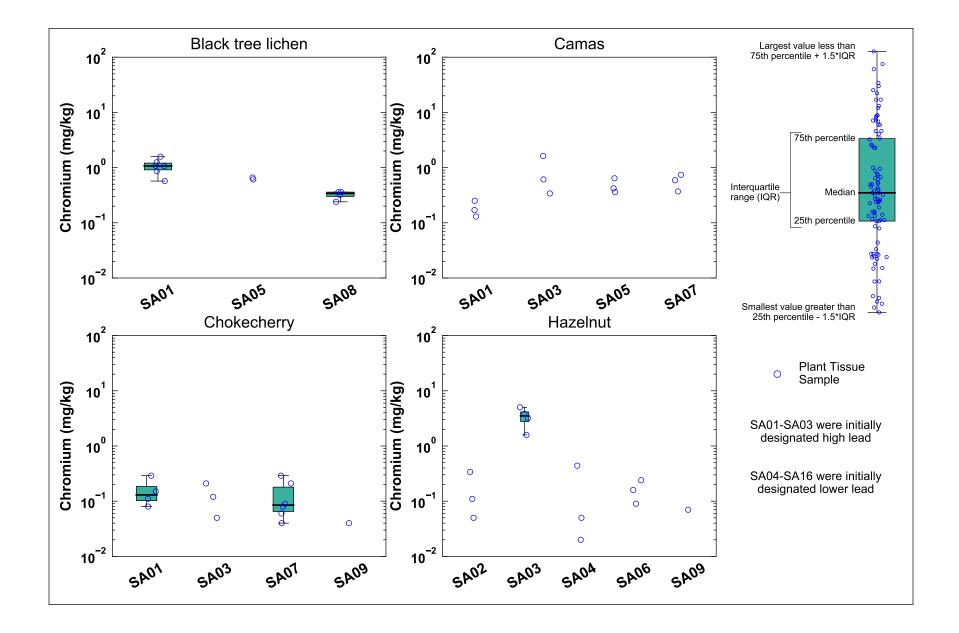


Figure 5-2y. Chromium Concentrations in Plant Tissue Samples by Sample Area

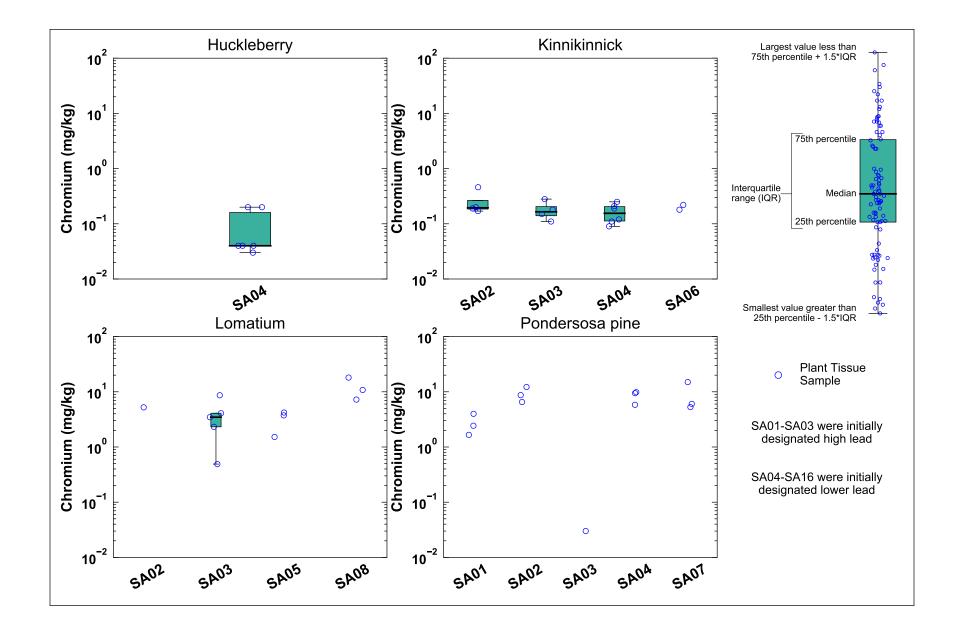


Figure 5-2z. Chromium Concentrations in Plant Tissue Samples by Sample Area

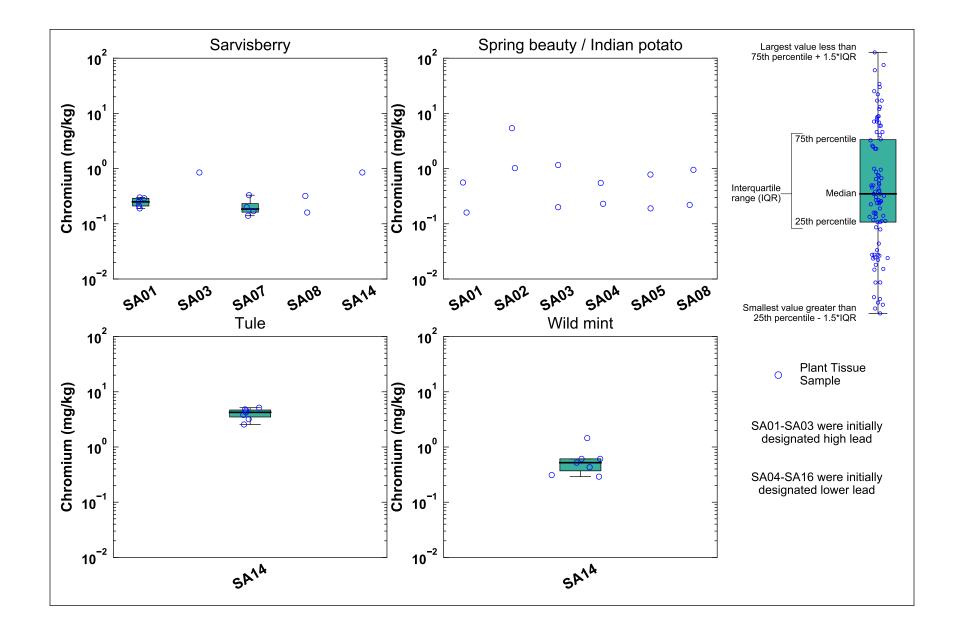


Figure 5-2aa. Chromium Concentrations in Plant Tissue Samples by Sample Area

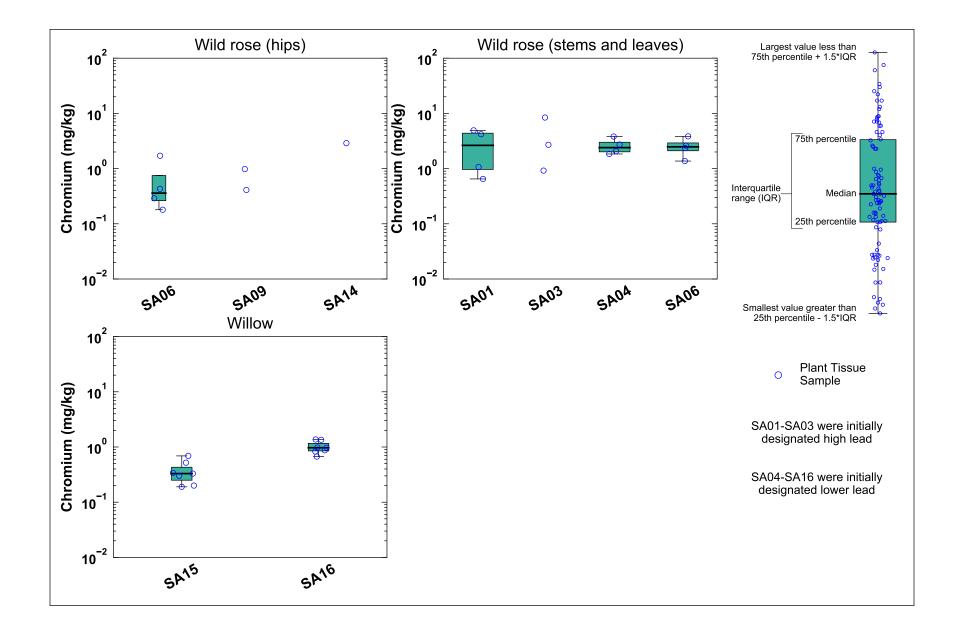


Figure 5-2ab. Chromium Concentrations in Plant Tissue Samples by Sample Area

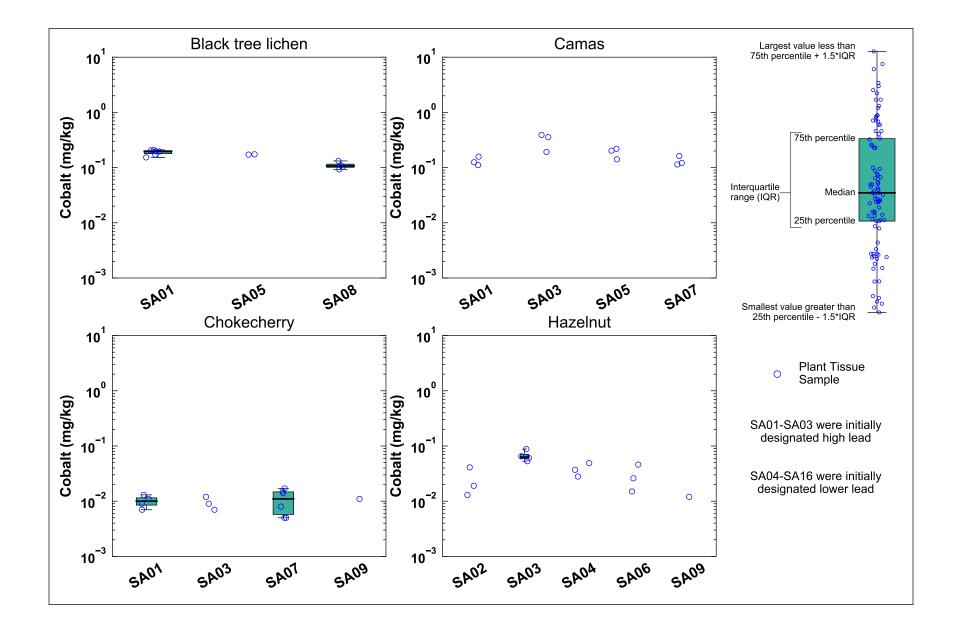


Figure 5-2ac. Cobalt Concentrations in Plant Tissue Samples by Sample Area

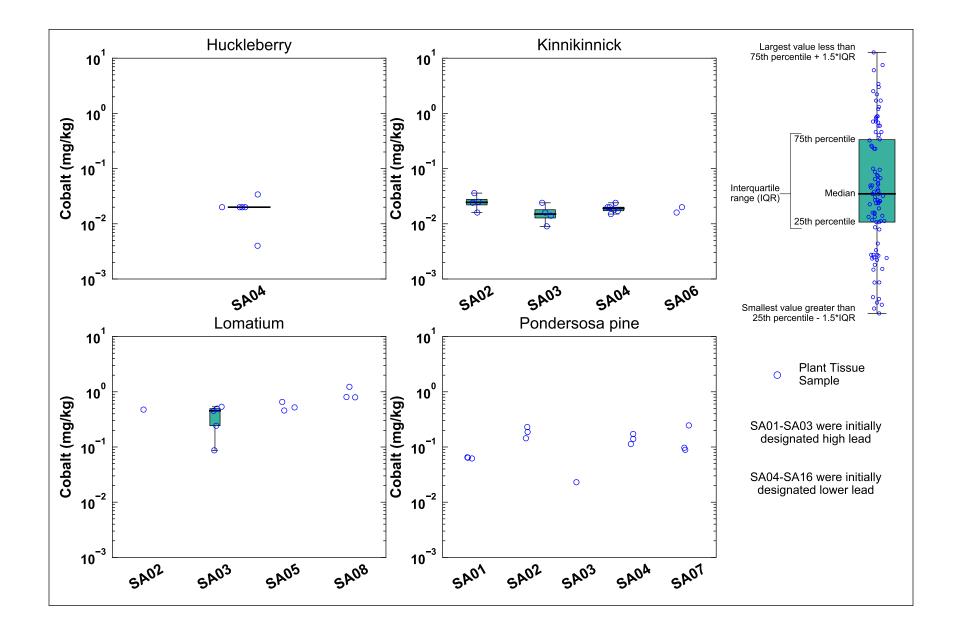


Figure 5-2ad. Cobalt Concentrations in Plant Tissue Samples by Sample Area

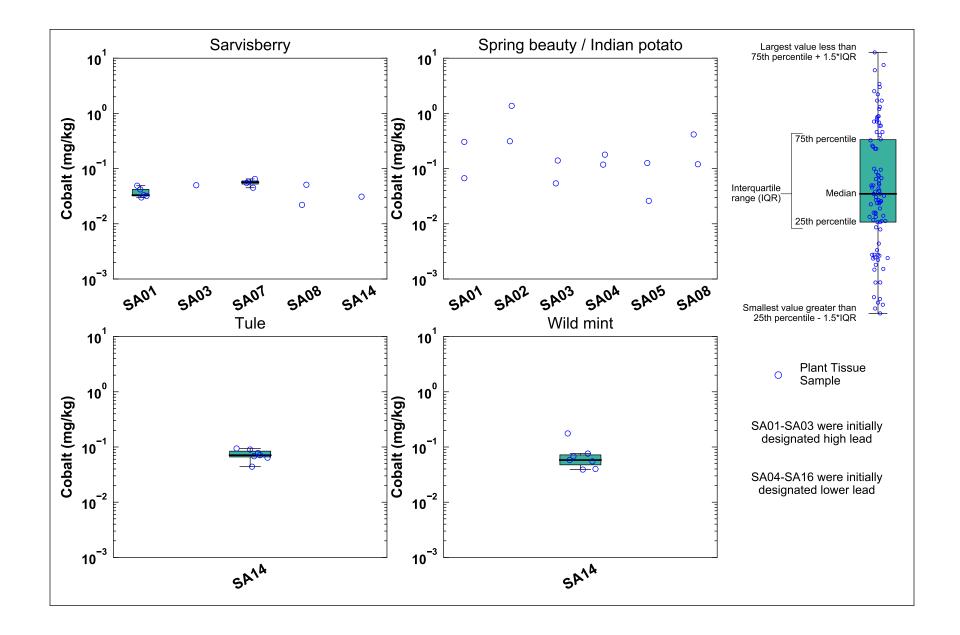


Figure 5-2ae. Cobalt Concentrations in Plant Tissue Samples by Sample Area

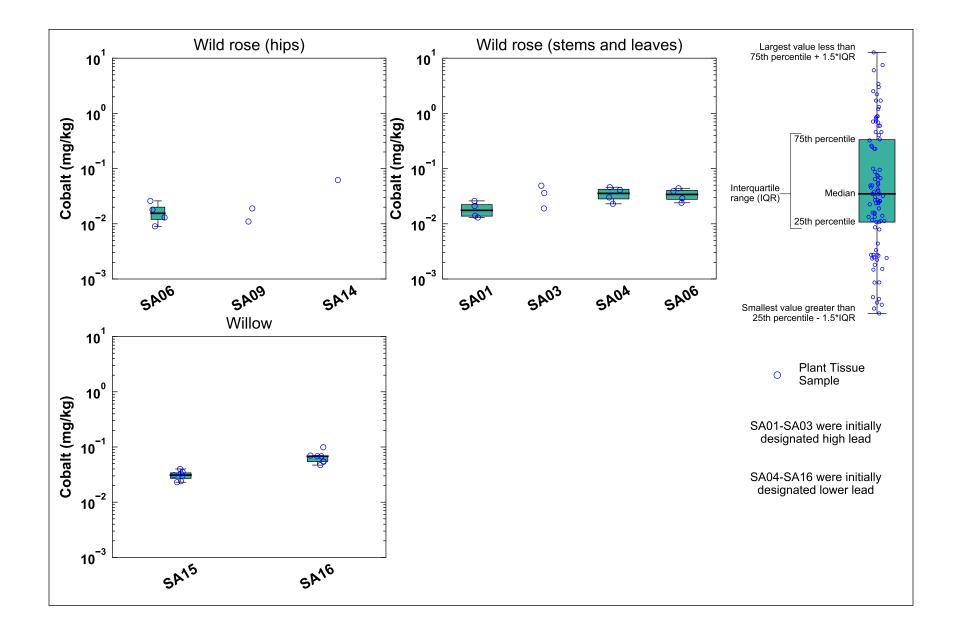


Figure 5-2af. Cobalt Concentrations in Plant Tissue Samples by Sample Area

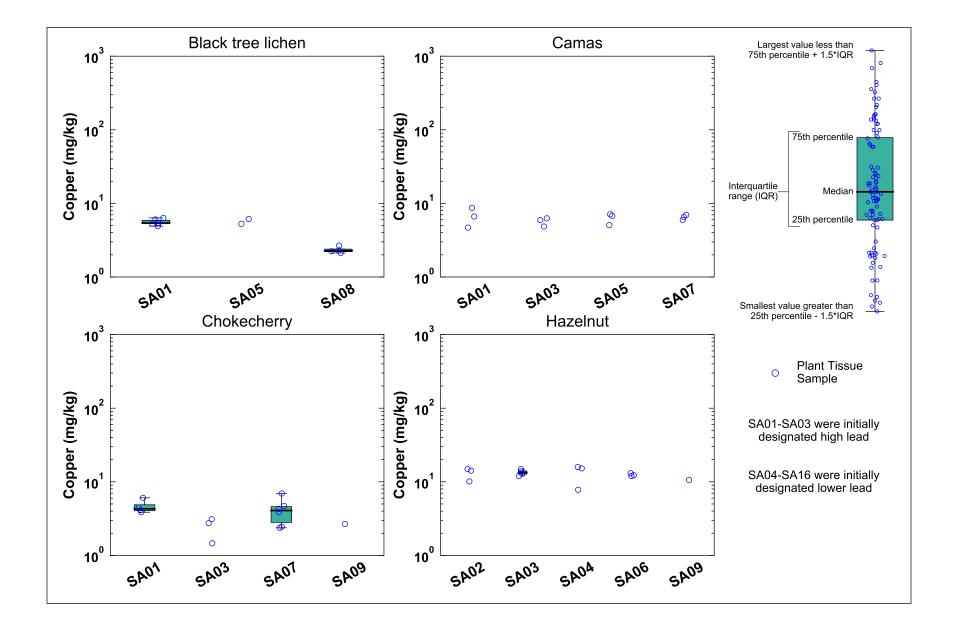


Figure 5-2ag. Copper Concentrations in Plant Tissue Samples by Sample Area

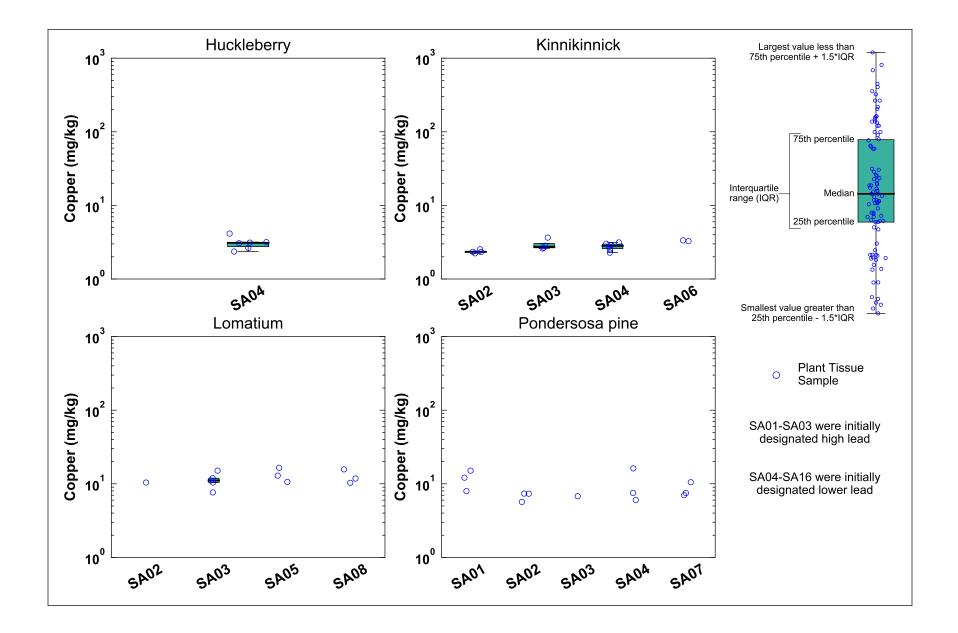


Figure 5-2ah. Copper Concentrations in Plant Tissue Samples by Sample Area

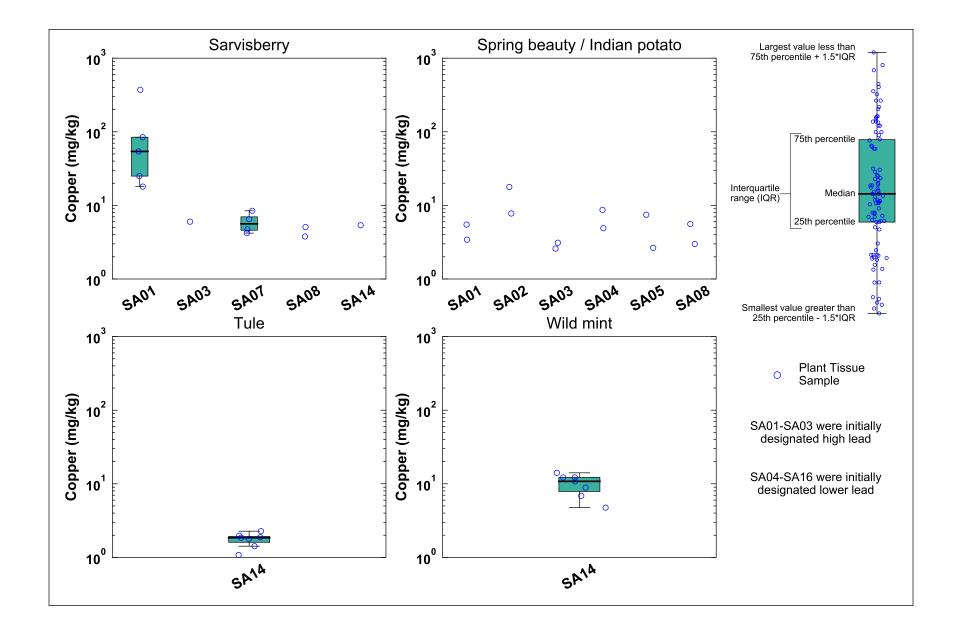


Figure 5-2ai. Copper Concentrations in Plant Tissue Samples by Sample Area

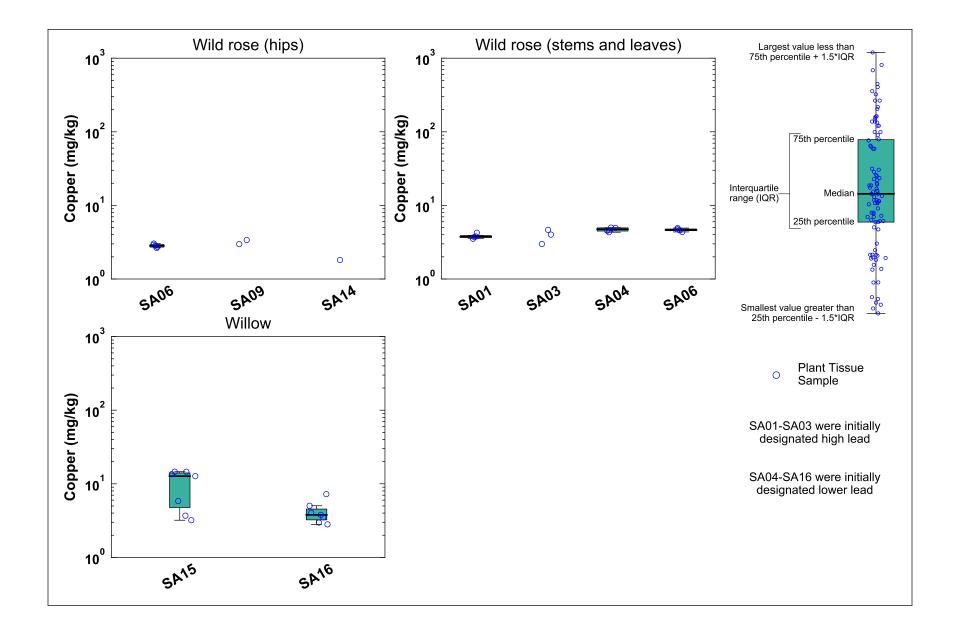


Figure 5-2aj. Copper Concentrations in Plant Tissue Samples by Sample Area

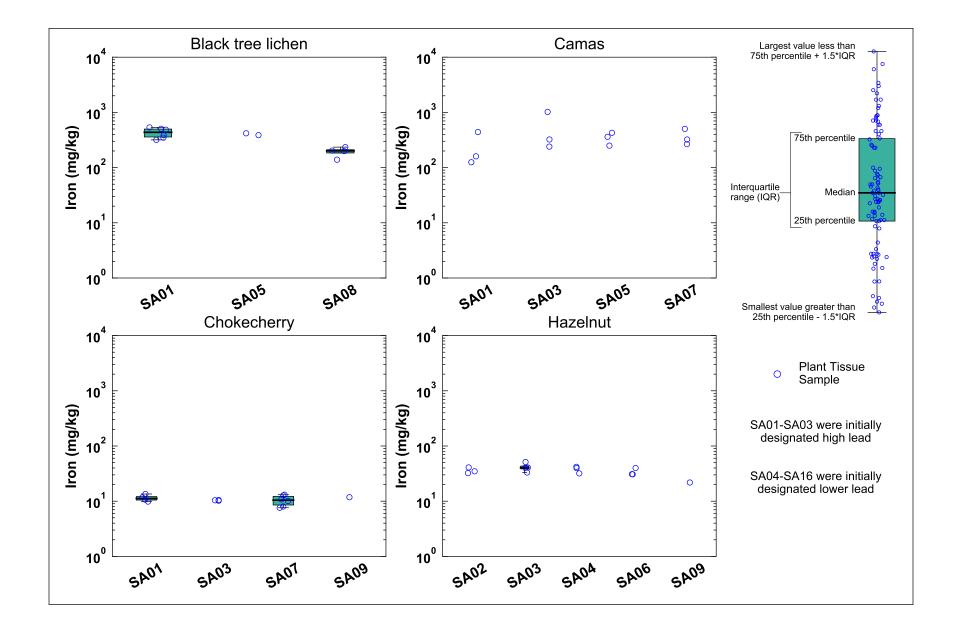


Figure 5-2ak. Iron Concentrations in Plant Tissue Samples by Sample Area

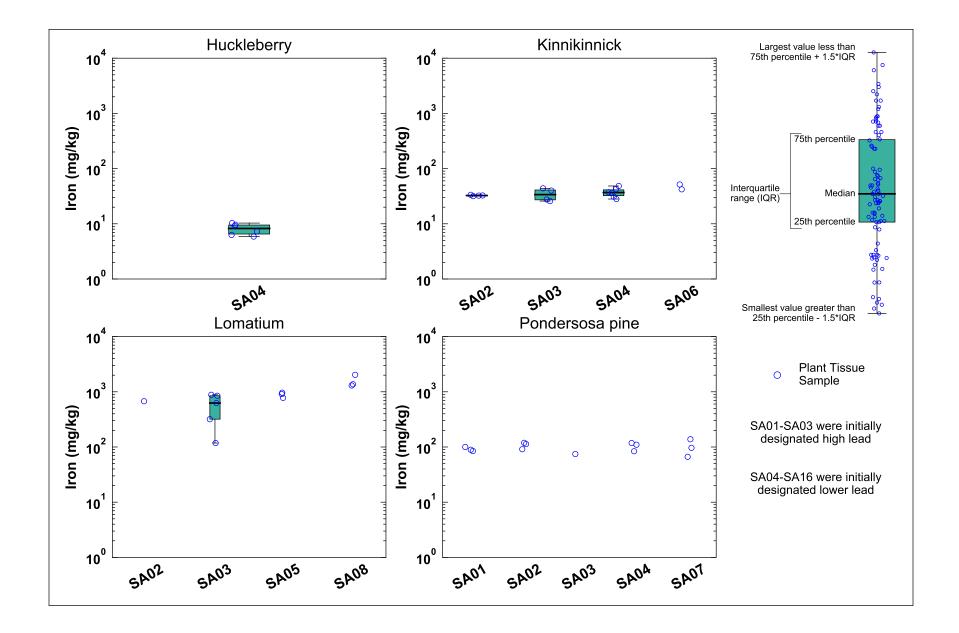


Figure 5-2al. Iron Concentrations in Plant Tissue Samples by Sample Area

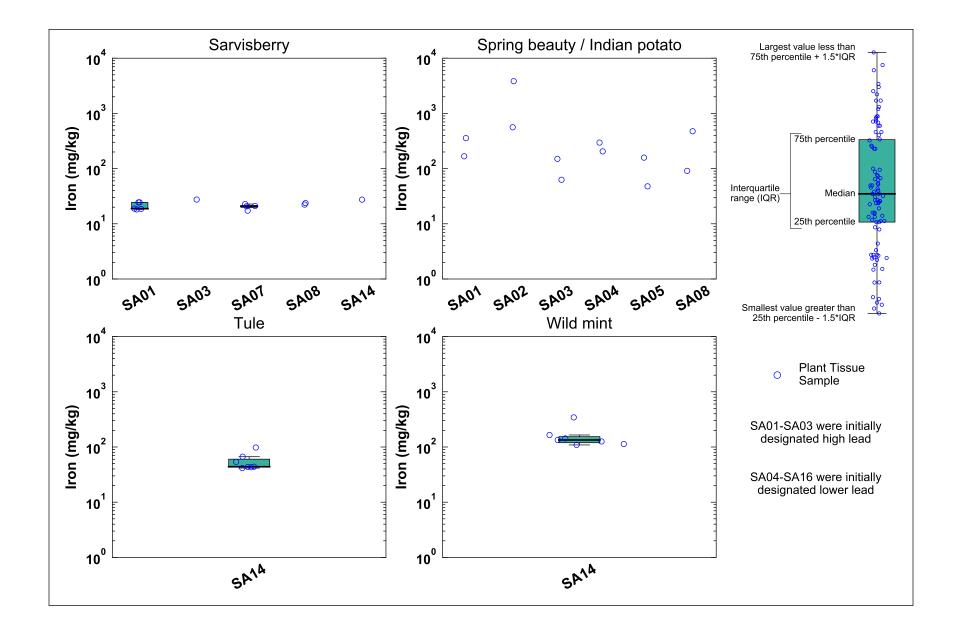


Figure 5-2am. Iron Concentrations in Plant Tissue Samples by Sample Area

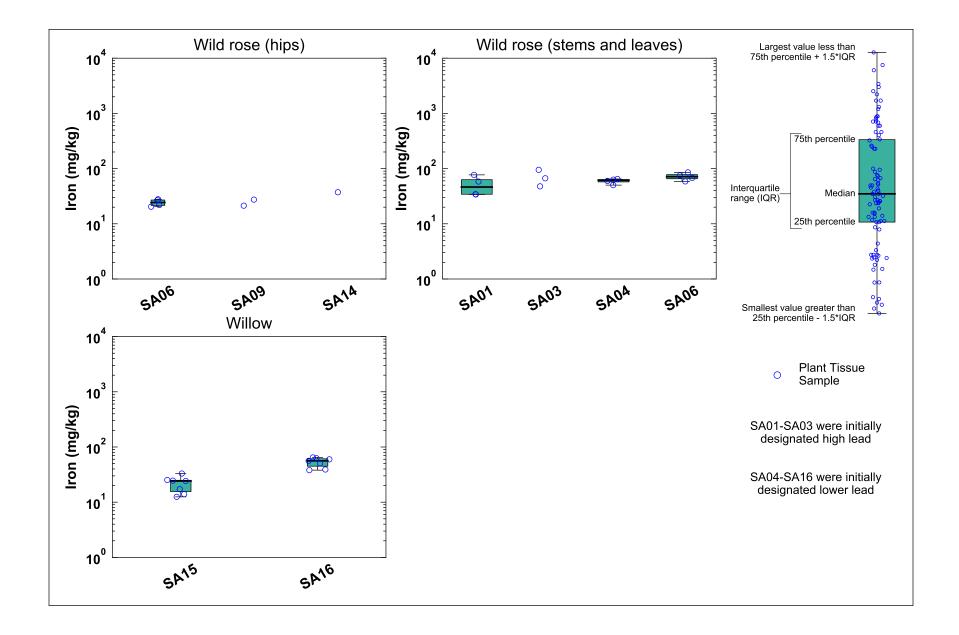


Figure 5-2an. Iron Concentrations in Plant Tissue Samples by Sample Area

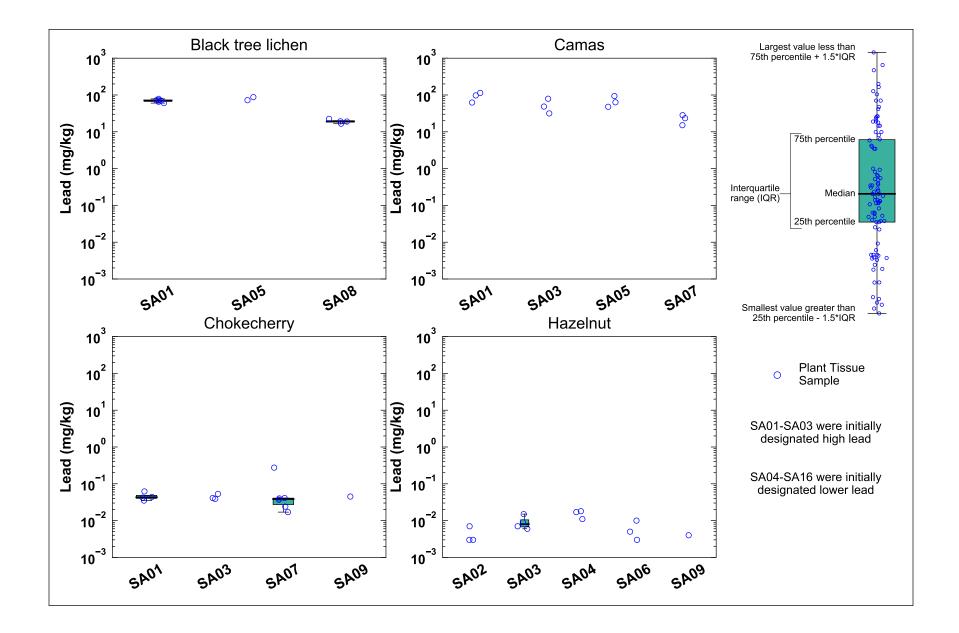


Figure 5-2ao. Lead Concentrations in Plant Tissue Samples by Sample Area

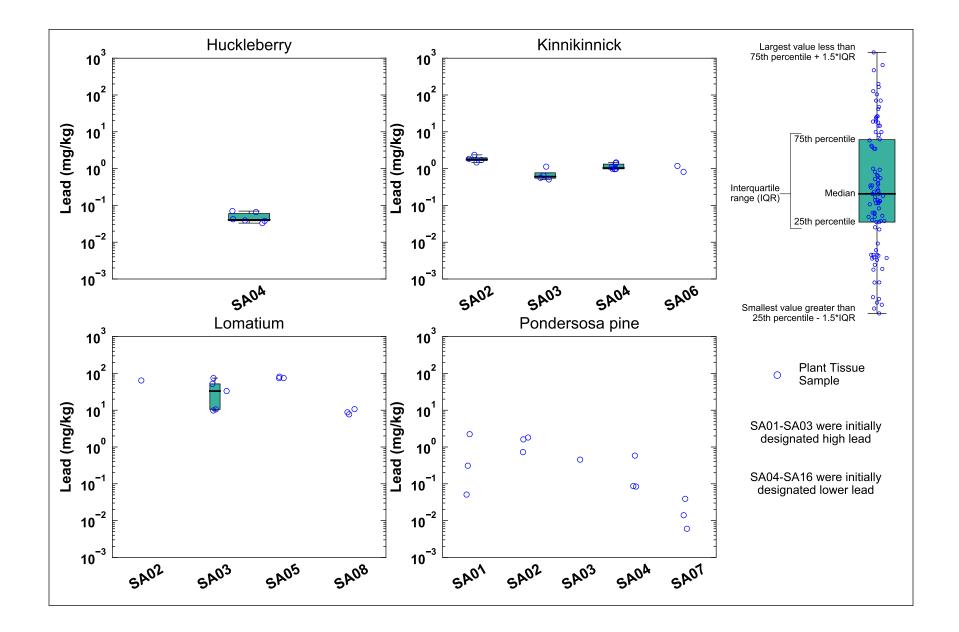


Figure 5-2ap. Lead Concentrations in Plant Tissue Samples by Sample Area

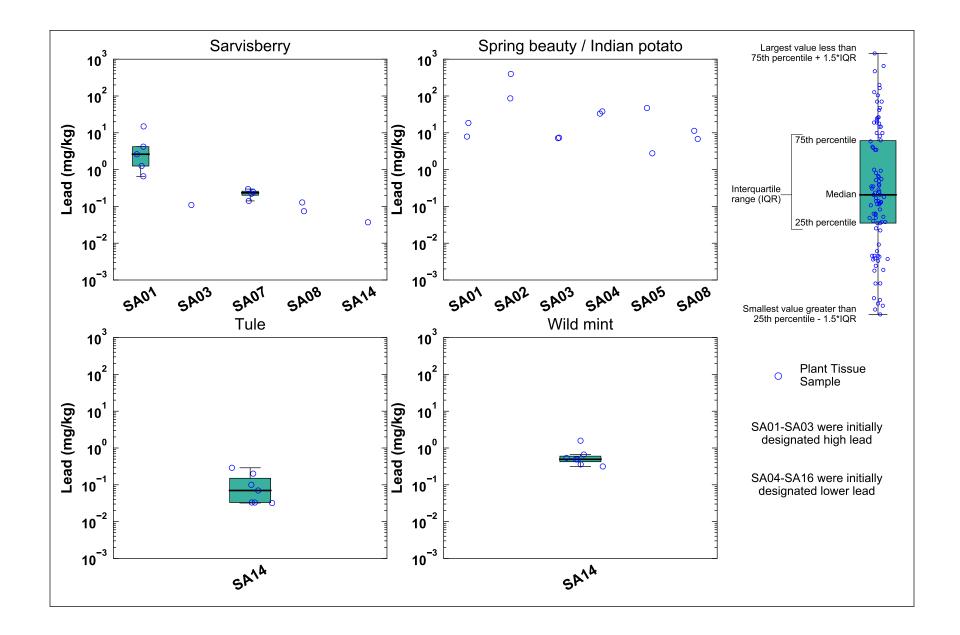


Figure 5-2aq. Lead Concentrations in Plant Tissue Samples by Sample Area

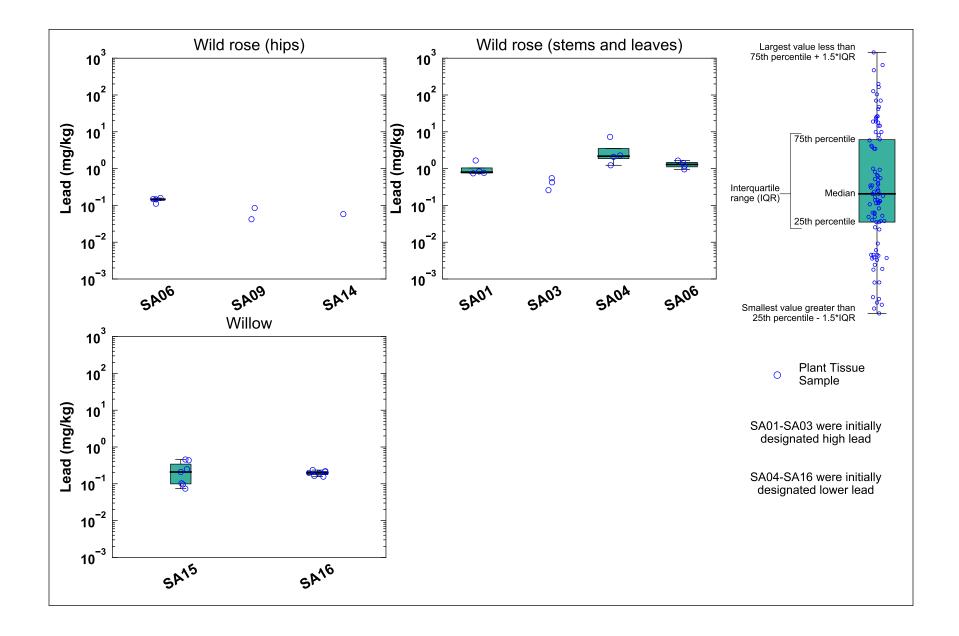


Figure 5-2ar. Lead Concentrations in Plant Tissue Samples by Sample Area

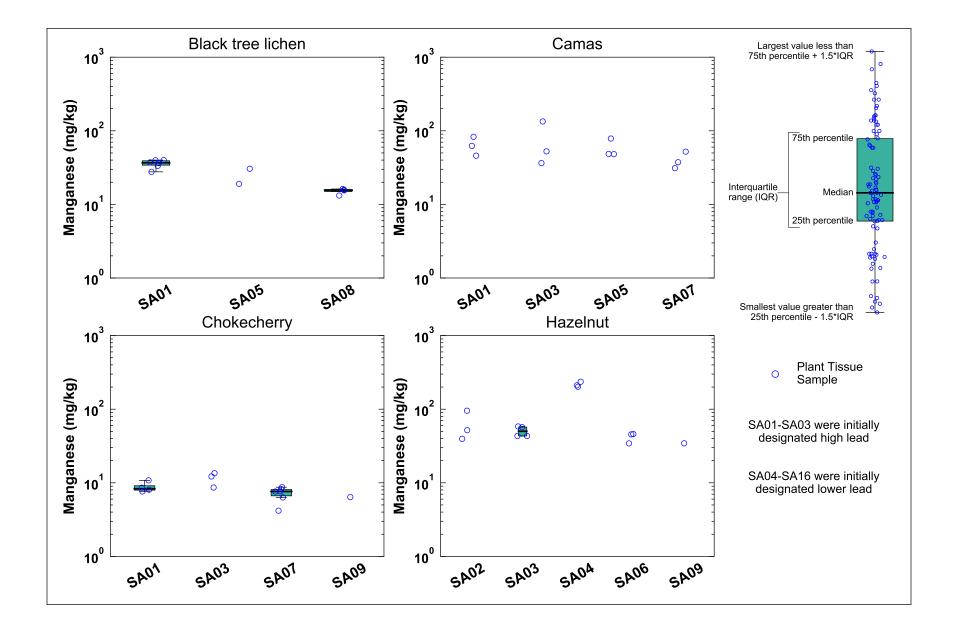


Figure 5-2as. Manganese Concentrations in Plant Tissue Samples by Sample Area

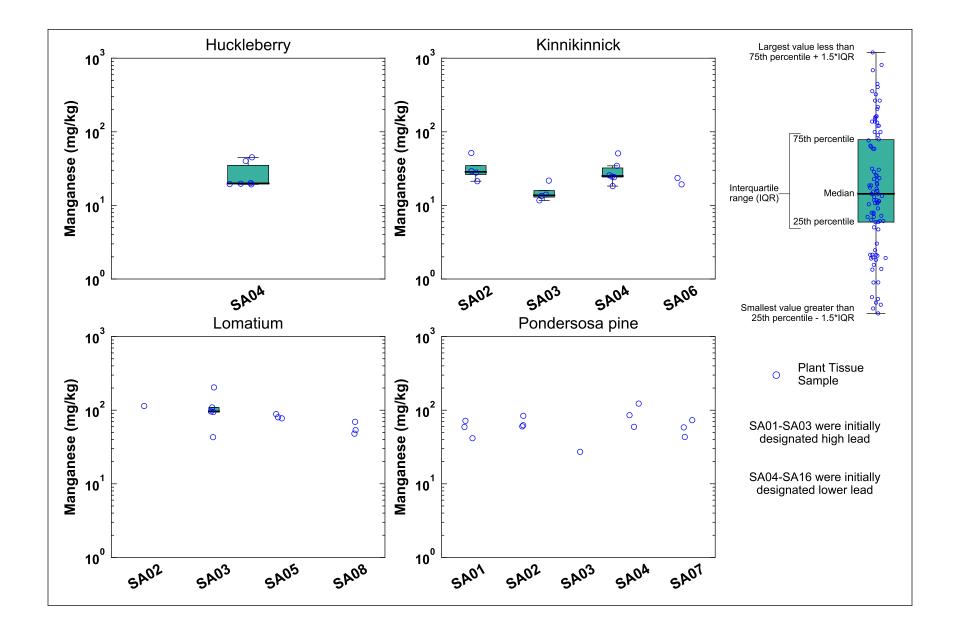


Figure 5-2at. Manganese Concentrations in Plant Tissue Samples by Sample Area

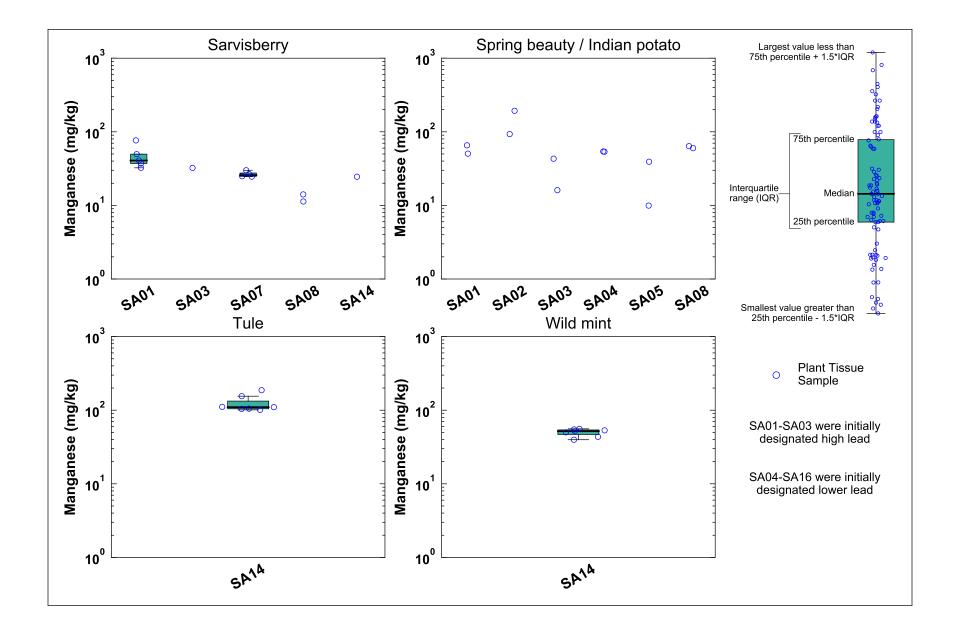


Figure 5-2au. Manganese Concentrations in Plant Tissue Samples by Sample Area

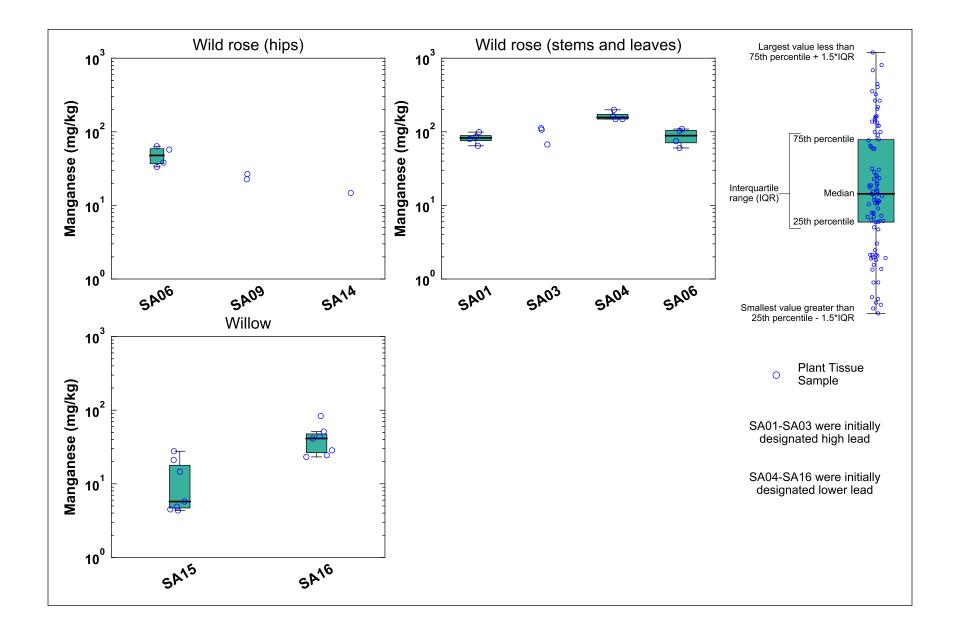
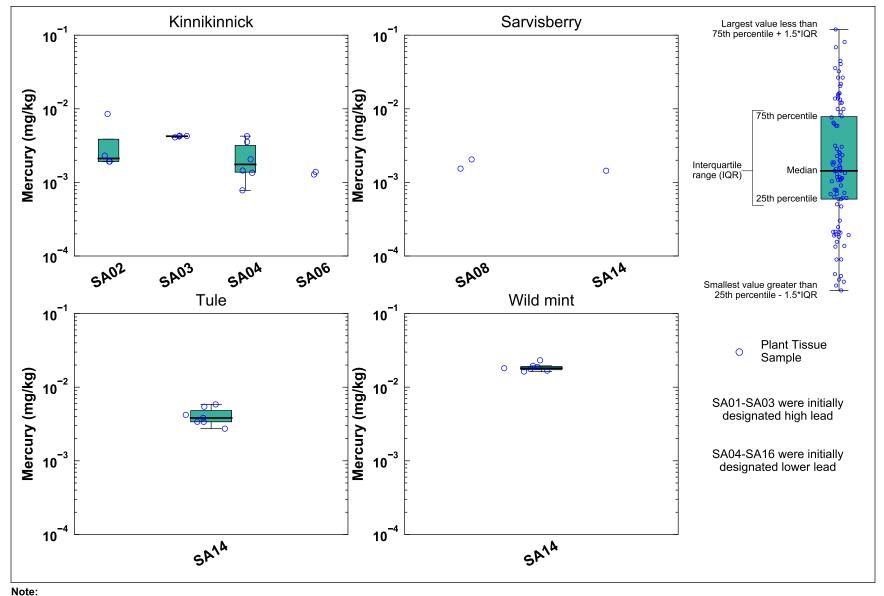
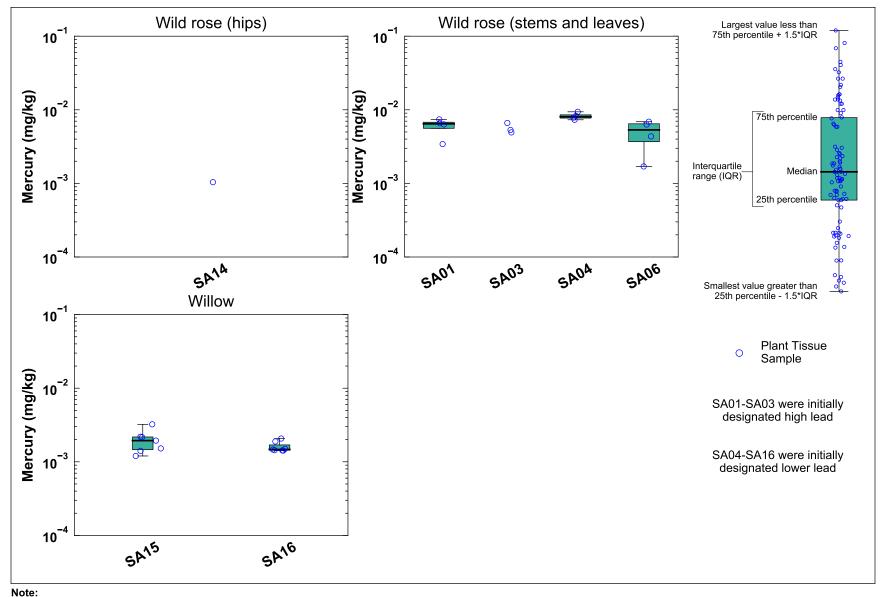


Figure 5-2av. Manganese Concentrations in Plant Tissue Samples by Sample Area



Mercury units were converted to mg/kg from ng/g values reported by ALS

Figure 5-2aw. Mercury Concentrations in Plant Tissue Samples by Sample Area



Mercury units were converted to mg/kg from ng/g values reported by ALS

Figure 5-2ax. Mercury Concentrations in Plant Tissue Samples by Sample Area

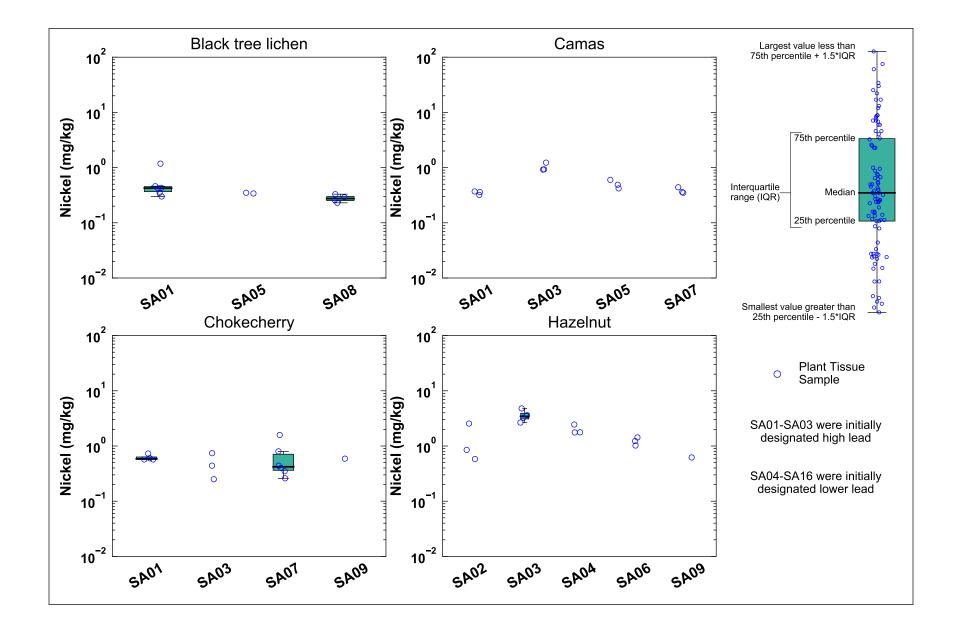


Figure 5-2ay. Nickel Concentrations in Plant Tissue Samples by Sample Area

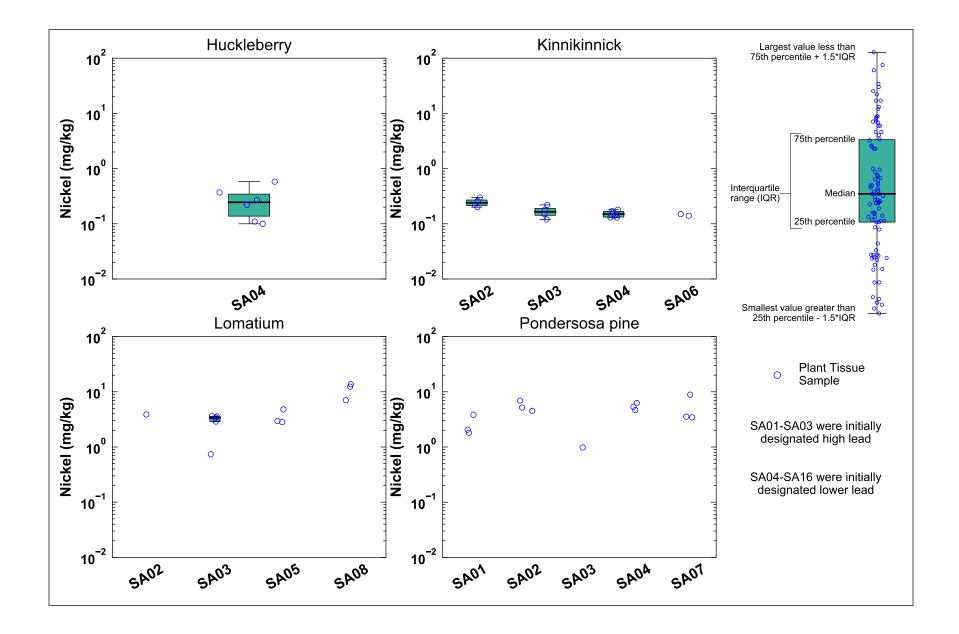


Figure 5-2az. Nickel Concentrations in Plant Tissue Samples by Sample Area

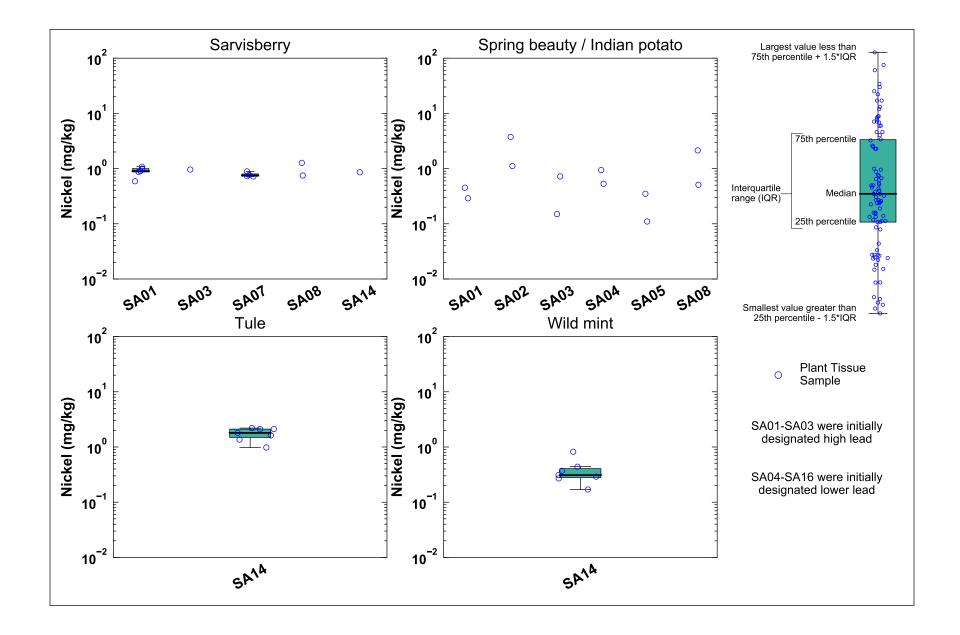


Figure 5-2ba. Nickel Concentrations in Plant Tissue Samples by Sample Area

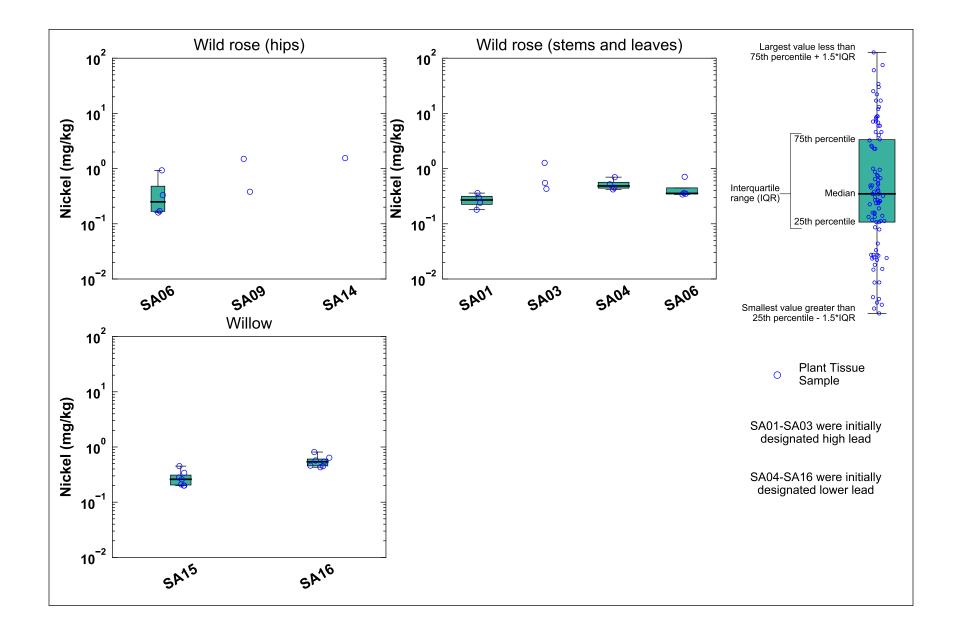


Figure 5-2bb. Nickel Concentrations in Plant Tissue Samples by Sample Area

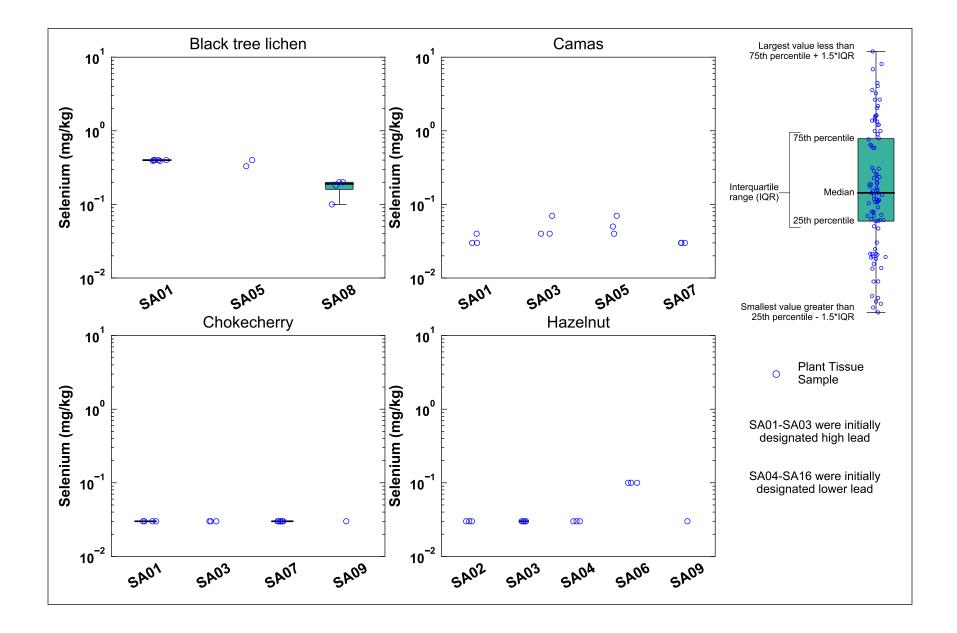


Figure 5-2bc. Selenium Concentrations in Plant Tissue Samples by Sample Area

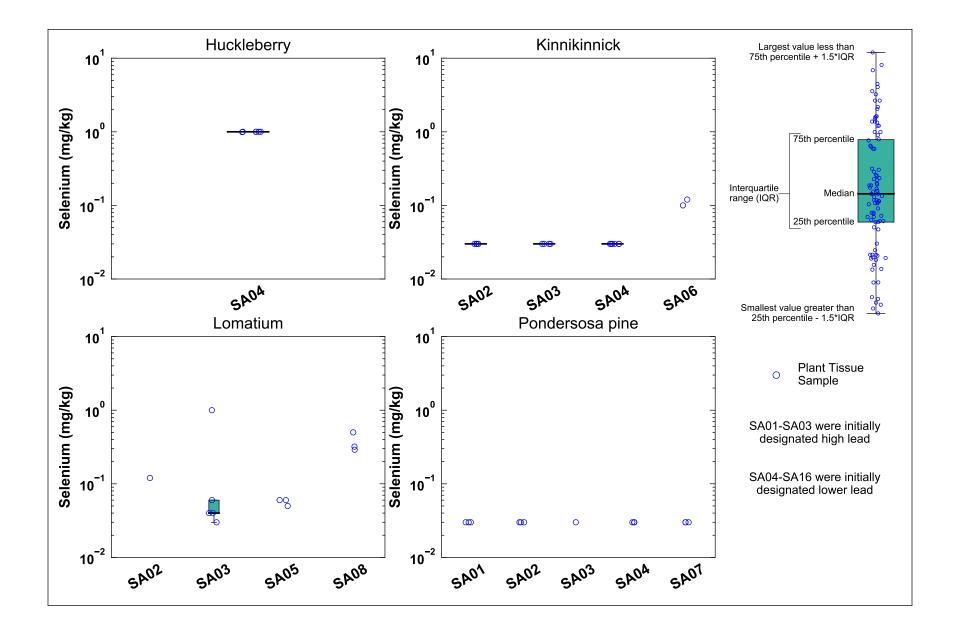


Figure 5-2bd. Selenium Concentrations in Plant Tissue Samples by Sample Area

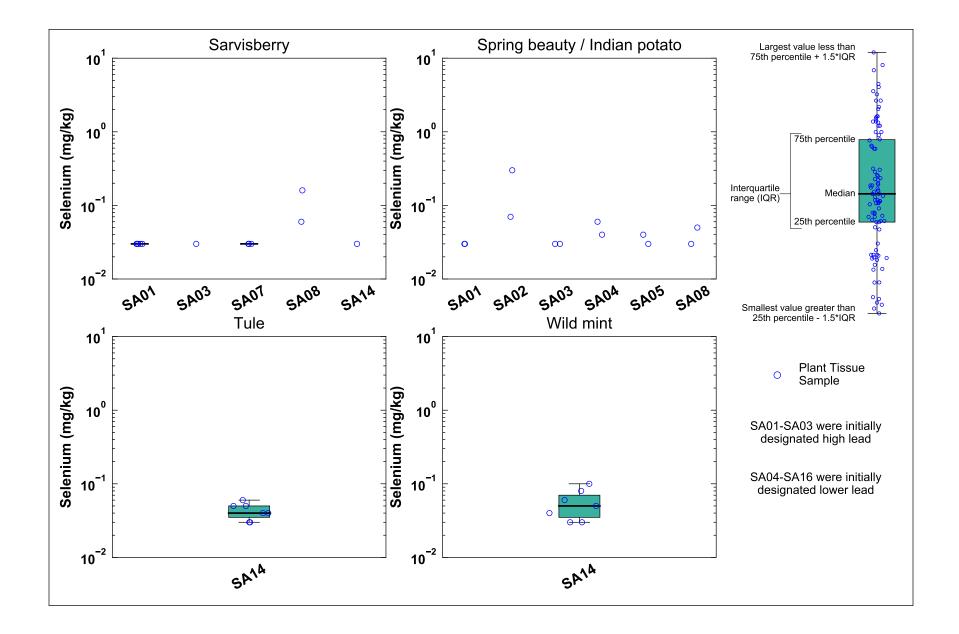


Figure 5-2be. Selenium Concentrations in Plant Tissue Samples by Sample Area

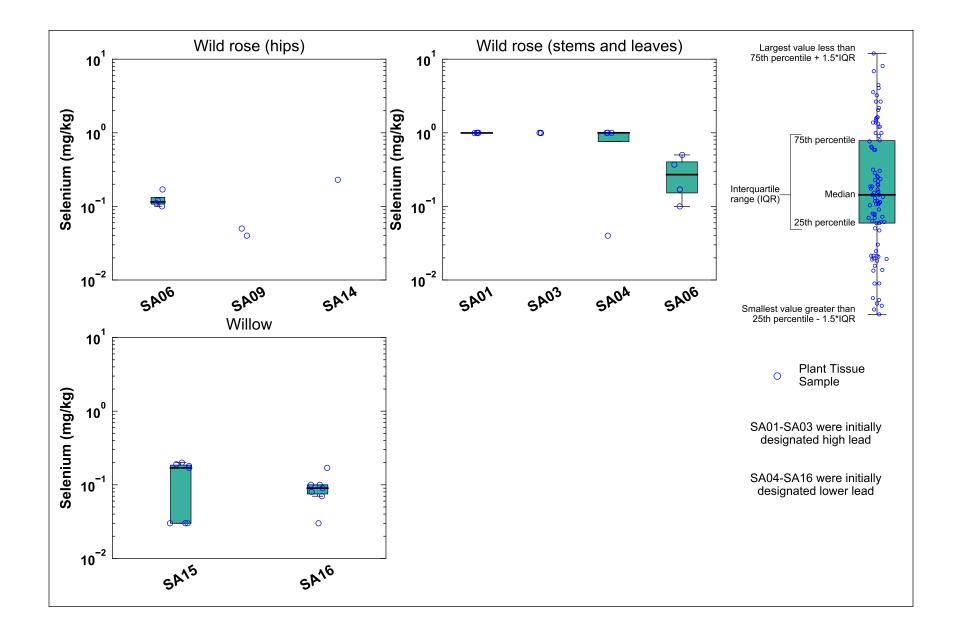


Figure 5-2bf. Selenium Concentrations in Plant Tissue Samples by Sample Area

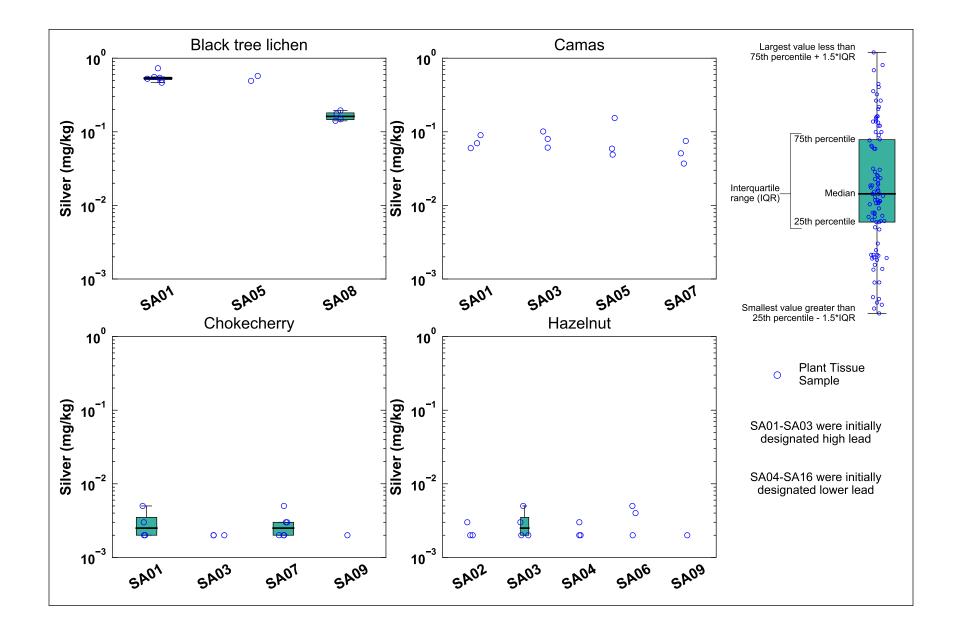


Figure 5-2bg. Silver Concentrations in Plant Tissue Samples by Sample Area

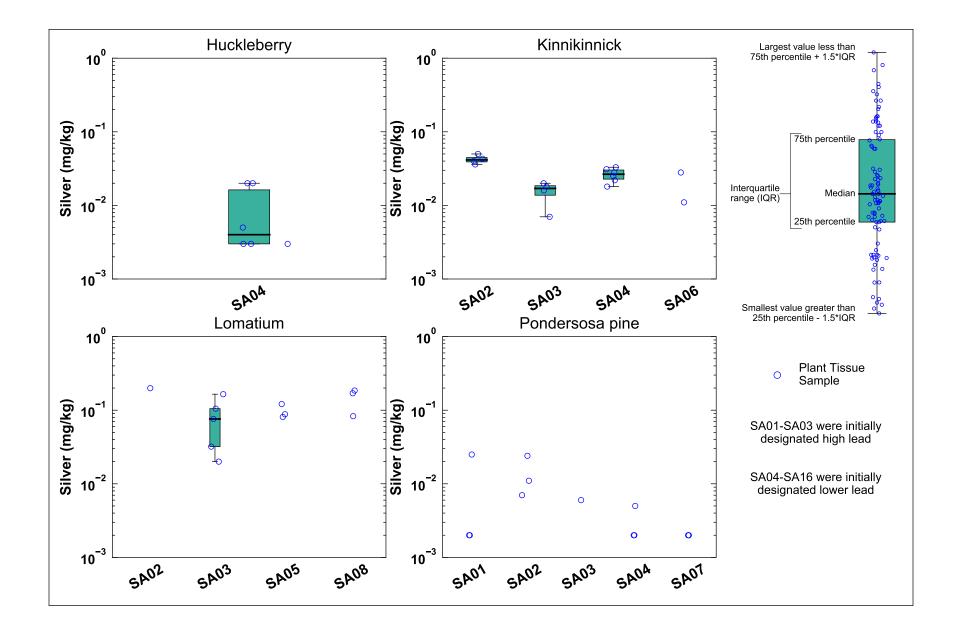


Figure 5-2bh. Silver Concentrations in Plant Tissue Samples by Sample Area

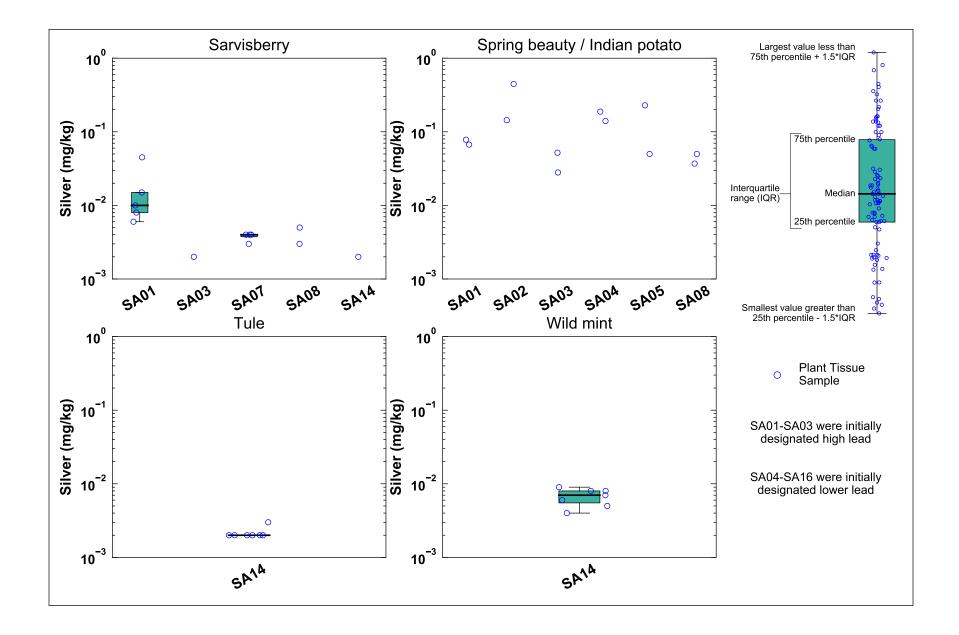


Figure 5-2bi. Silver Concentrations in Plant Tissue Samples by Sample Area

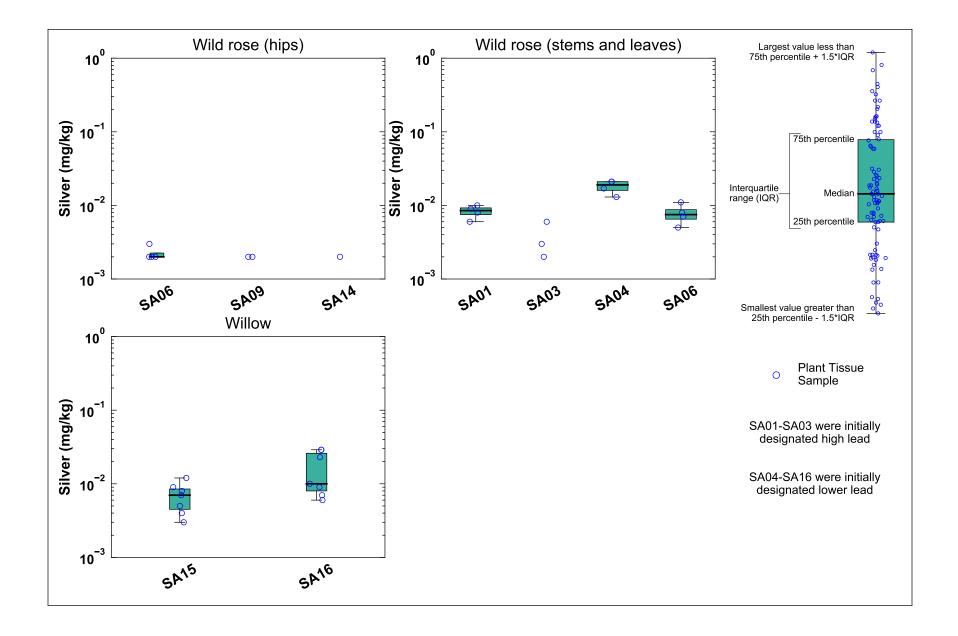


Figure 5-2bj. Silver Concentrations in Plant Tissue Samples by Sample Area

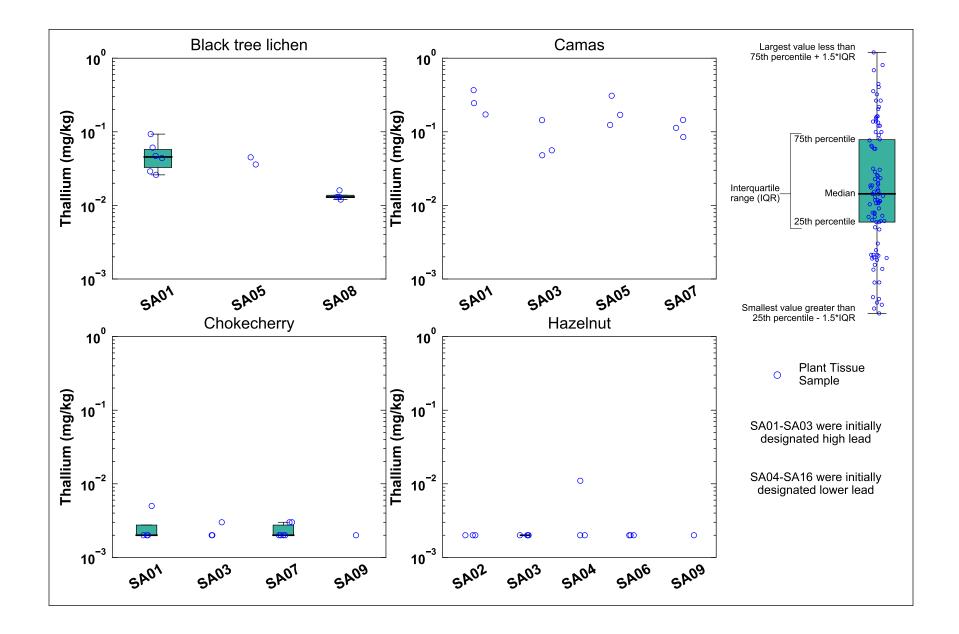


Figure 5-2bk. Thallium Concentrations in Plant Tissue Samples by Sample Area

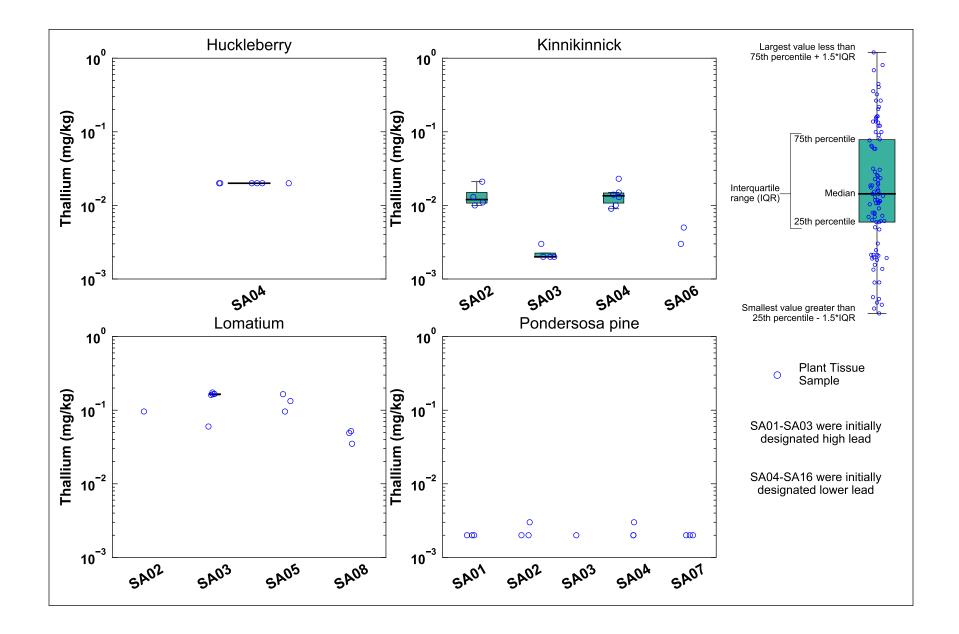


Figure 5-2bl. Thallium Concentrations in Plant Tissue Samples by Sample Area

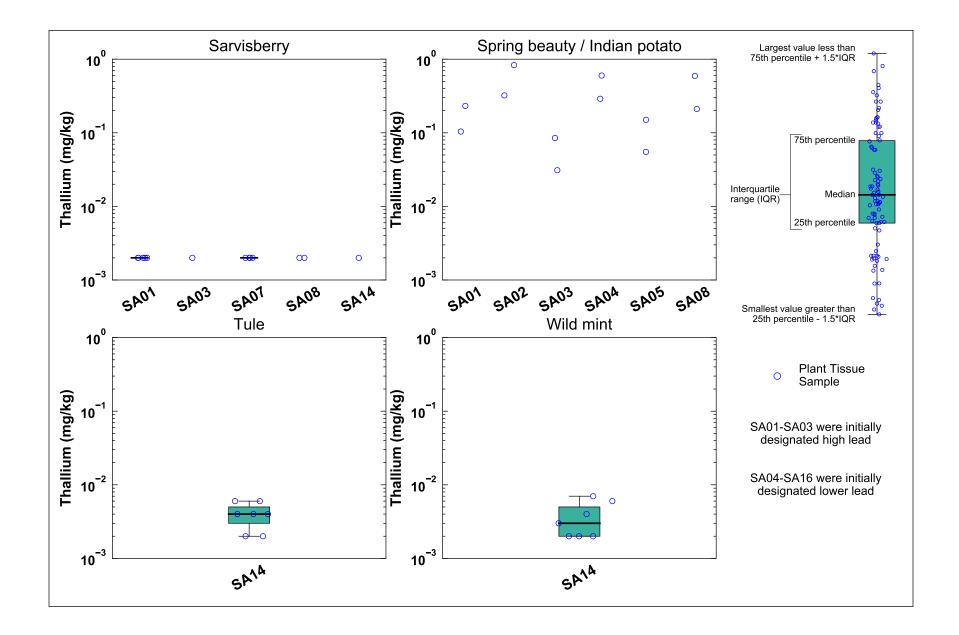


Figure 5-2bm. Thallium Concentrations in Plant Tissue Samples by Sample Area

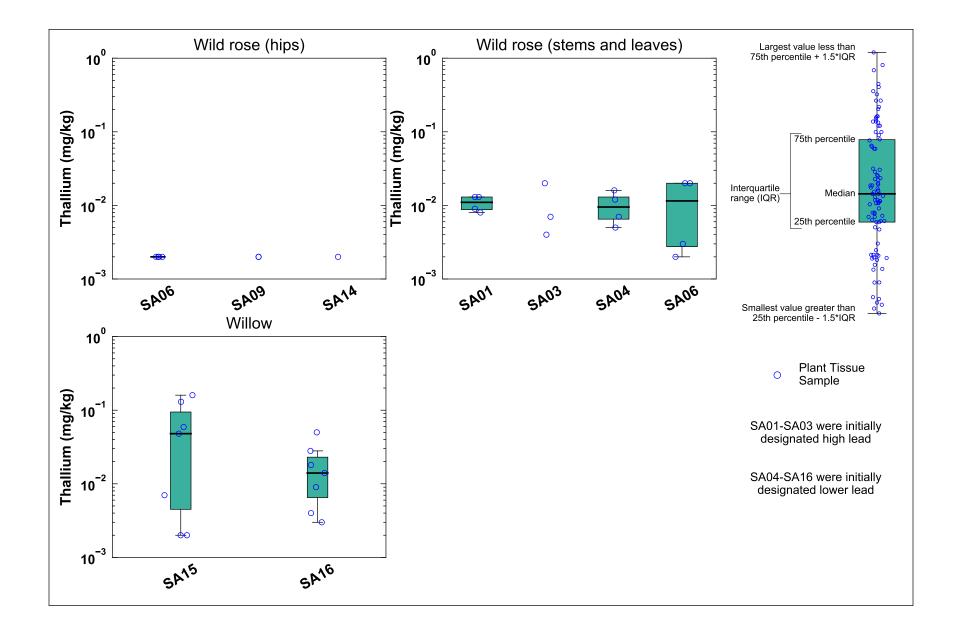


Figure 5-2bn. Thallium Concentrations in Plant Tissue Samples by Sample Area

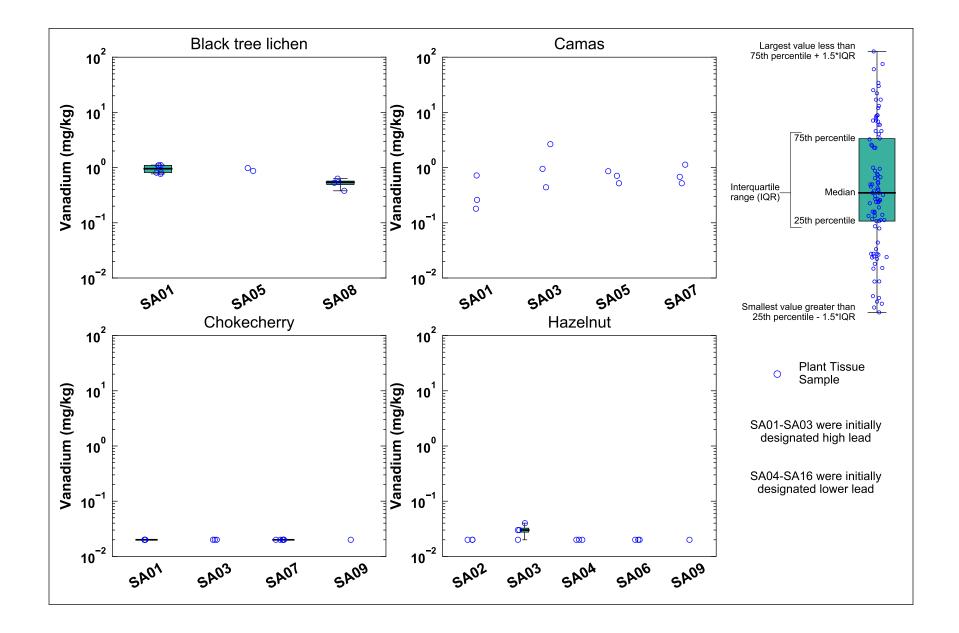


Figure 5-2bo. Vanadium Concentrations in Plant Tissue Samples by Sample Area

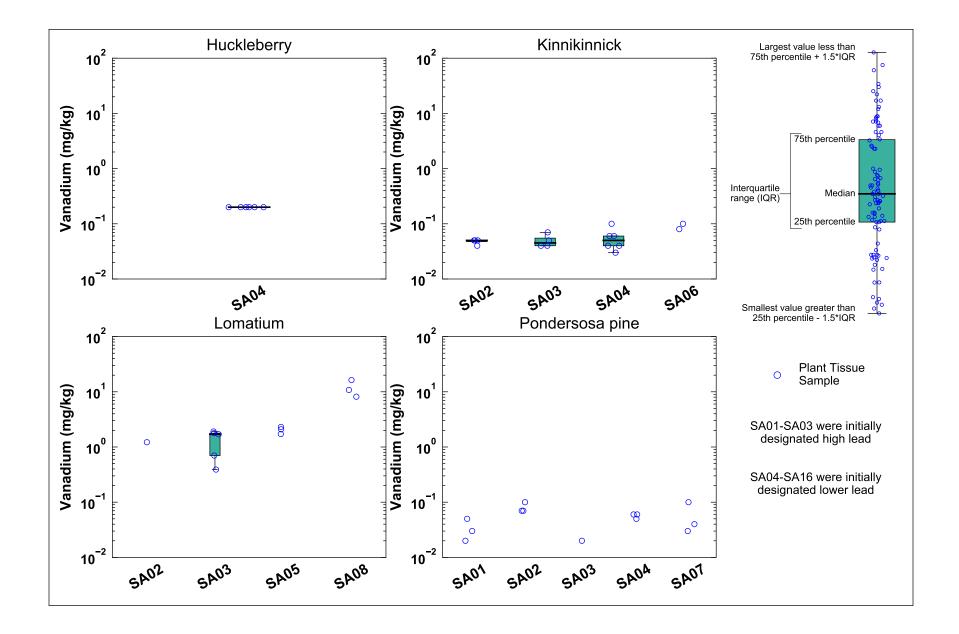


Figure 5-2bp. Vanadium Concentrations in Plant Tissue Samples by Sample Area

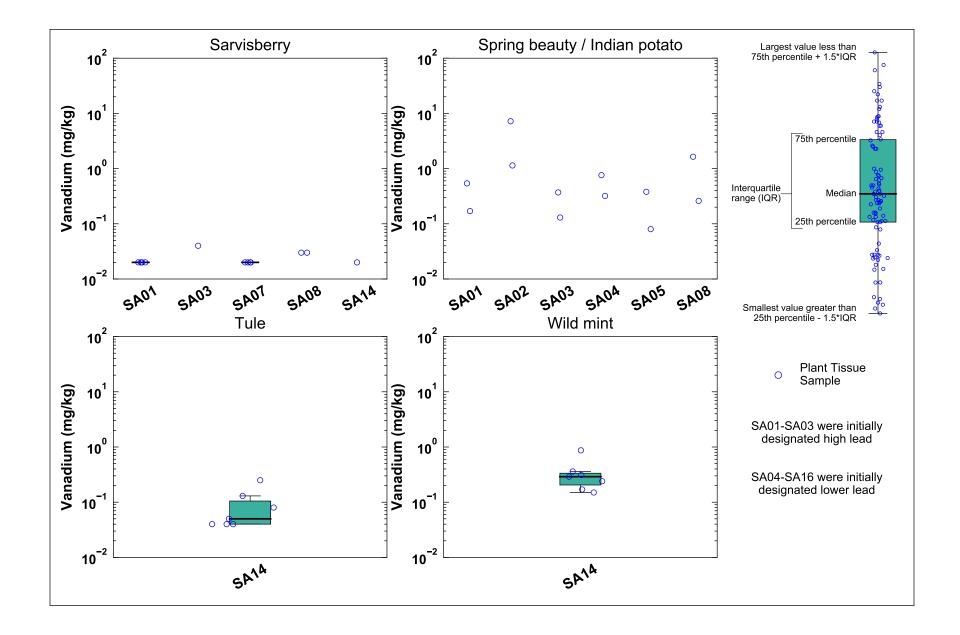


Figure 5-2bq. Vanadium Concentrations in Plant Tissue Samples by Sample Area

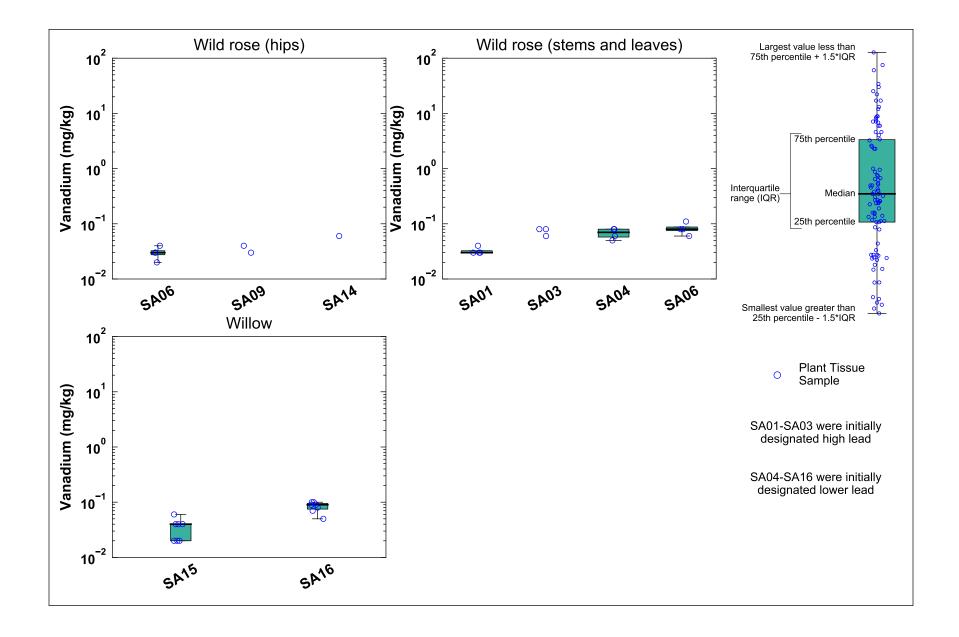


Figure 5-2br. Vanadium Concentrations in Plant Tissue Samples by Sample Area

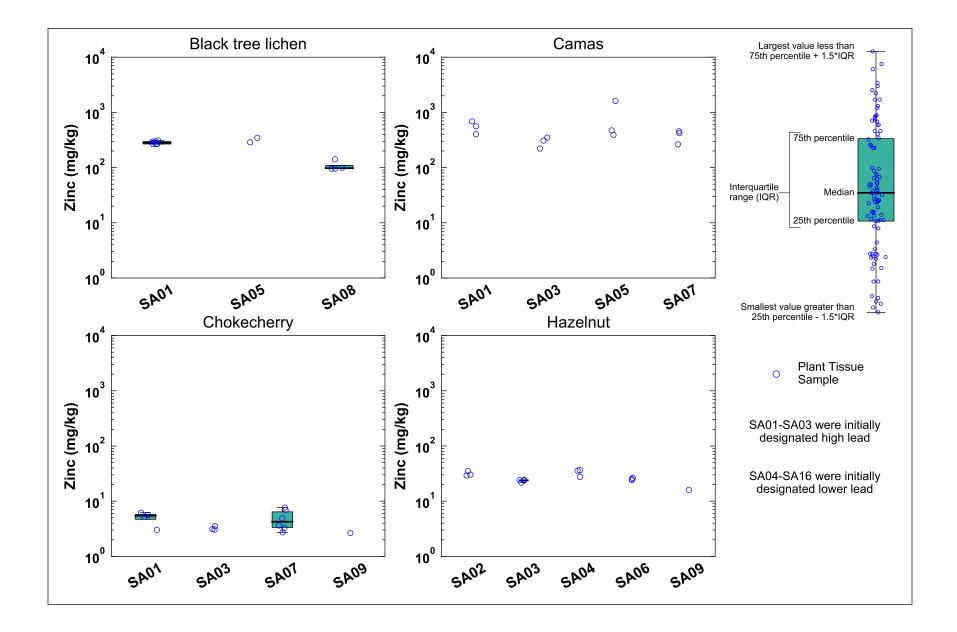


Figure 5-2bs. Zinc Concentrations in Plant Tissue Samples by Sample Area

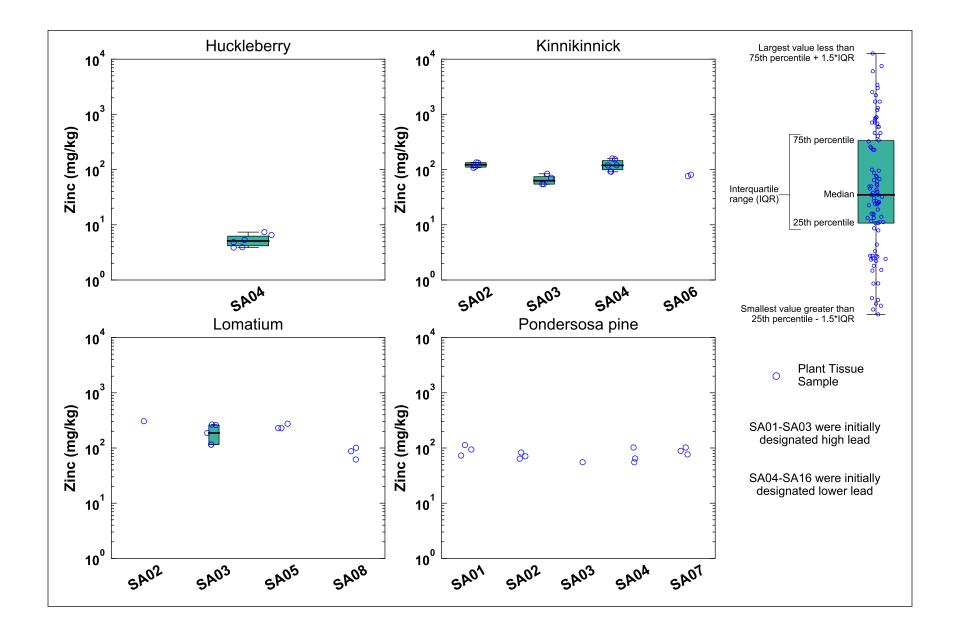


Figure 5-2bt. Zinc Concentrations in Plant Tissue Samples by Sample Area

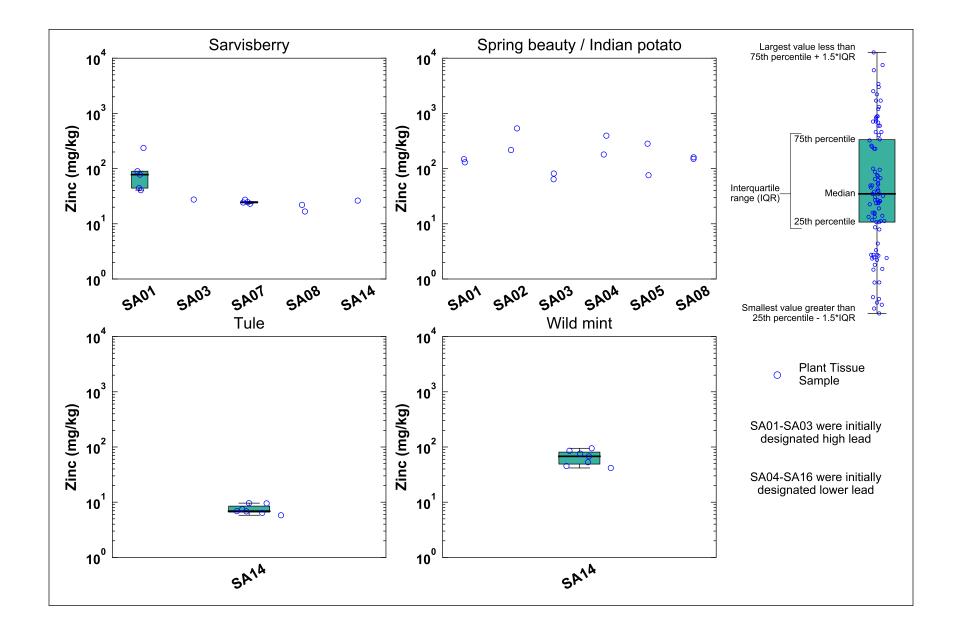


Figure 5-2bu. Zinc Concentrations in Plant Tissue Samples by Sample Area

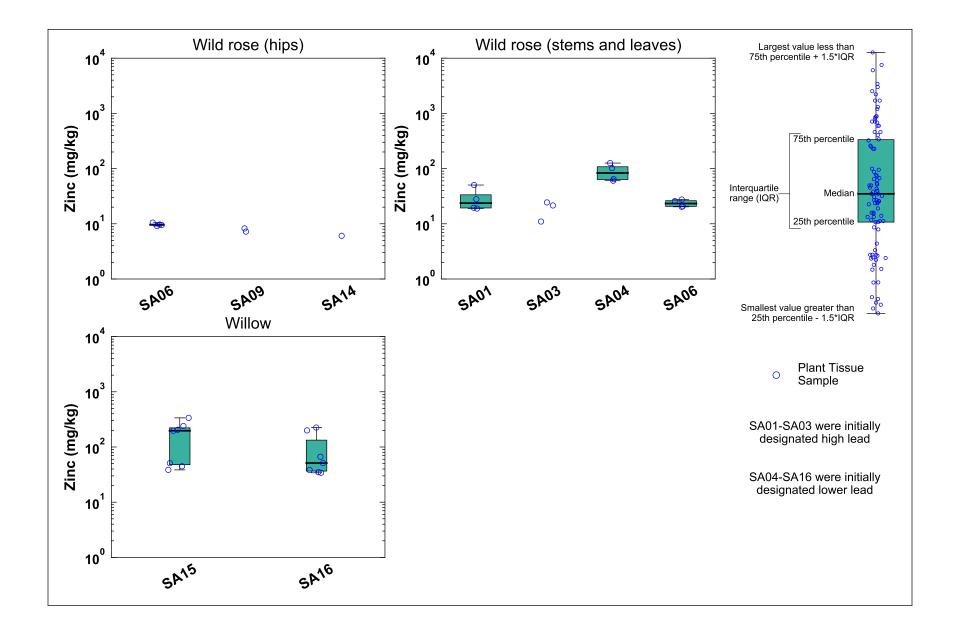


Figure 5-2bv. Zinc Concentrations in Plant Tissue Samples by Sample Area

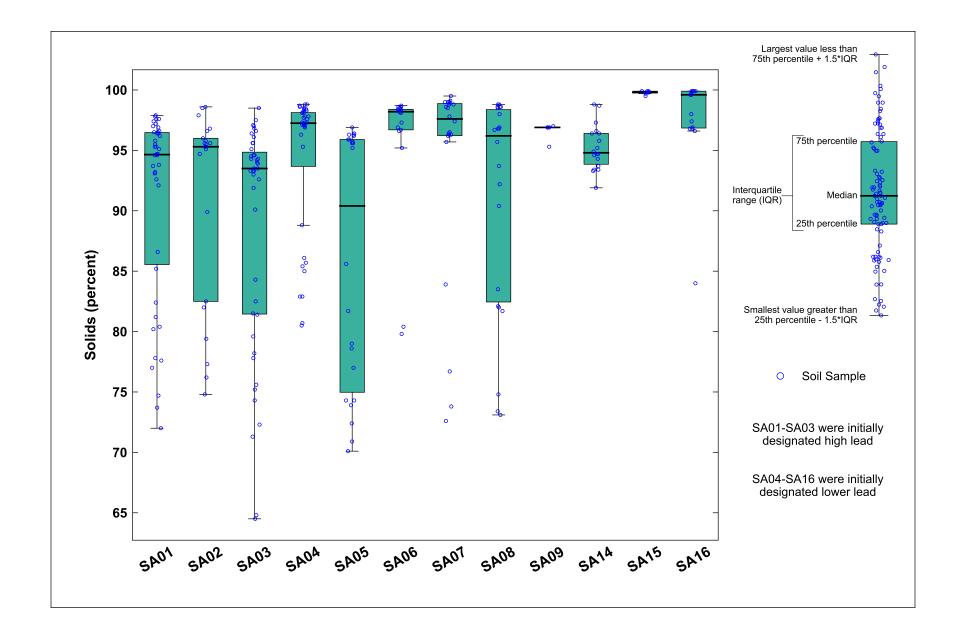


Figure 5-3. Percent Solids in Soil Samples by Sample Area

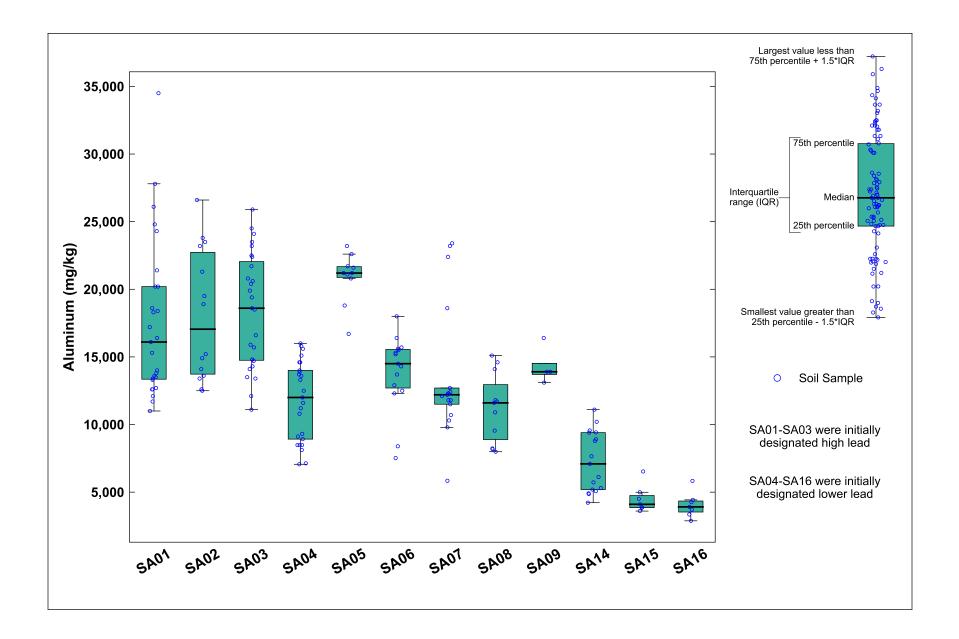


Figure 5-4a. Aluminum Concentrations in Soil Samples by Sample Area

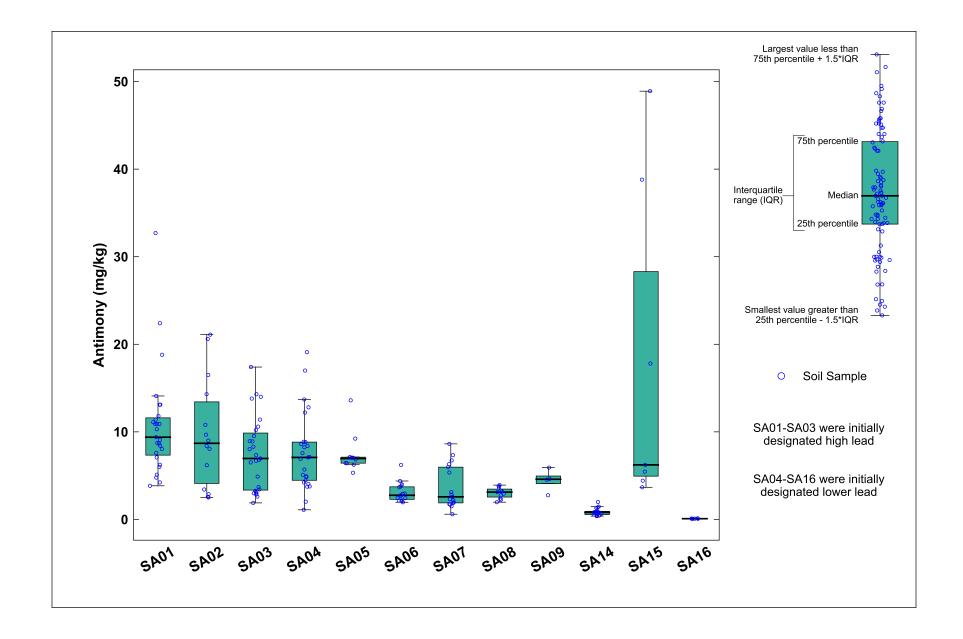


Figure 5-4b. Antimony Concentrations in Soil Samples by Sample Area

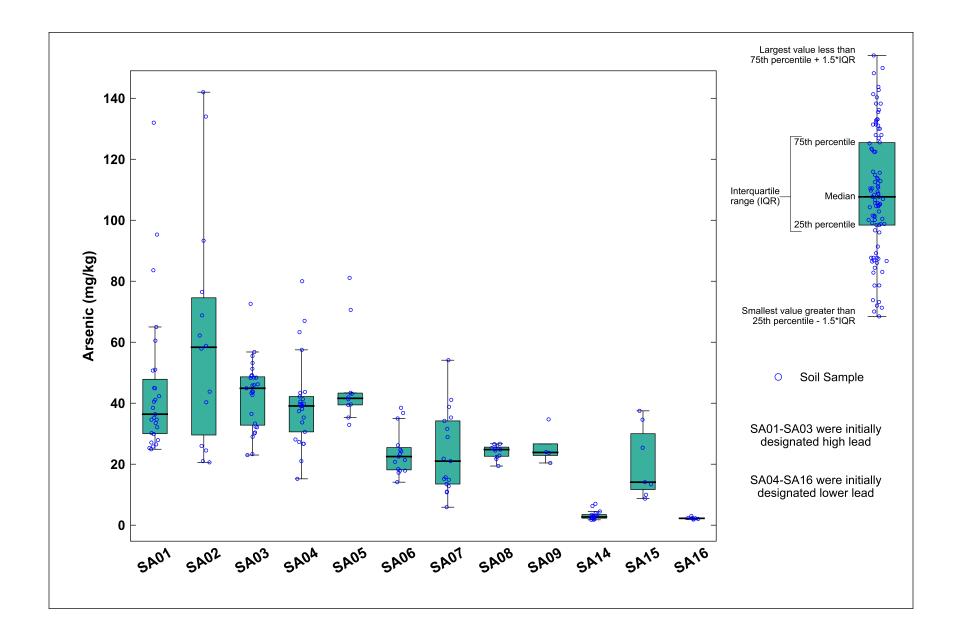


Figure 5-4c. Arsenic Concentrations in Soil Samples by Sample Area

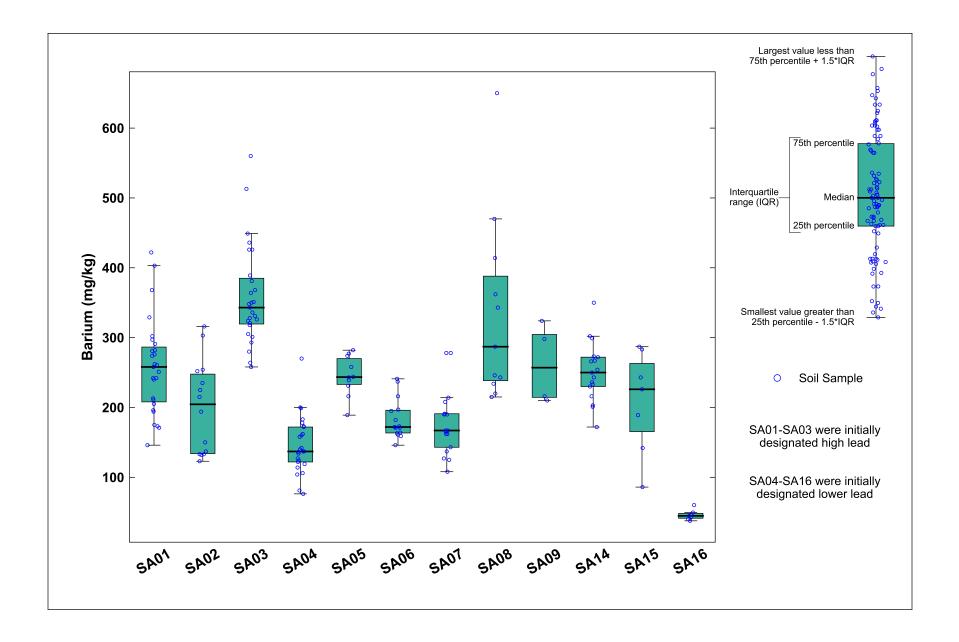


Figure 5-4d. Barium Concentrations in Soil Samples by Sample Area

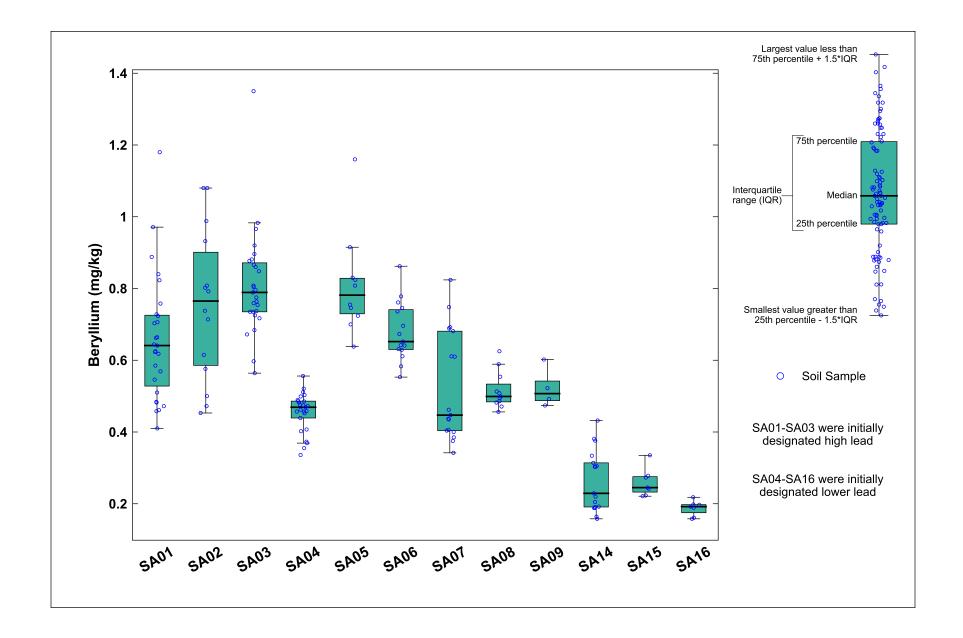


Figure 5-4e. Beryllium Concentrations in Soil Samples by Sample Area

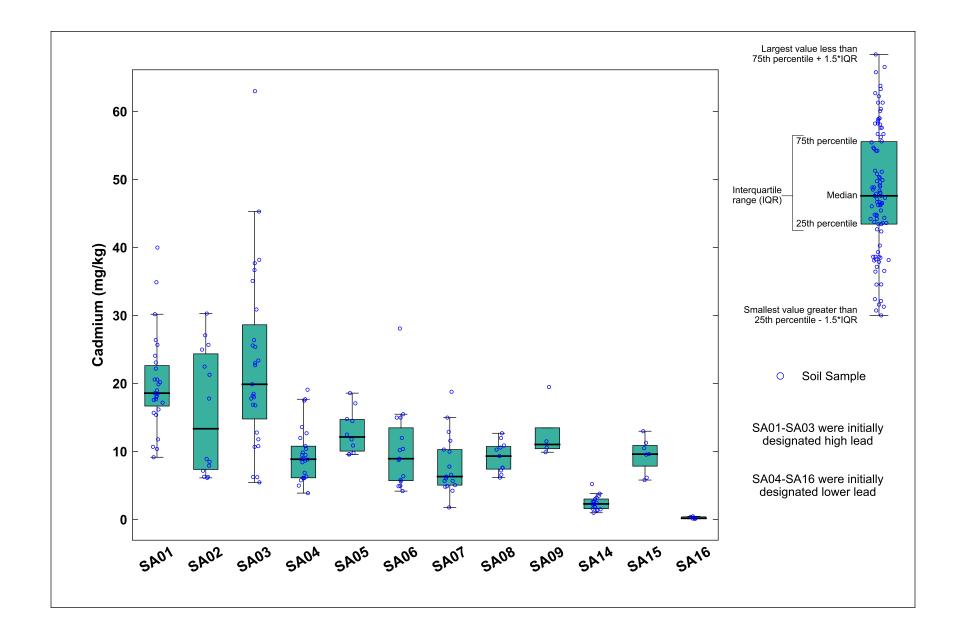


Figure 5-4f. Cadmium Concentrations in Soil Samples by Sample Area

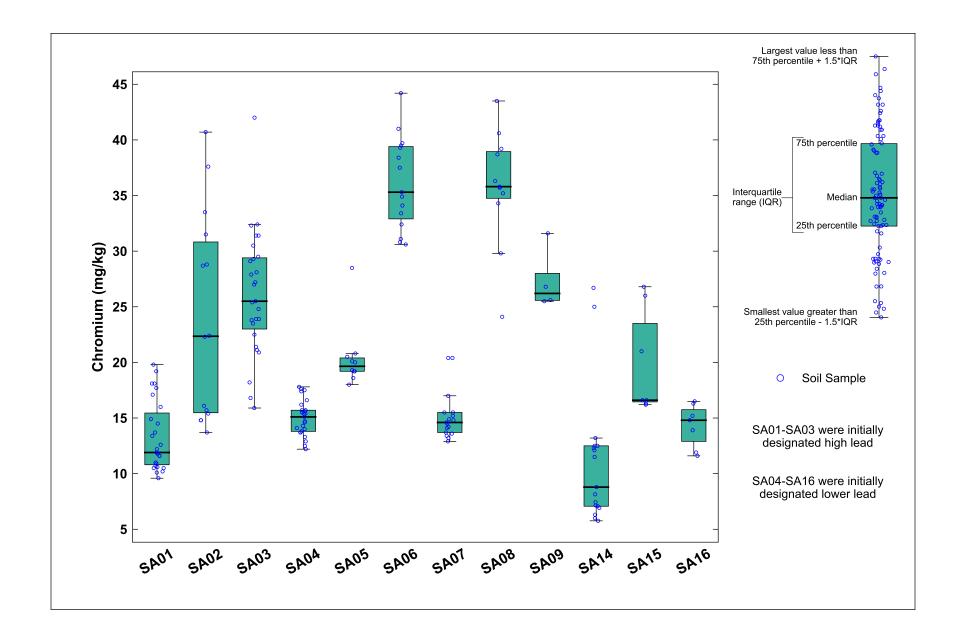


Figure 5-4g. Chromium Concentrations in Soil Samples by Sample Area

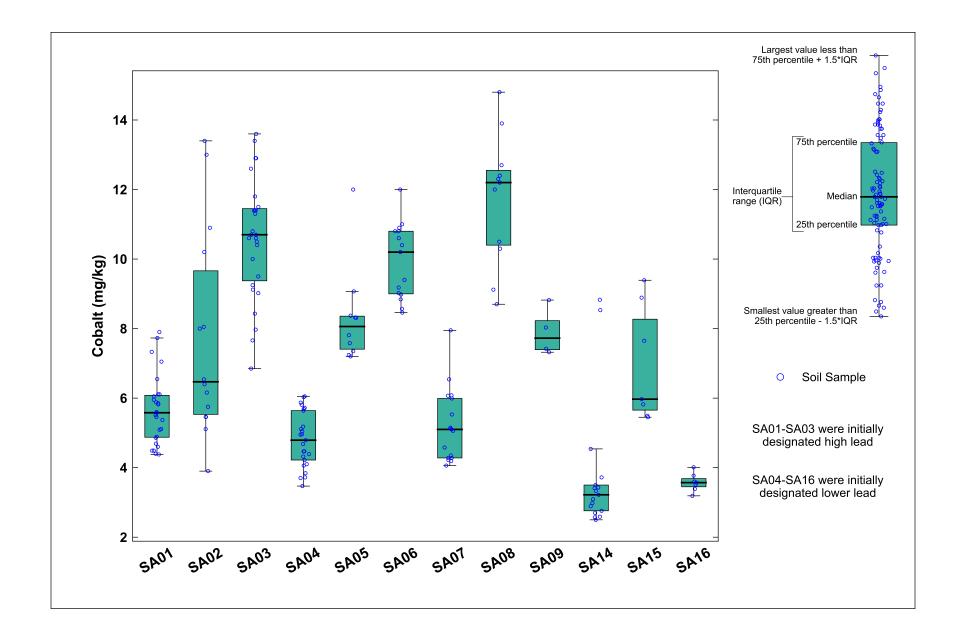


Figure 5-4h. Cobalt Concentrations in Soil Samples by Sample Area

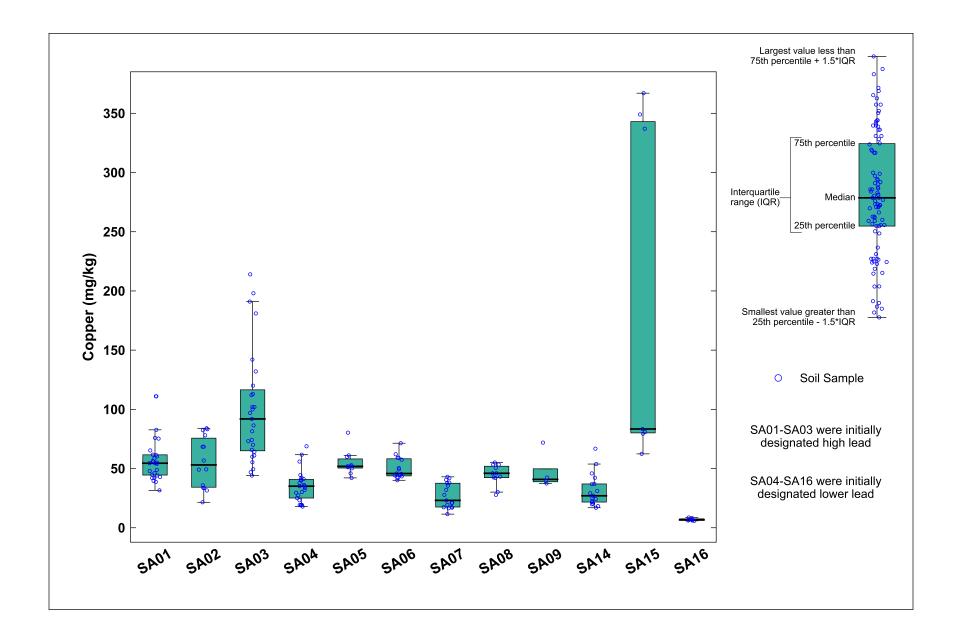


Figure 5-4i. Copper Concentrations in Soil Samples by Sample Area

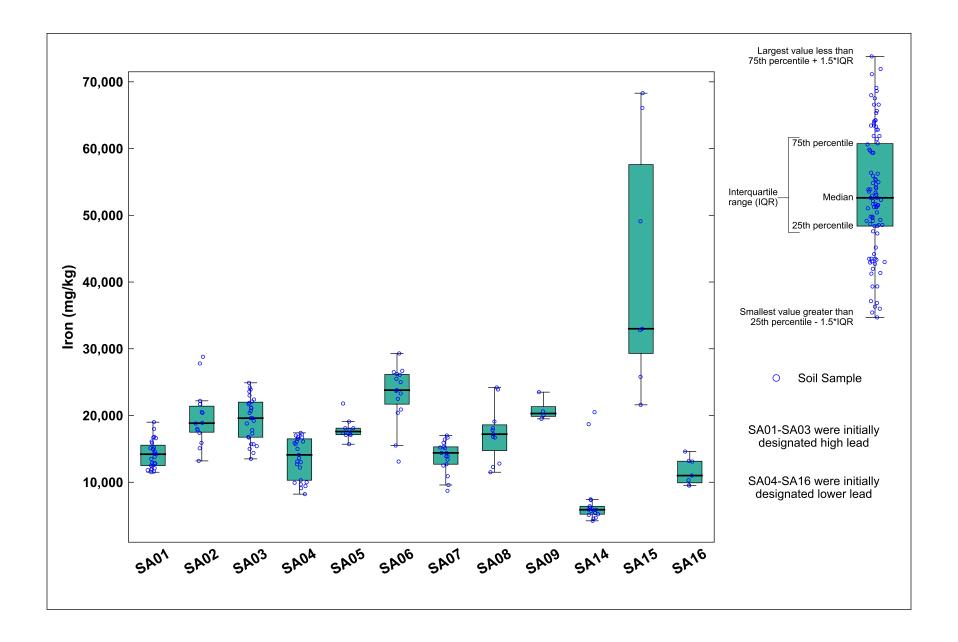


Figure 5-4j. Iron Concentrations in Soil Samples by Sample Area

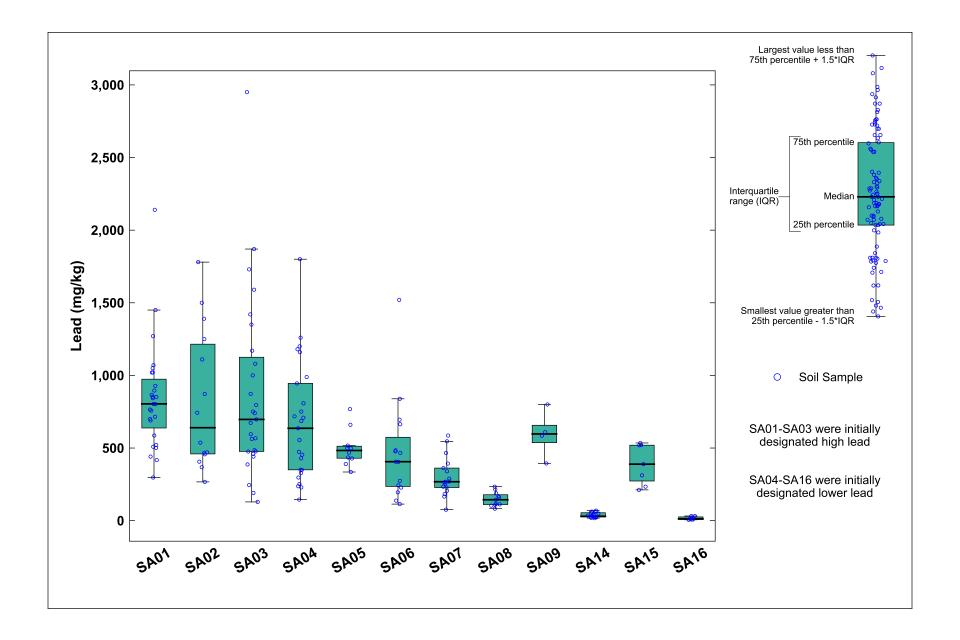


Figure 5-4k. Lead Concentrations in Soil Samples by Sample Area

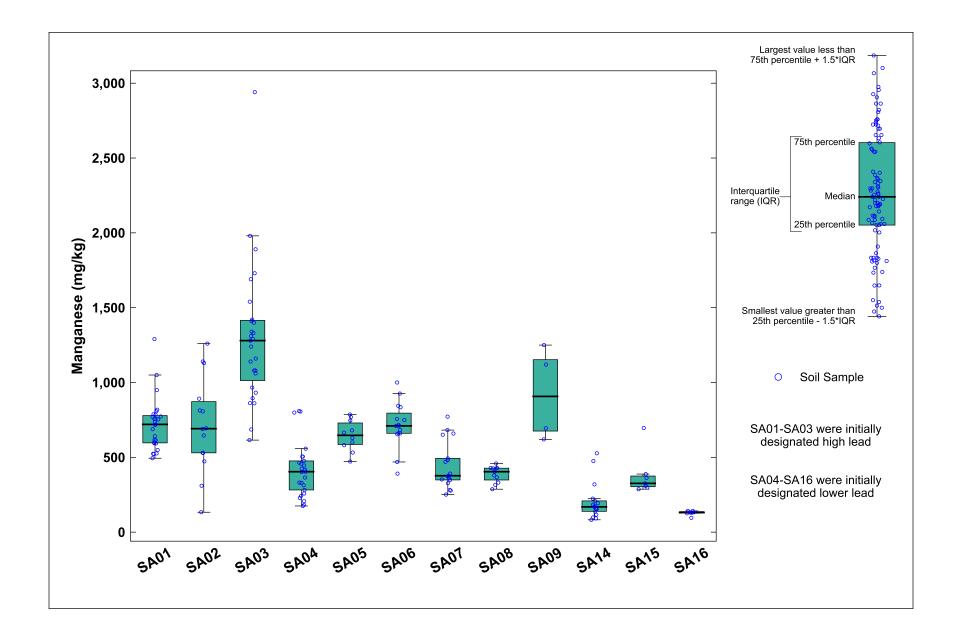
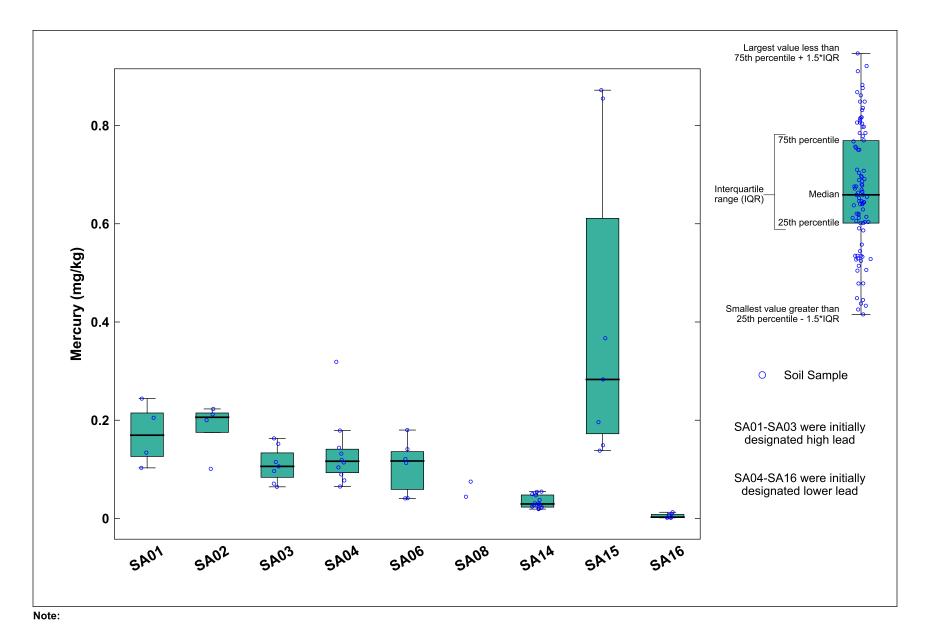


Figure 5-4I. Manganese Concentrations in Soil Samples by Sample Area



Mercury units were converted to mg/kg from ng/g values reported by ALS

Figure 5-4m. Mercury Concentrations in Soil Samples by Sample Area

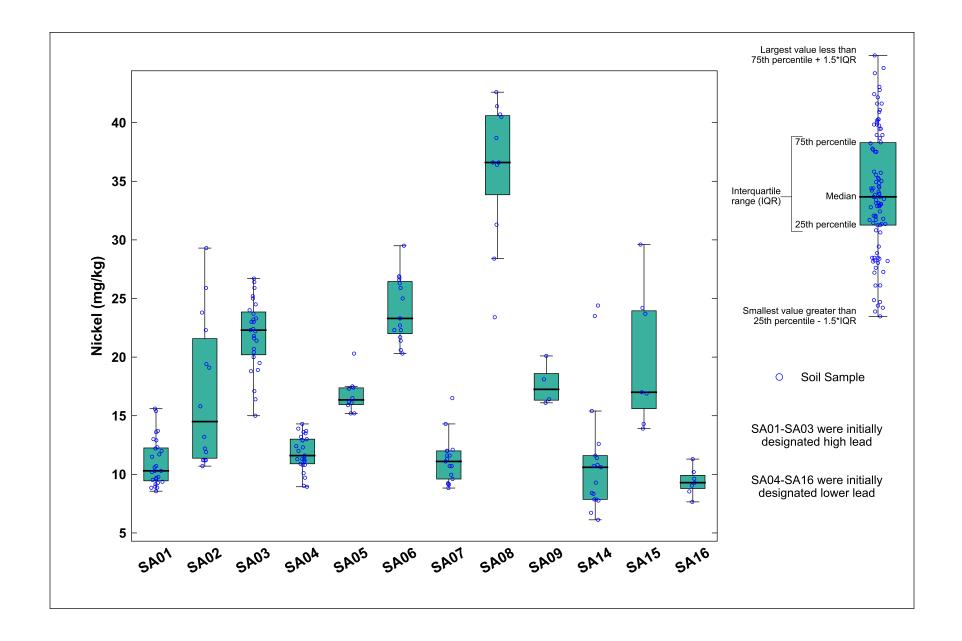


Figure 5-4n. Nickel Concentrations in Soil Samples by Sample Area

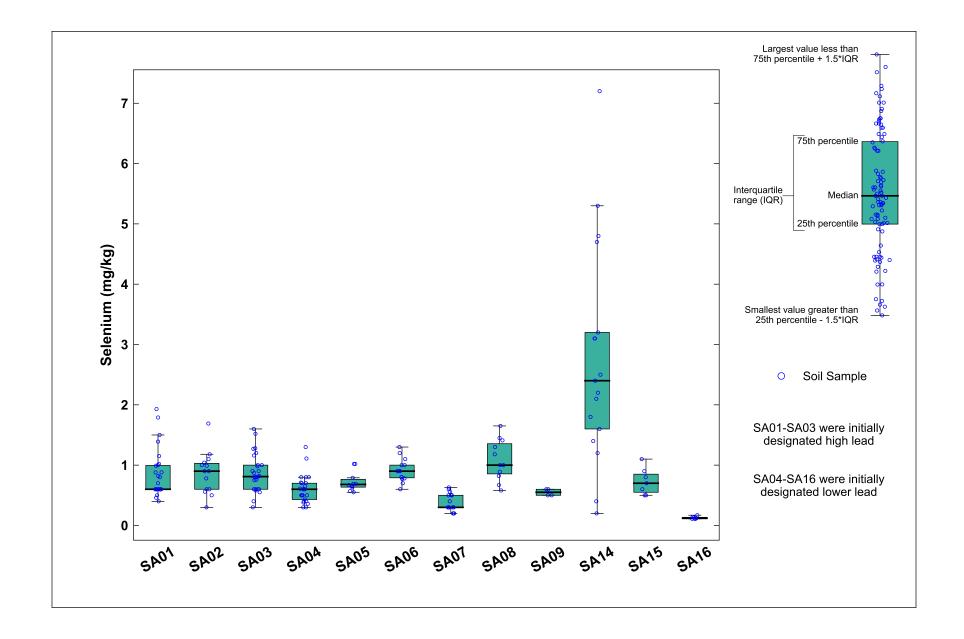


Figure 5-4o. Selenium Concentrations in Soil Samples by Sample Area

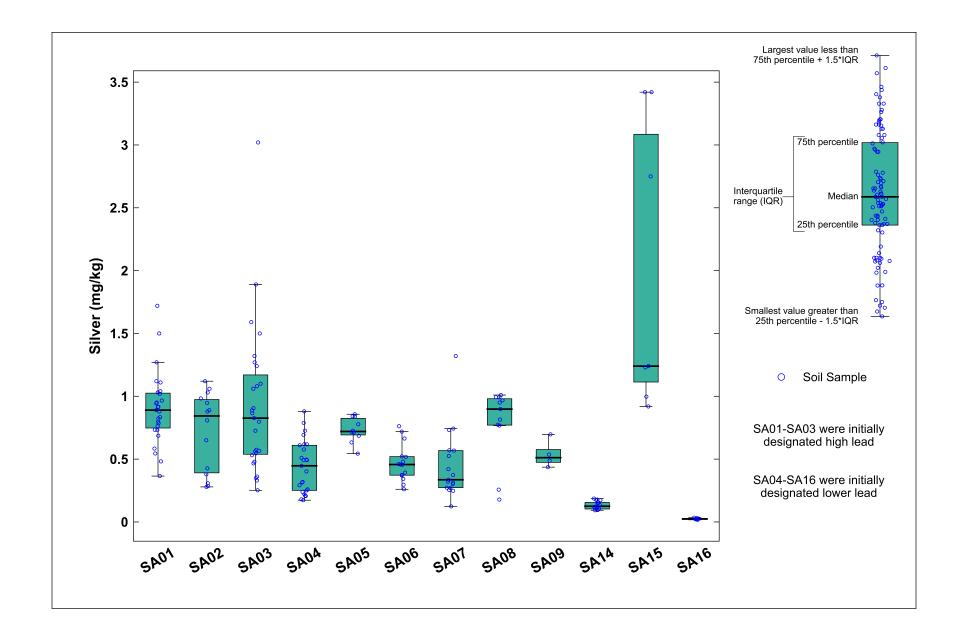


Figure 5-4p. Silver Concentrations in Soil Samples by Sample Area

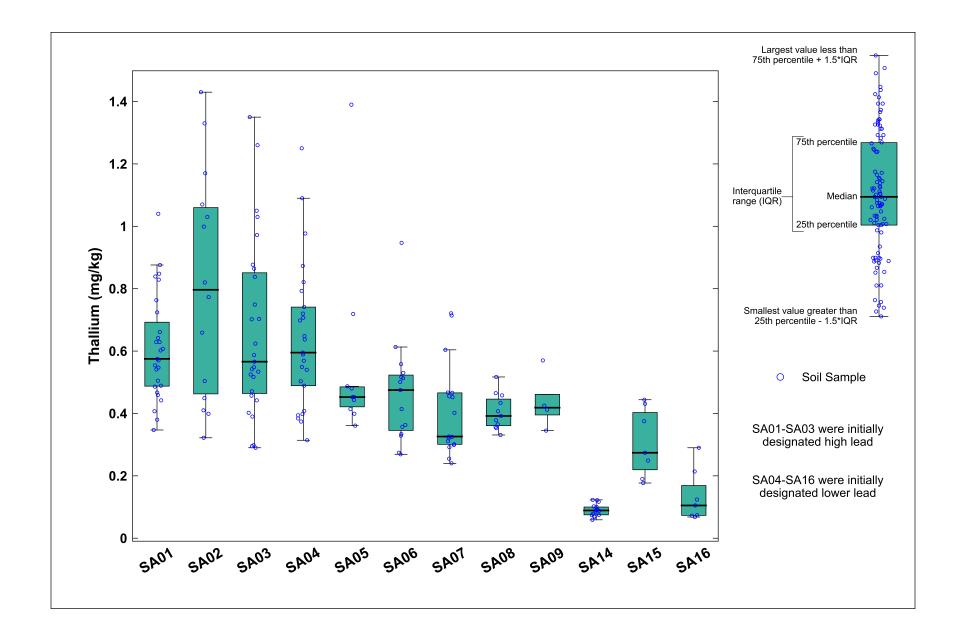


Figure 5-4q. Thallium Concentrations in Soil Samples by Sample Area

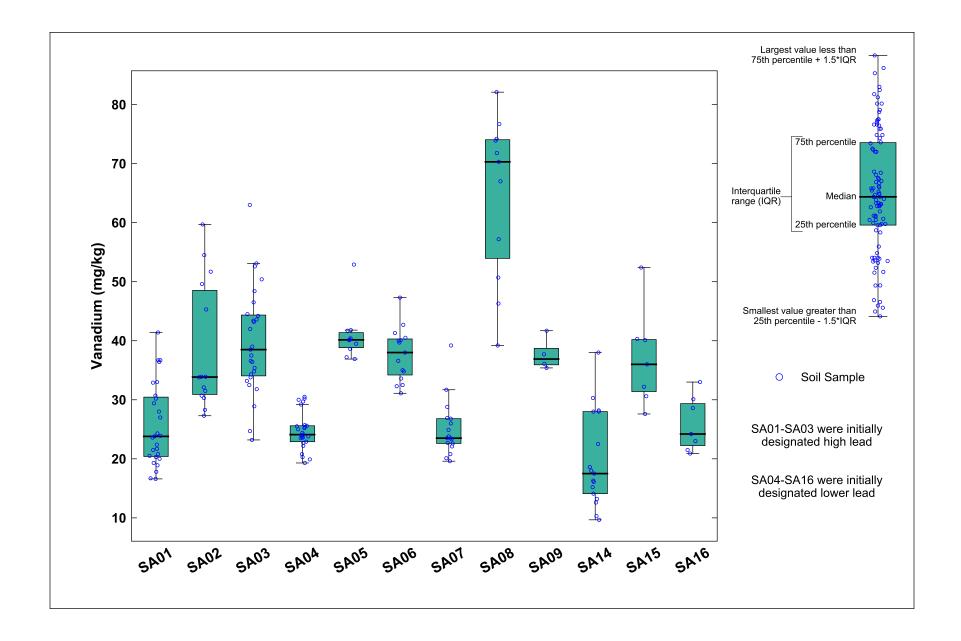


Figure 5-4r. Vanadium Concentrations in Soil Samples by Sample Area

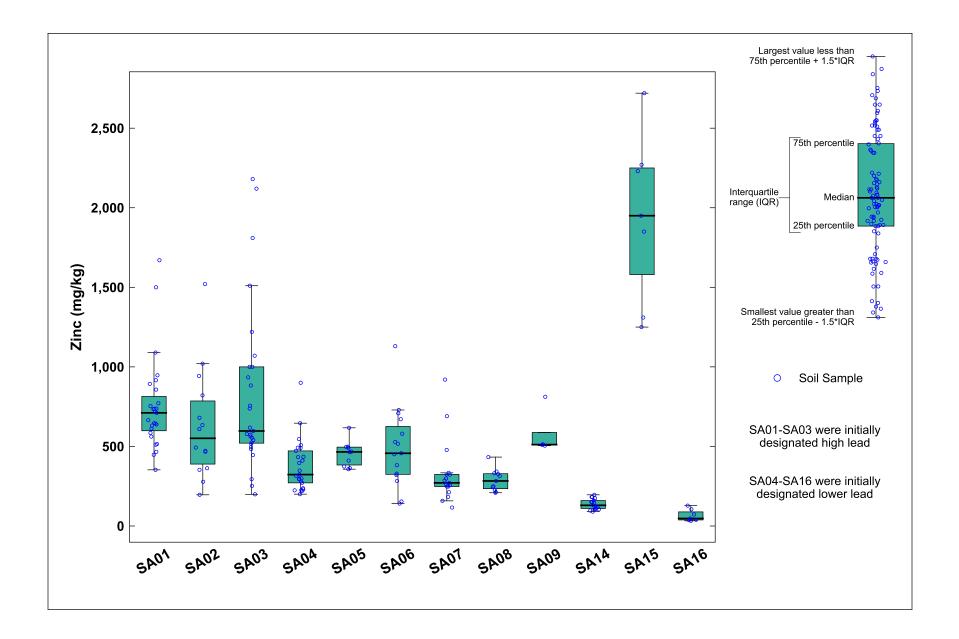
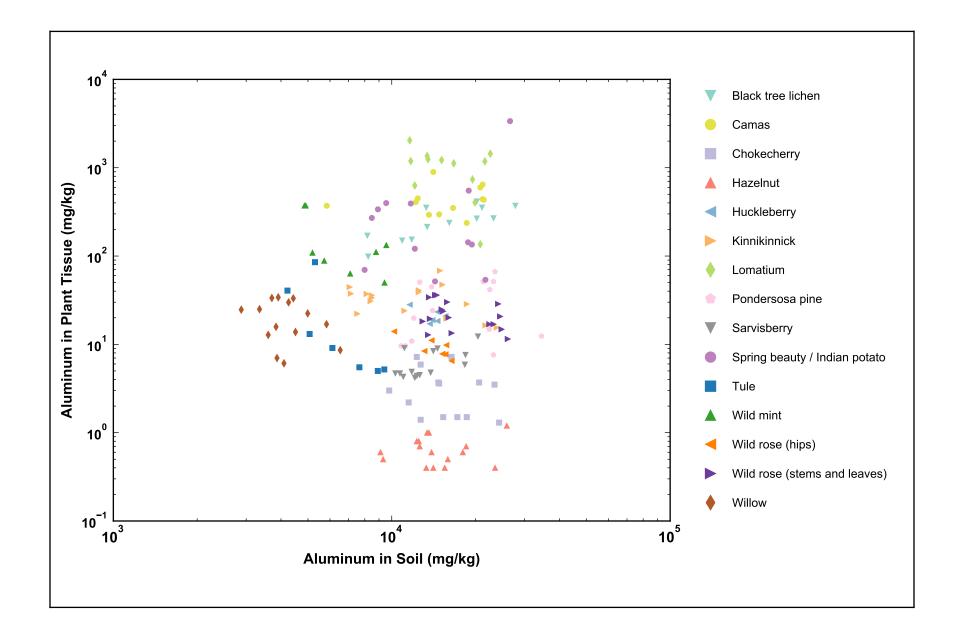


Figure 5-4s. Zinc Concentrations in Soil Samples by Sample Area



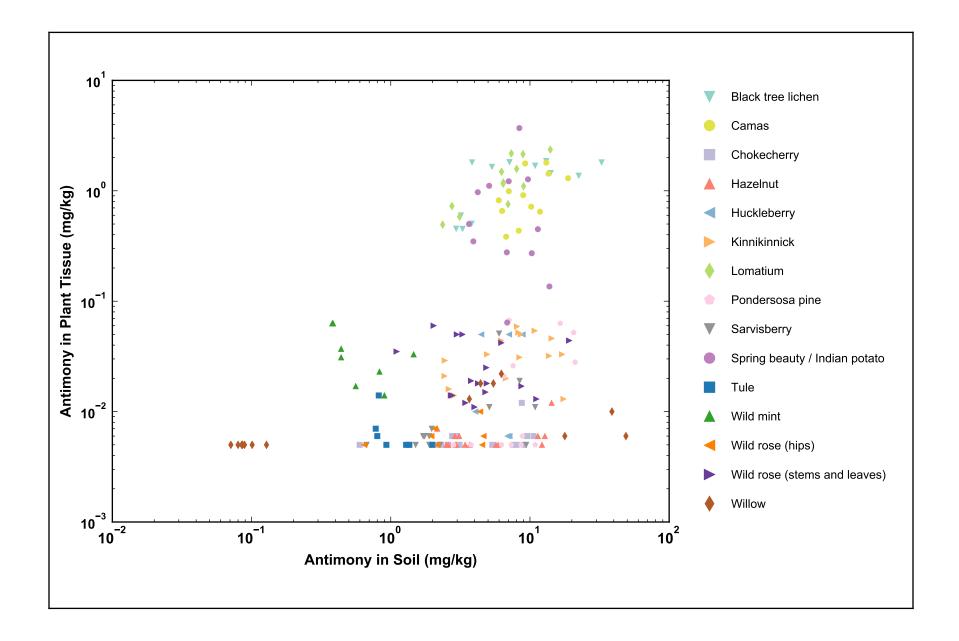


Figure 5-5b. Antimony Concentrations in Soil vs. Plant Tissue Samples

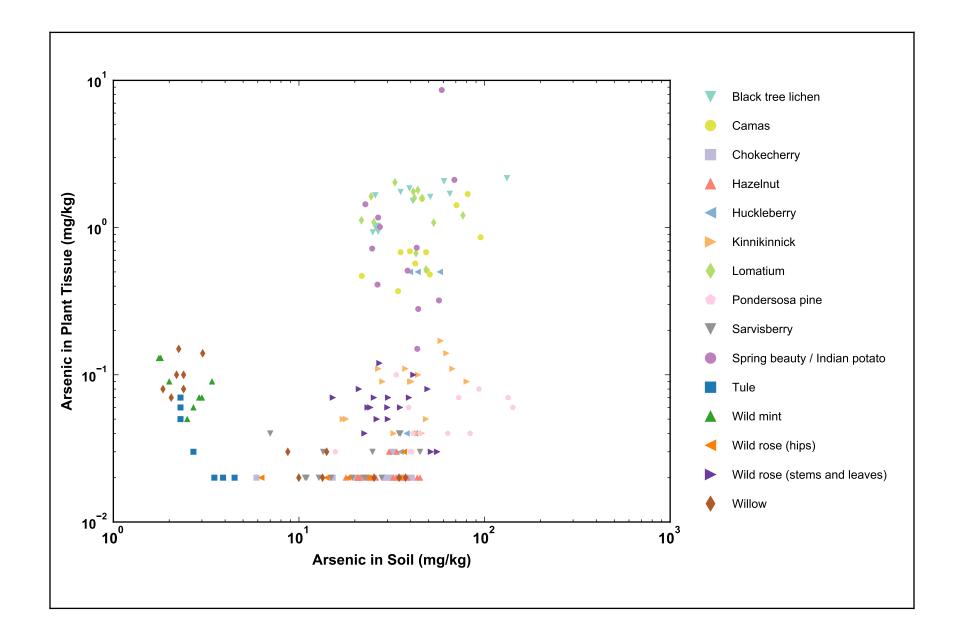
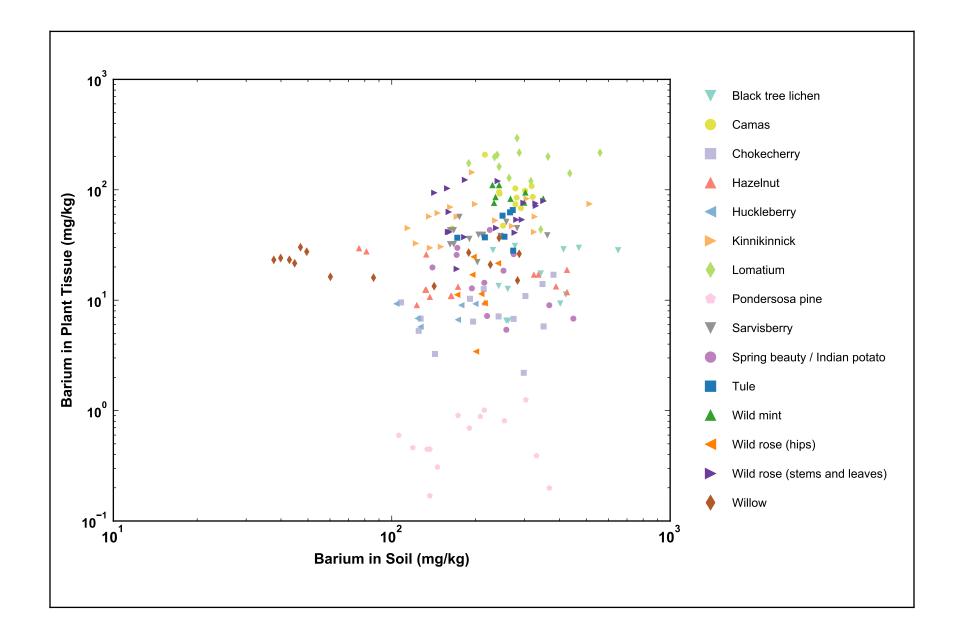
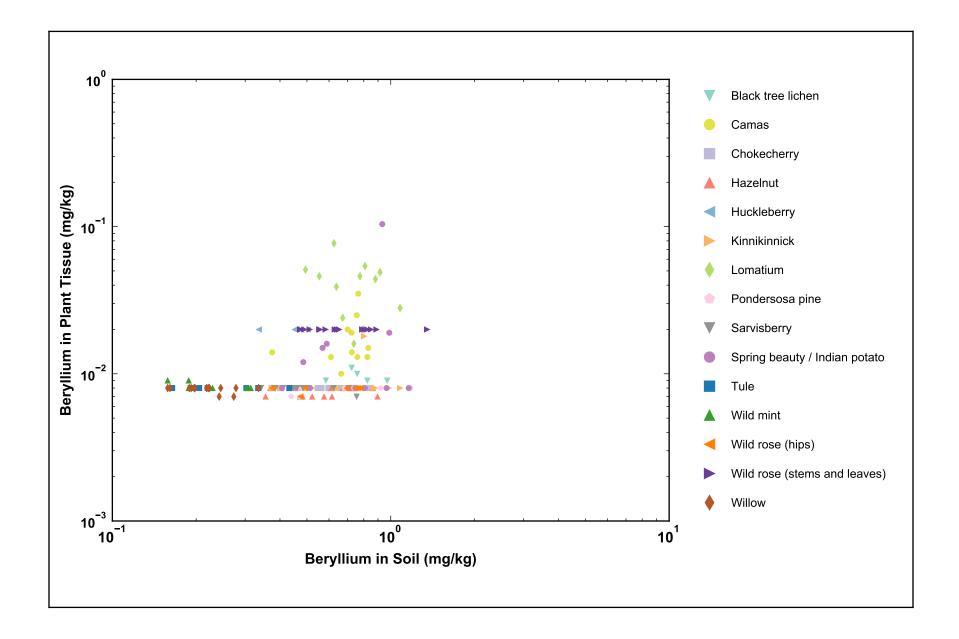
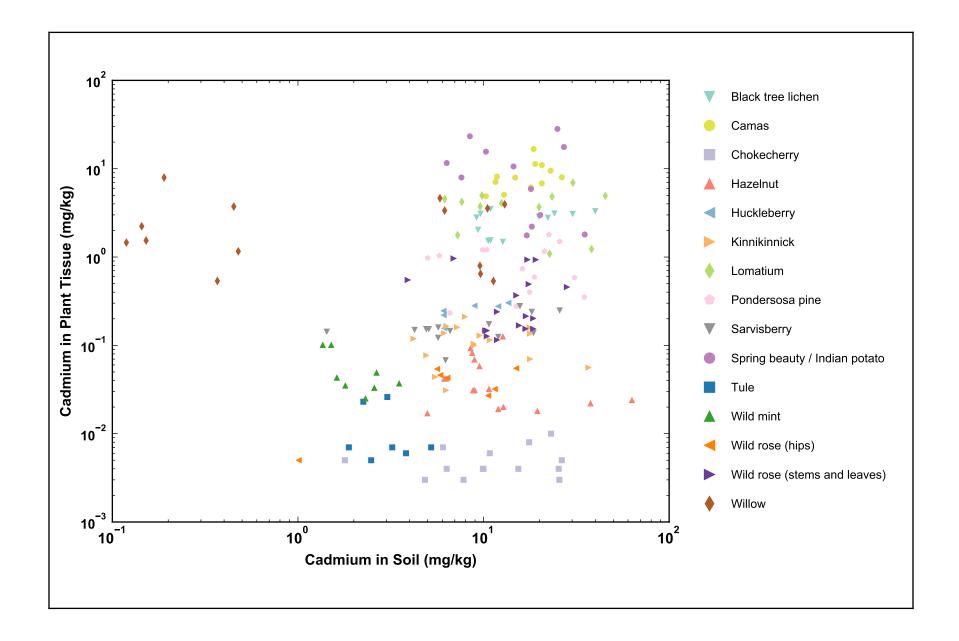
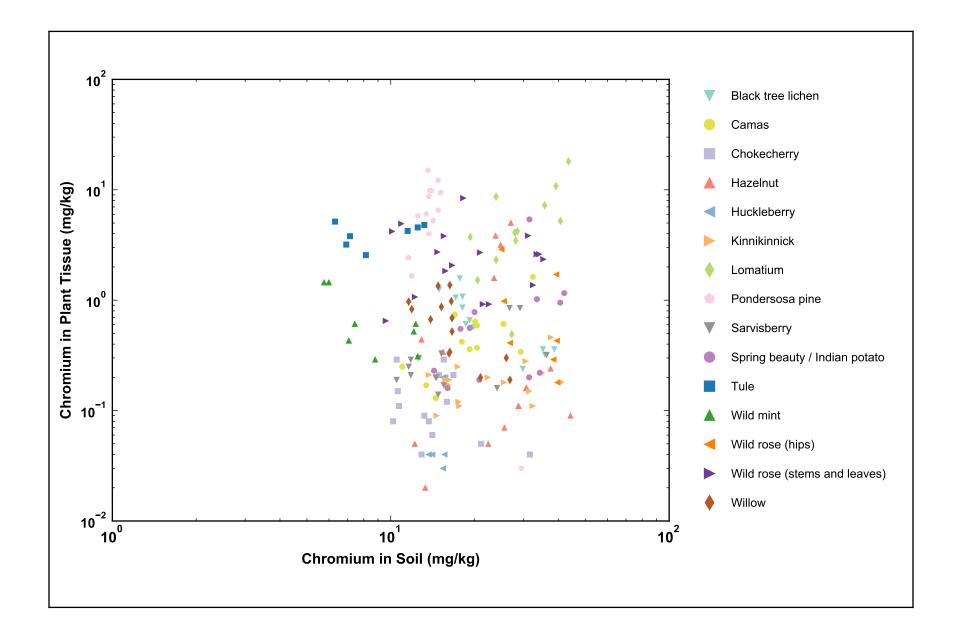


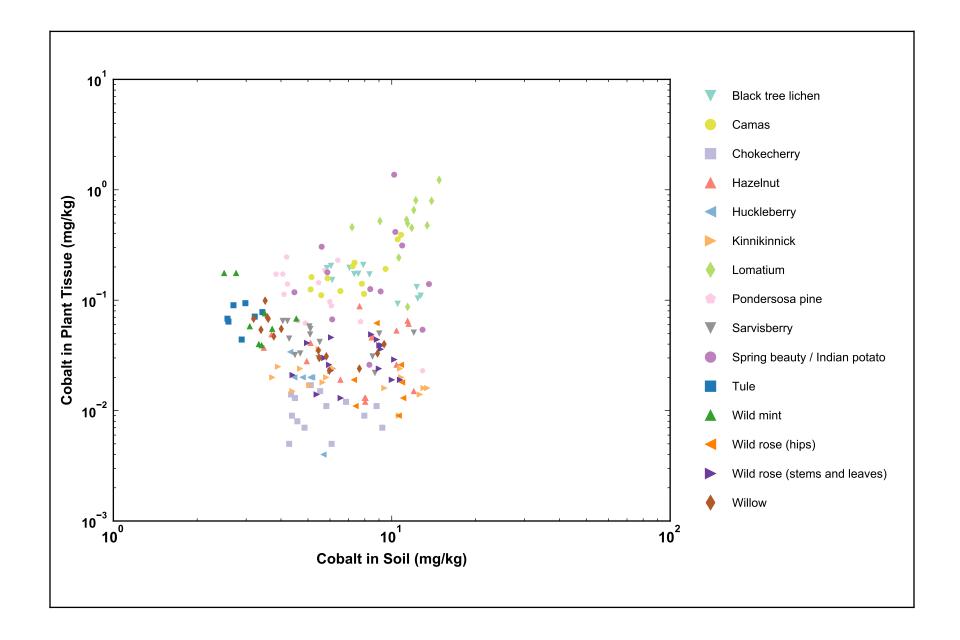
Figure 5-5c. Arsenic Concentrations in Soil vs. Plant Tissue Samples











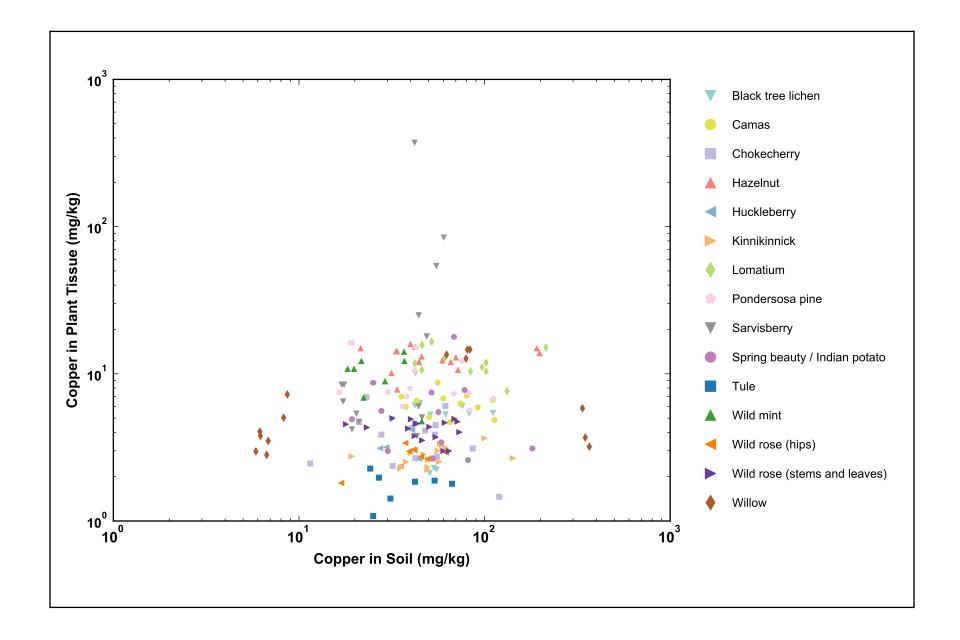
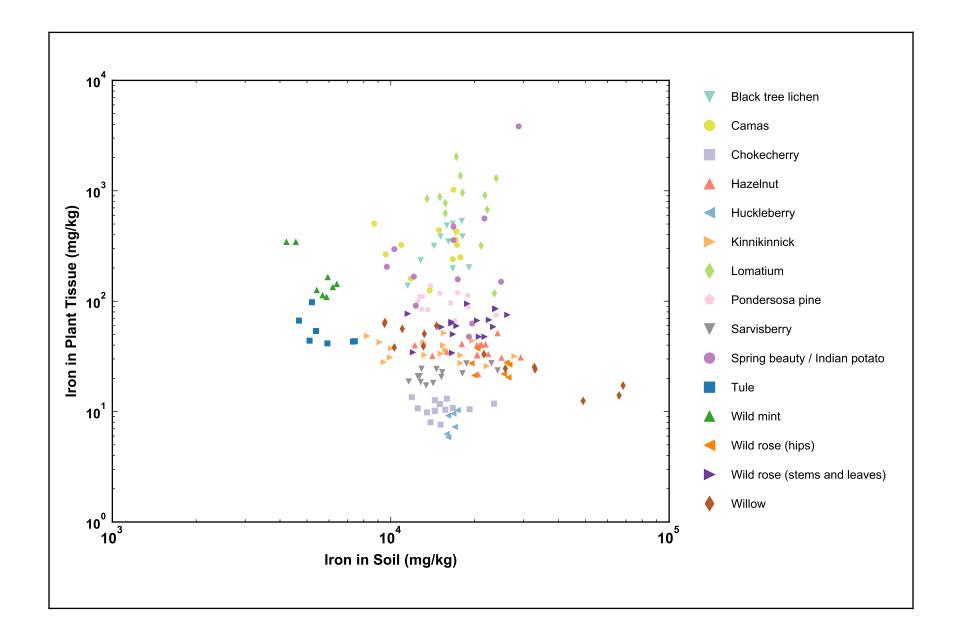


Figure 5-5i. Copper Concentrations in Soil vs. Plant Tissue Samples



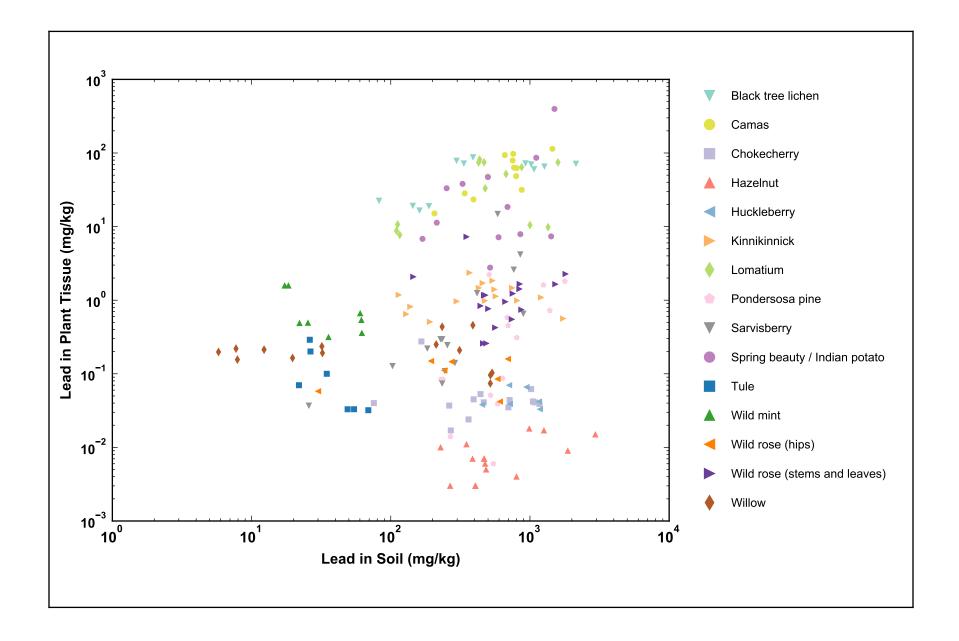
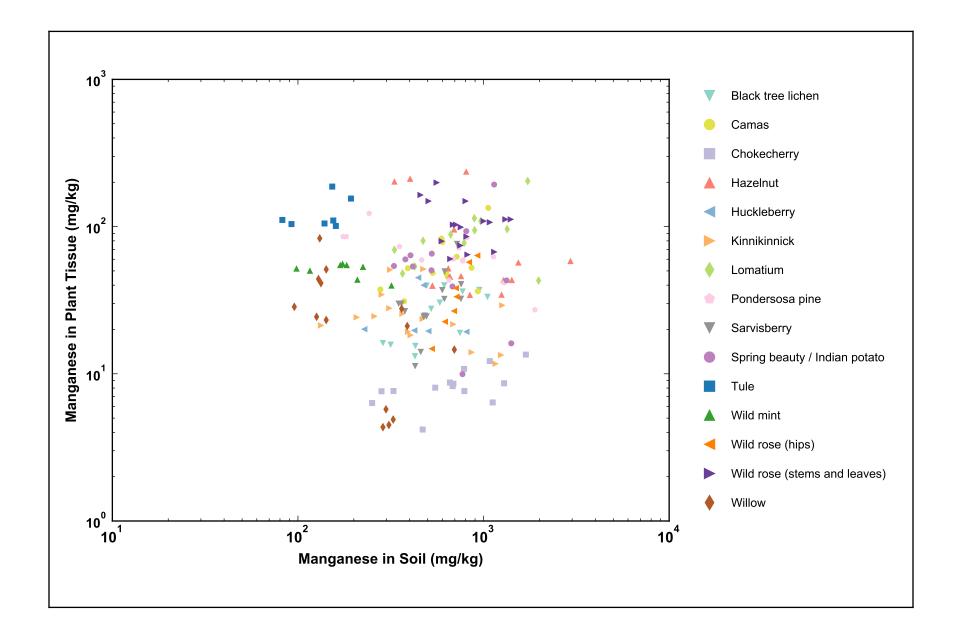
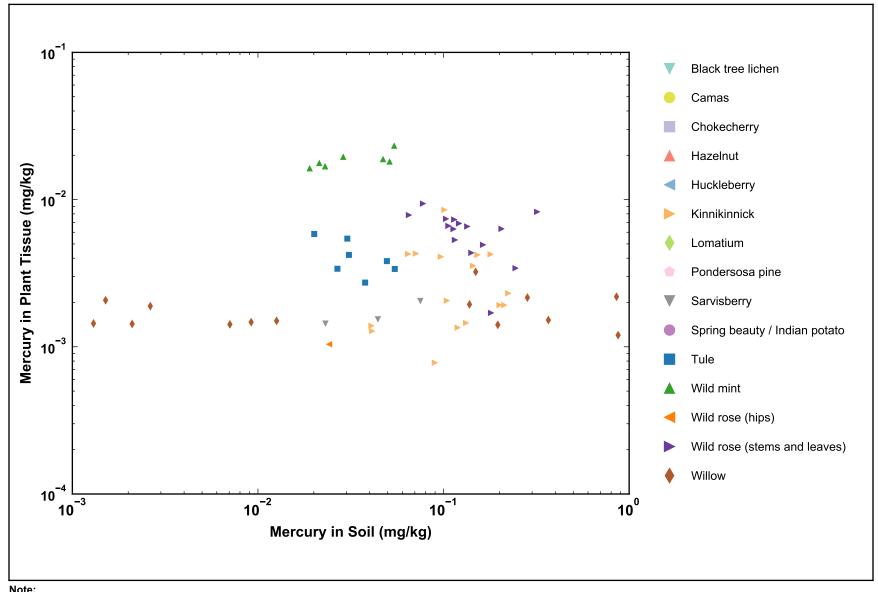


Figure 5-5k. Lead Concentrations in Soil vs. Plant Tissue Samples





Note: Mercury units were converted to mg/kg from ng/g values reported by ALS

Figure 5-5m. Mercury Concentrations in Soil vs. Plant Tissue Samples

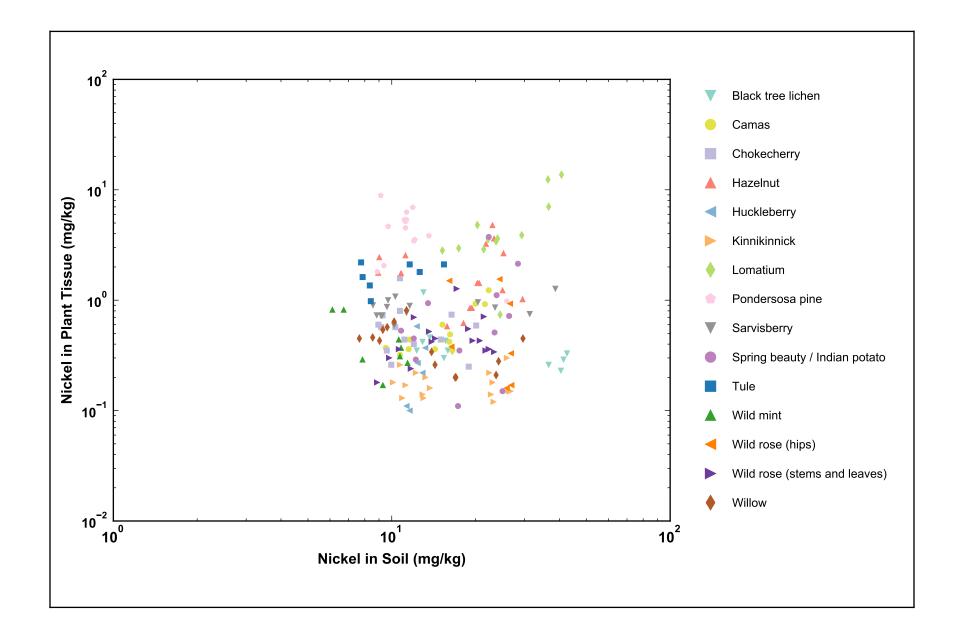
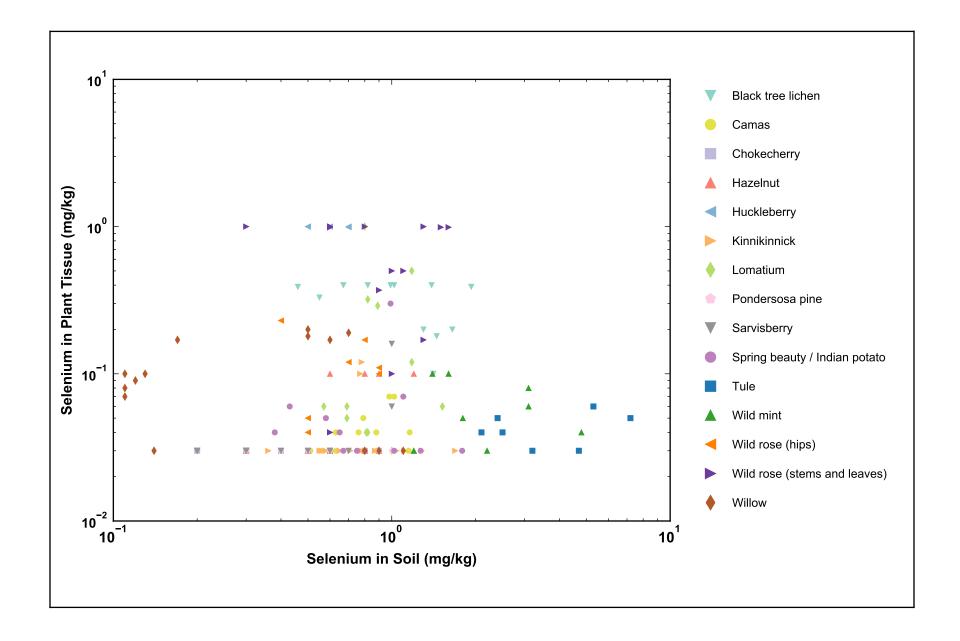


Figure 5-5n. Nickel Concentrations in Soil vs. Plant Tissue Samples



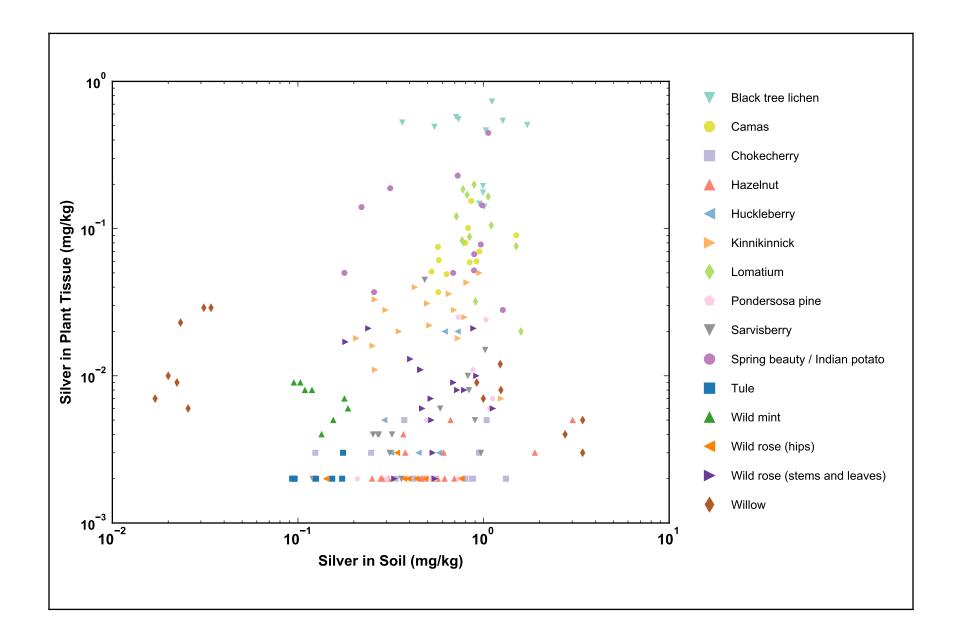


Figure 5-5p. Silver Concentrations in Soil vs. Plant Tissue Samples

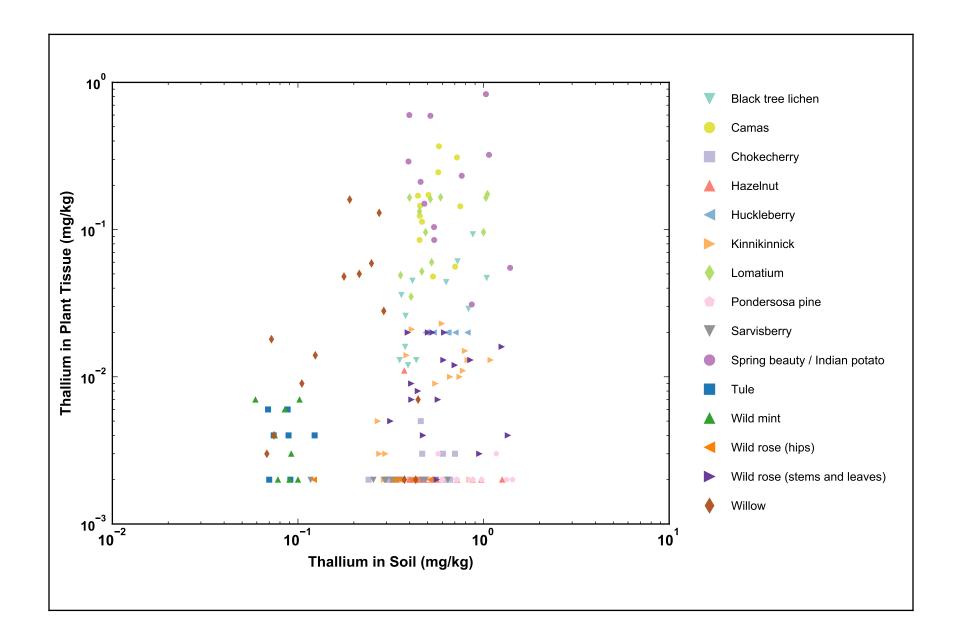
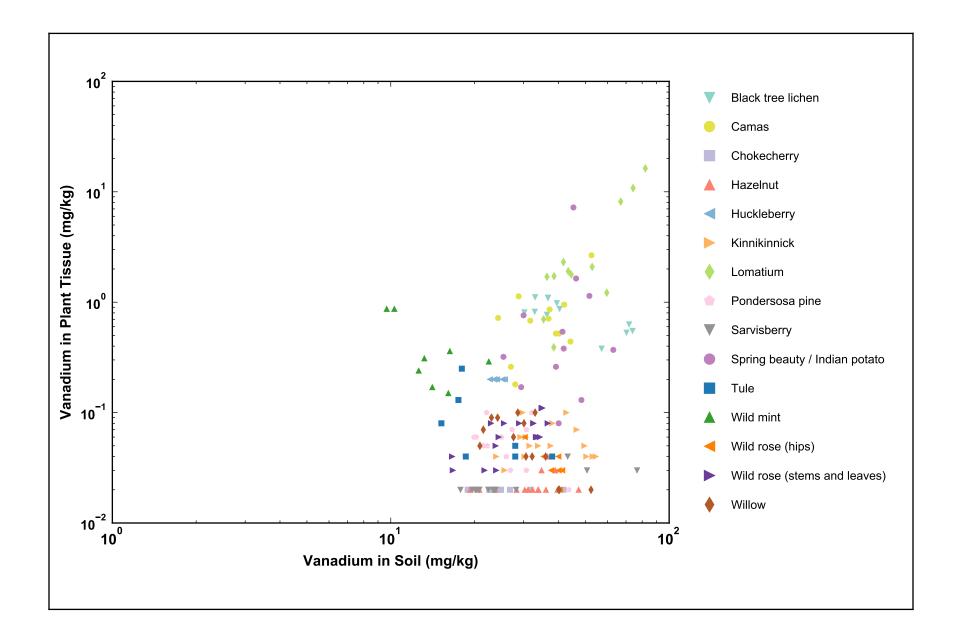
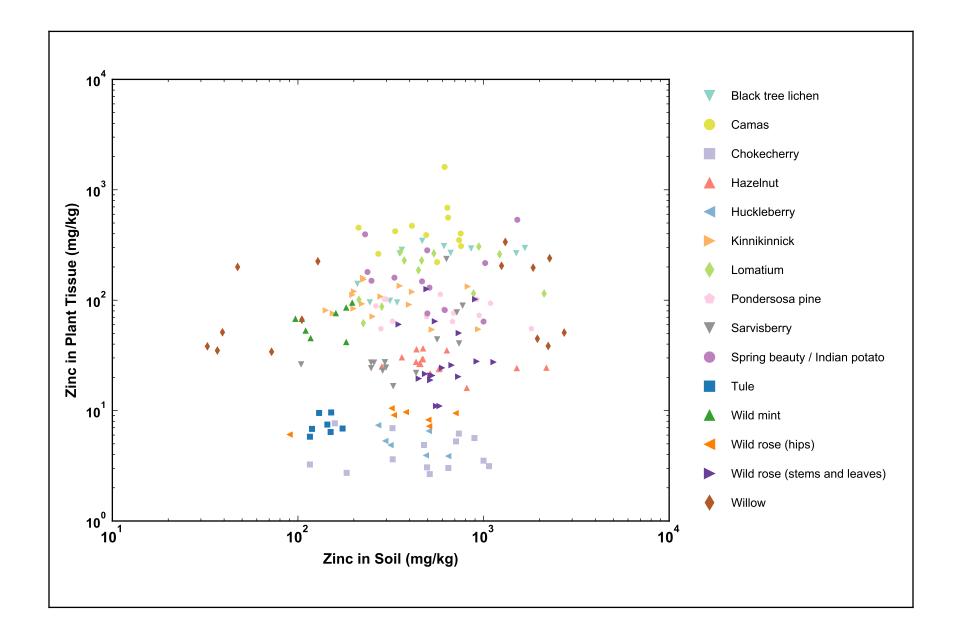


Figure 5-5q. Thallium Concentrations in Soil vs. Plant Tissue Samples





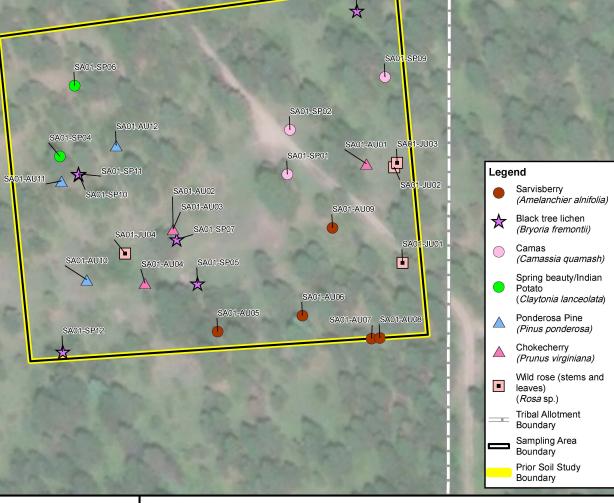
MAPS



Soil Sample	Arsenic (mg/kg)	Cadmium (mg/kg)	Lead (mg/kg)	Mercury (mg/kg)
SA01-AU01-S01	36.4	15.4	700	
SA01-AU02-S01	37.6	24.8	1040	
SA01-AU04-S01	32.1	17.6	715	
SA01-AU05-S01	35.2	15.7	586	
SA01-AU06-S01	27.9	10.7	417	
SA01-AU07-S01	24.9	18.6	896	
SA01-AU08-S01	34.6	18.2	765	
SA01-AU09-S01	44.9	25.7	852	
SA01-AU10-S01	45.0	17.7	521	
SA01-AU11-S01	33.5	16.2	509	
SA01-AU12-S01	83.6	34.9	804	
SA01-JU01-S01	29.9	18.5	866	0.244
SA01-JU02-S01	28.7	11.1	471	0.119
SA01-JU04-S01	25.3	17.2	843	0.205
SA01-SP01-S01	42.3	20.6	802	
SA01-SP02-S01	95.3	20.6	1450	
SA01-SP04-S01	38.5	18.0	690	
SA01-SP05-S01	41.1	19.9	1020	
SA01-SP06-S01	26.5	20.2	853	
SA01-SP07-S01	132	30.2	1270	
SA01-SP08-S01	60.5	22.2	928	
SA01-SP09-S01	50.7	19.0	758	
SA01-SP10-S01	65.0	40.0	2140	
SA01-SP11-S01	51.0	24.1	1070	
SA01-SP12-S01	25.8	9.17	297	

"--" Hant tissue not specified for mercury analysis Replicate soil sample concentations not shown

Mercury units were converted to mg/kg from ng/g values reported by ALS



A01-SPC

Map 2-2. Detail for Sampling Area 01 Upper Columbia River, WA

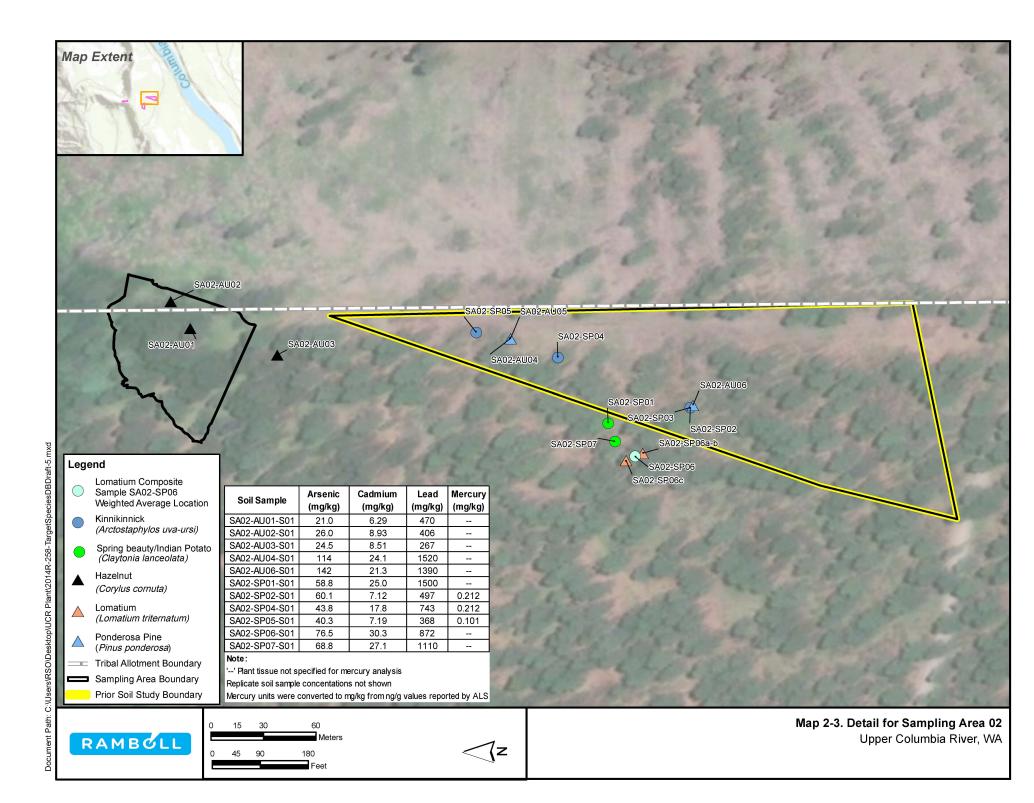
RAMBOLL

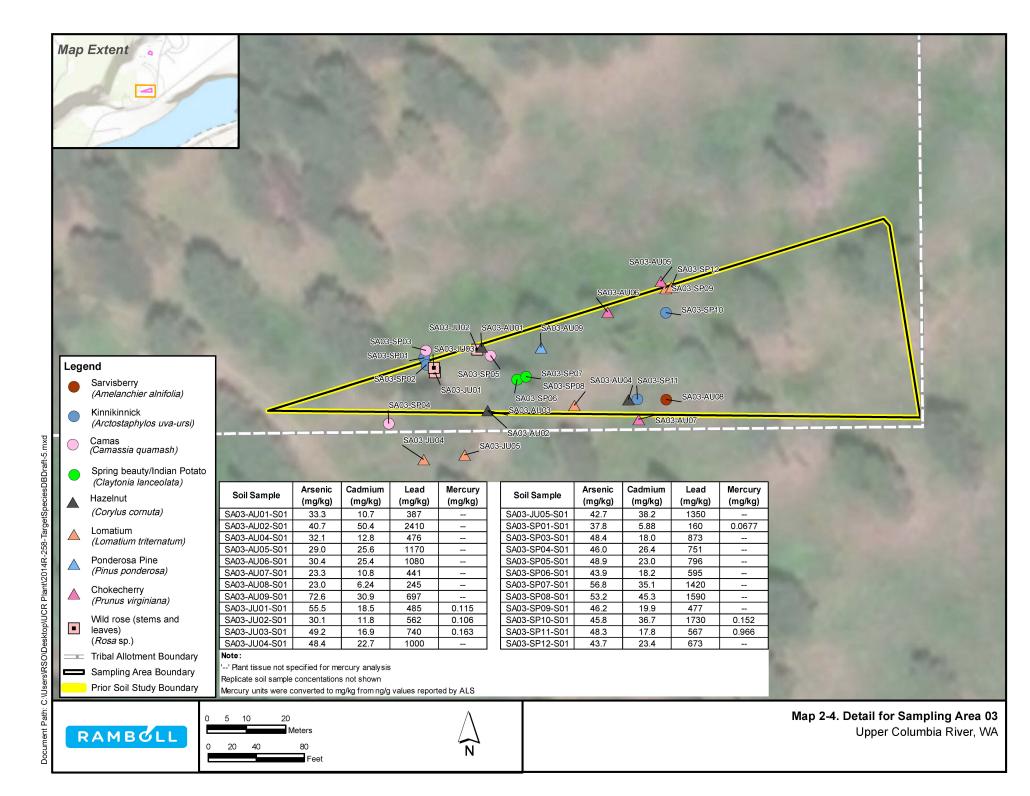


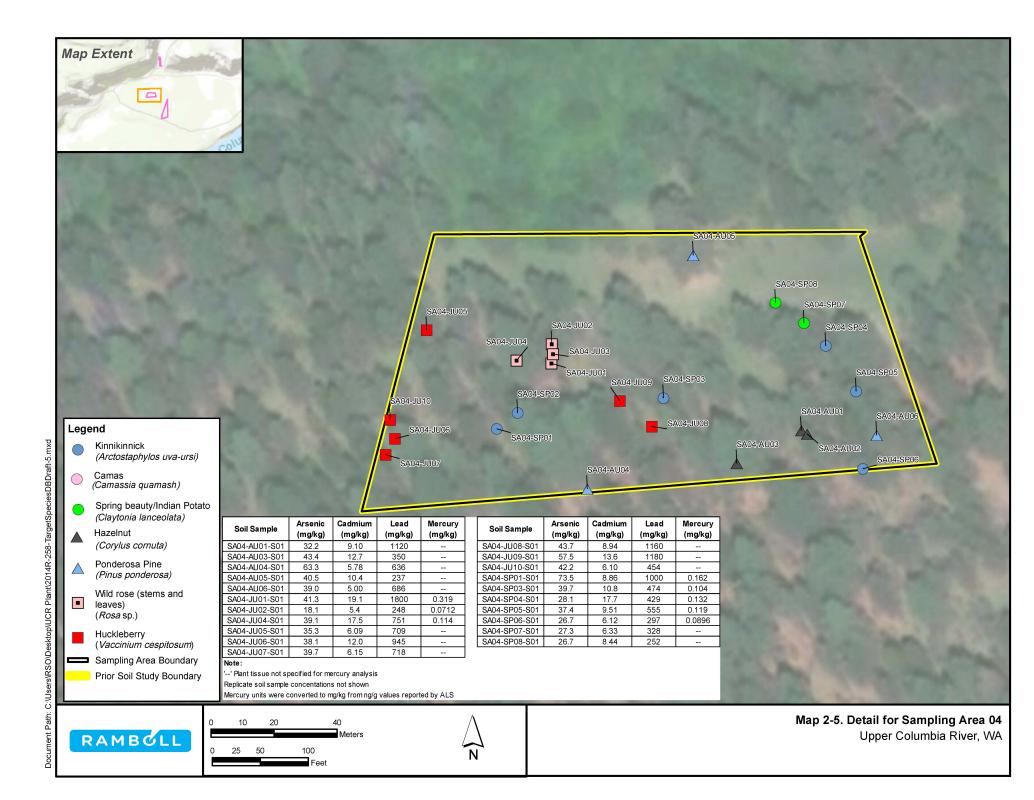
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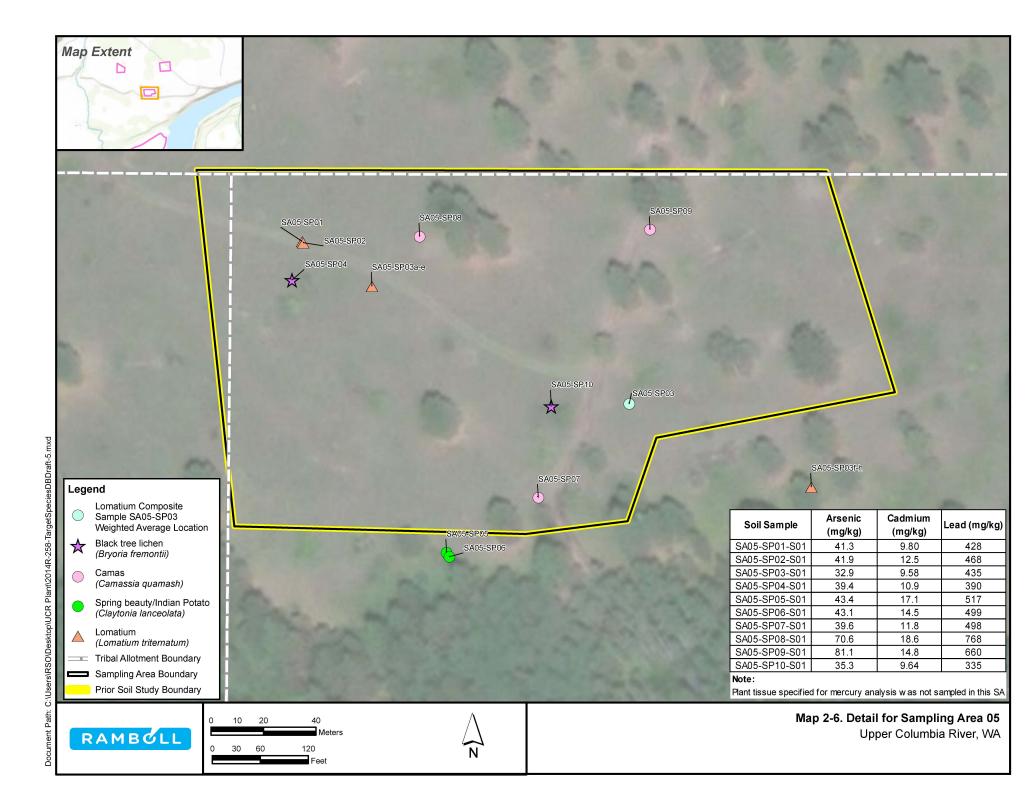
ment Path: C:\Users\RSO\Desktop\UCR Plant\2014R-258-TargetS

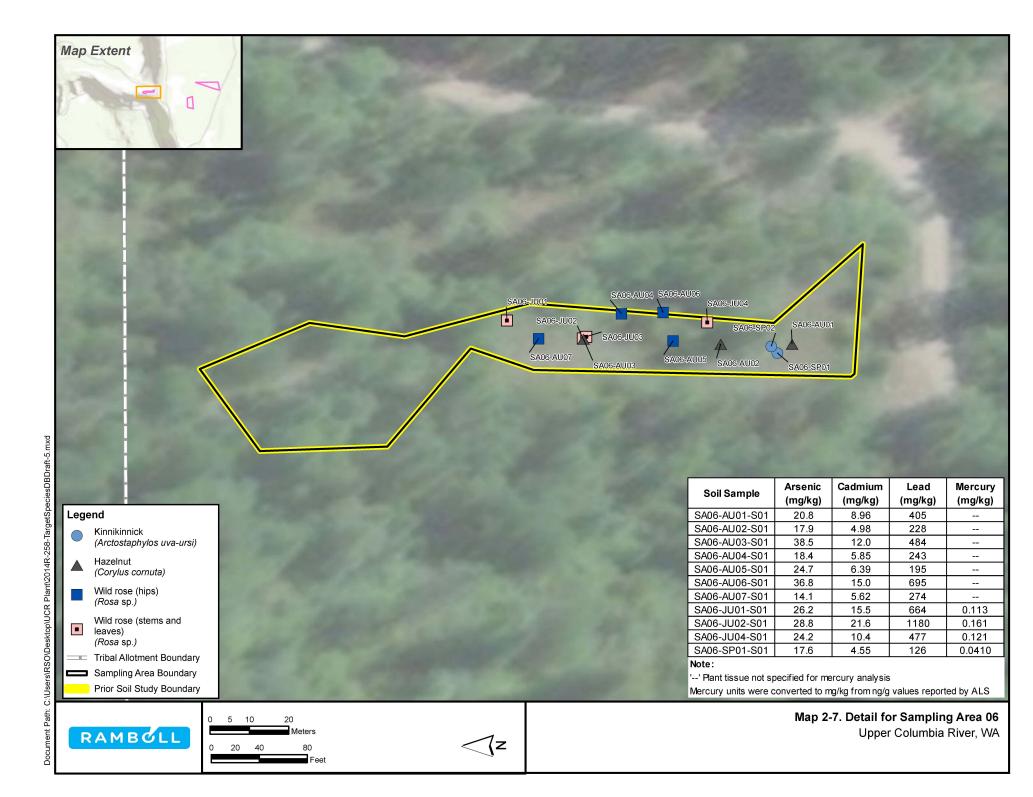
Map Extent

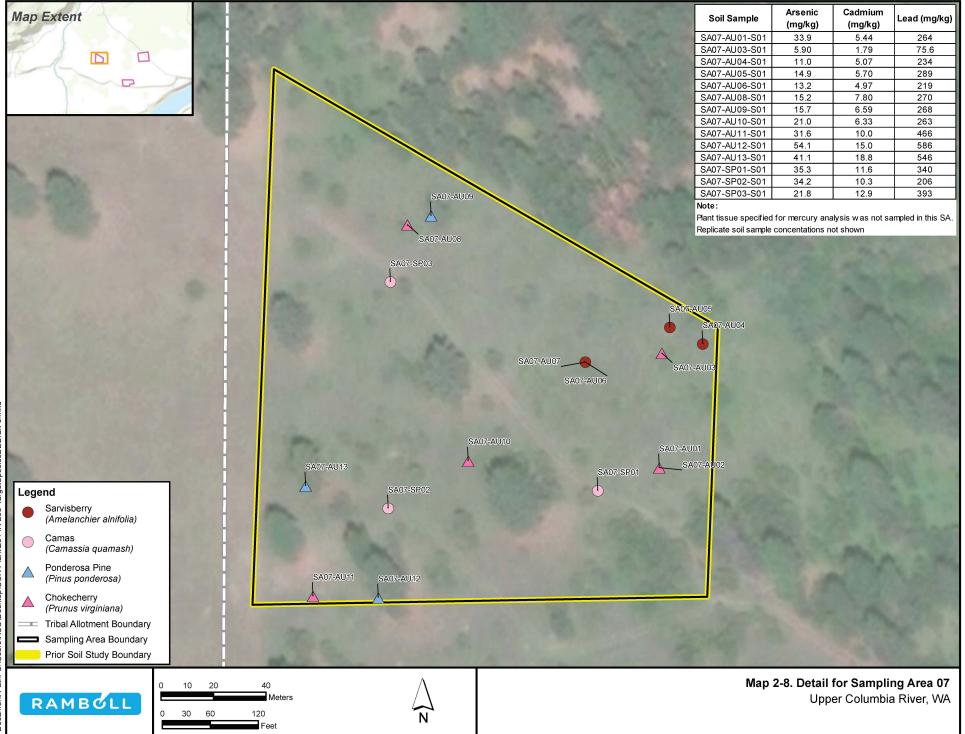






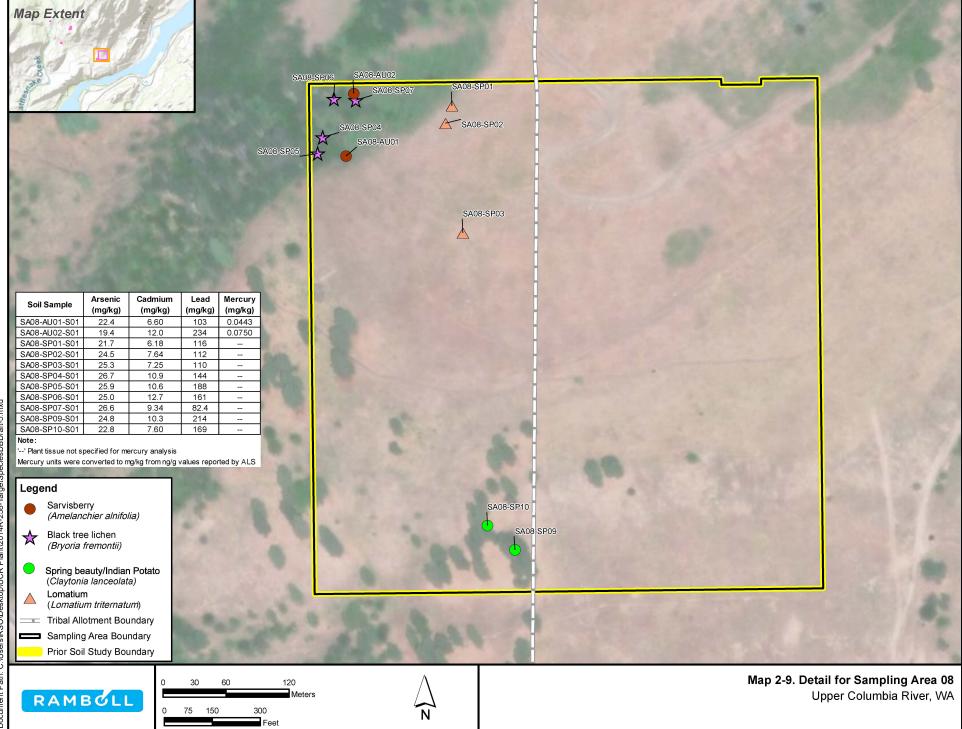






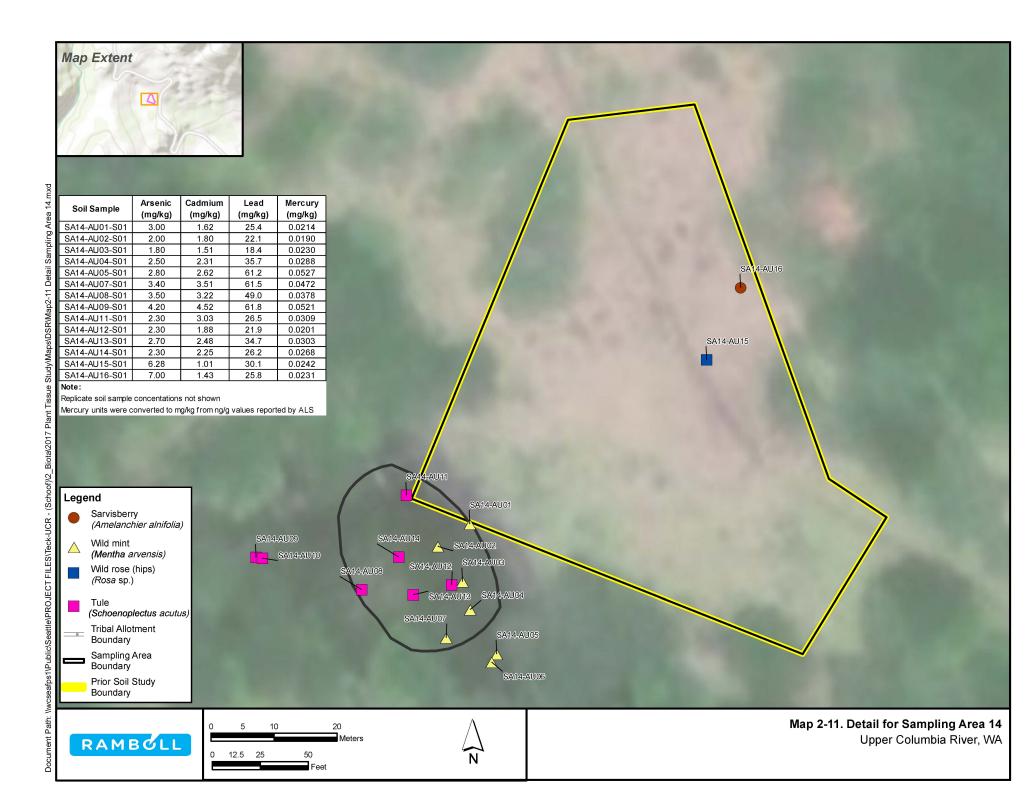
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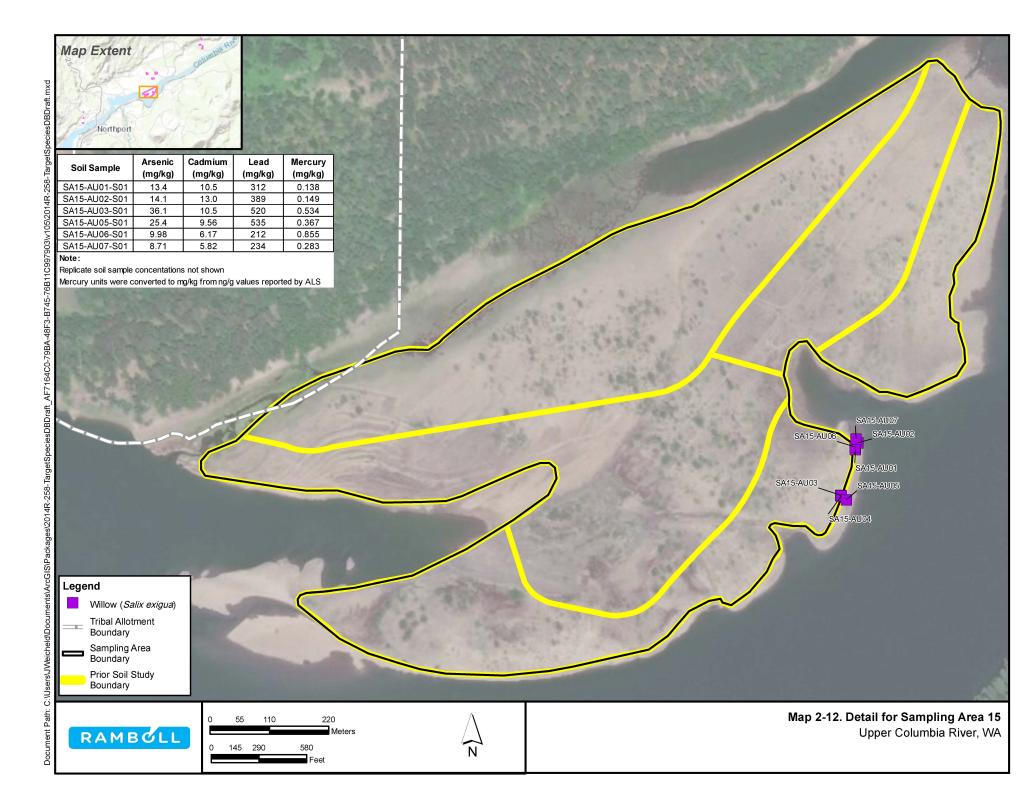
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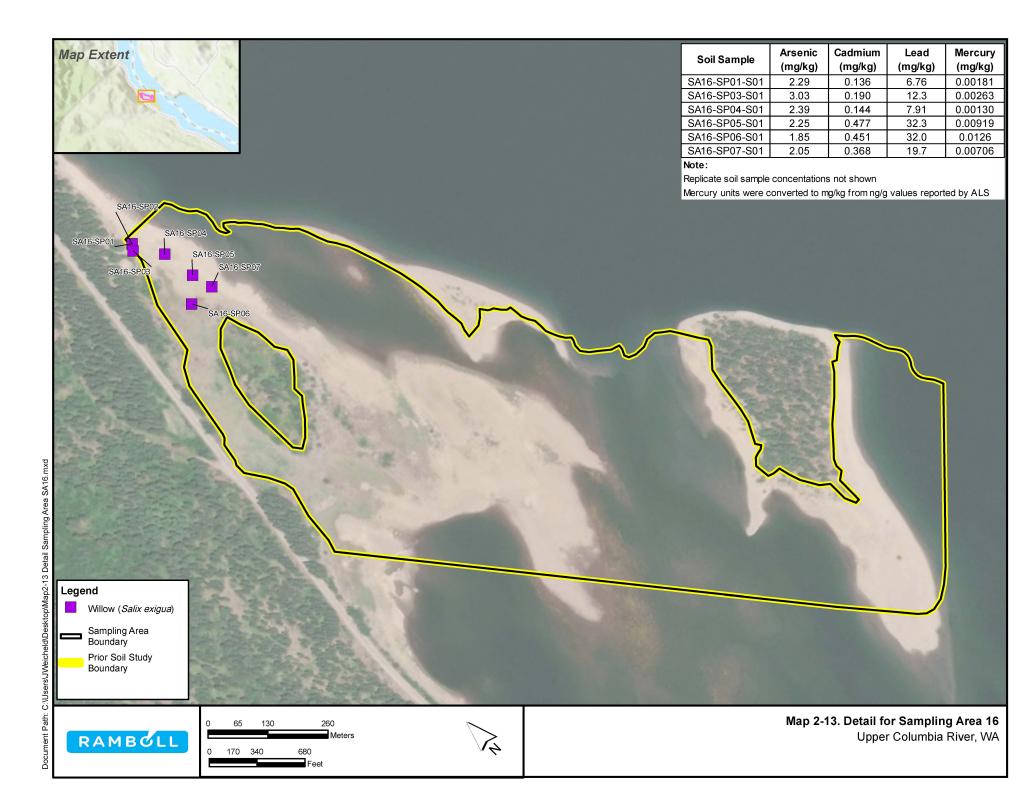


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TABLES

Table 2-1. Number of Plant Tissue and Soil Samples Collected^a

		High	Lead	Samplii	ng Areas⁵				Lov	ver Lead	d Samp	ling Are	as ^{b,c}		
Species Common Name	Species Scientific Name	SA01	SA02	SA03	Sampling Event High Lead Total	SA04	SA05	SA06	SA07	SA08	SA09	SA14	SA15 ^d	SA16	Sampling Event Lowe Lead Total
Spring Sampling Event	· · · · · · · · · · · · · · · · · · ·														
Black tree lichen	Bryoria fremontii	6			6		2			4					6
Camas	Camassia quamash	3		3	6		3		3						6
Kinnikinnick	Arctostaphylos uva-ursi		3 ^{e,f}	3 ^{e,f}	6	5 ^{e,f}		1 ^e							6
Lomatium	Lomatium triternatum		1	3	4		3			3					6
Spring beauty / Indian potato	Claytonia lanceolata	2	2	2	6	2	2			2					6
Willow	Salix exigua				0									6 ^{e,f}	6
June Sampling Event															
Lomatium	Lomatium triternatum			2	2										0
Huckleberry	Vaccinium cespitosum				0	6									6
Wild rose (stems and leaves)	Rosa sp.	3 ^{e,f}		3	6	3 ^{e,f}		3 ^{e,f}							6
August Sampling Event															
Chokecherry	Prunus virginiana	3 ^e		3	6				5 ^{e,f}		1				6
Hazelnut	Corylus cornuta var. californica		3	3 ^{e,f}	6	2 ^e		3 ^f			1				6
Ponderosa pine	Pinus ponderosa	3	2 ^e	1	6	3 ^f			3						6
Sarvisberry	Amelanchier alnifolia	5		1 ^f	6				3 ^{e,f}	2		1			6
Tule	Schoenoplectus acutus				0							6 ^{e,f}			6
Willow	Salix exigua				0								6 ^{e,f}		6
Wild rose (hips)	<i>Rosa</i> sp.				0			4			1 ^e	1			6
Wild mint	Mentha arvensis				0							6 ^{e,f}			6
Target Species Not Collected ⁹															
Bitterroot	Lewisia rediviva				0										0
Indian carrot	Perideridia gairdneri				0										0
Morel	Morchella esculenta				0										0
Puffball	Calvatia gigantea				0										0
Red willow / red-osier dogwood	Cornus sericea				0										0
Shaggy mane	Coprinus comatus				0										0
Wild strawberry	Fragaria vesca, F. virginiana				0										0

Notes:

^a A co-located soil sample was collected with each plant tissue sample, so numbers reflect both plant tissue and soil sample counts.

^b SA01, SA02, and SA03 were designated "high lead" in the QAPP (Ramboll 2018) because the average soil concentrations reported in the 2014 residential soil study (CH2M Hill 2016) were above the time-critical removal action level of 700 mg/kg. The remaining sampling areas (SAs) were designated "lower lead" in the QAPP because the reported soil concentrations were below 700 mg/kg in the soil studies where these SAs were sampled.

^c SA10, SA11, SA12, and SA13 were designated as additional potential lower lead SAs in the QAPP (Ramboll 2018). However, they were not sampled because they were either inaccessible, did not have the target plant species, or an adequate number of samples had already been collected at one or more of the other SAs and no more samples were needed to meet the study objectives.

^d Willow was collected in SA15, which has higher lead concentrations in soil than SA16. The average soil lead concentration reported in the 2014 upland soil study (CH2MHill 2016; Ramboll Environ 2017b) for SA15 was 389 mg/kg, which is below the time-critical removal action level of 700 mg/kg and was therefore not identified as a "high lead" sampling area in the QAPP.

^e One replicate sample was collected.

^f One potential EPA split sample was collected.

^g Species were not collected because they could not be found or could not be found in high enough mass to meet minimum sampling requirements. The exception is red willow / red-osier dogwood, which was not sampled because Confederated Tribes of the Colville Reservation (CCT) determined that the species was not mouthed. Some puffballs were found, but CCT determined that they were the wrong type for consumption thus they were not collected.

-- - not sampled

ampling Event	Sample ID ^a	Sampling Date	Species or Soil	Study Element	Composite Unit Count	Average Composite Sample Measurement	Total Sample Measurement	Sample Measureme Units
A01								
	SA01-SP01-P01	4/27/2018	Camas	Field sample	3	1.63	4.9	g
	SA01-SP01-S01	4/27/2018	Soil	Field sample	3	N/A	N/A	NA
	SA01-SP02-P01	4/27/2018	Camas	Field sample	6	0.82	4.9	g
	SA01-SP02-S01	4/27/2018	Soil	Field sample	6	N/A	N/A	NA
	SA01-SP04-P01	4/28/2018	Spring beauty/Indian potato	Field sample	9	0.51	4.6	g
	SA01-SP04-S01	4/28/2018	Soil	Field sample	9	N/A	N/A	NA
	SA01-SP05-P01	4/28/2018	Black tree lichen	Field sample, EPA split	N/A ^b	N/A ^b	2.3	g
	SA01-SP05-S01	4/28/2018	Soil	Field sample	NA ^c	NA ^c	N/A	NA
	SA01-SP06-P01	4/28/2018	Spring beauty/Indian potato	Field sample	11	0.40	4.4	g
D	SA01-SP06-S01	4/28/2018	Soil	Field sample	11	N/A	N/A	NA
ġ.	SA01-SP07-P01	4/28/2018	Black tree lichen	Field sample	N/A ^b	N/A ^b	16	g
Spring	SA01-SP07-S01	4/28/2018	Soil	Field sample	NA ^c	NA ^c	N/A	NA
0)	SA01-SP08-P01	4/28/2018	Black tree lichen	Field sample	N/A ^b	N/A ^b	9	g
	SA01-SP08-S01	4/28/2018	Soil	Field sample	NA ^c	NA ^c	N/A	NA
	SA01-SP09-P01	4/28/2018	Camas	Field sample	2	2.30	4.6	g
	SA01-SP09-S01	4/28/2018	Soil	Field sample	2	N/A	N/A	NA
	SA01-SP10-P01	4/28/2018	Black tree lichen	Field sample	N/A ^b	N/A ^b	6.1	g
	SA01-SP10-S01	4/28/2018	Soil	Field sample, EPA split	NA ^c	NA ^c	N/A	NA
	SA01-SP11-P01	4/28/2018	Black tree lichen	Field sample	N/A ^b	N/A ^b	5.3	g
	SA01-SP11-S01	4/28/2018	Soil	Field sample	NA ^c	NA ^c	N/A	NA
	SA01-SP12-P01	4/28/2018	Black tree lichen	Field sample	N/A ^b	N/A ^b	10.3	g
	SA01-SP12-S01	4/28/2018	Soil	Field sample	NA ^c	NA ^c	N/A	NA
	SA01-JU01-P01	6/19/2018	Wild rose (stems and leaves)	Field sample, potential EPA split			275	cm
	SA01-JU01-S01	6/19/2018	Soil	Field sample, potential EPA split			N/A	NA
	SA01-JU02-P01	6/19/2018	Wild rose (stems and leaves)	Field sample			98	cm
June	SA01-JU02-S01	6/19/2018	Soil	Field sample			N/A	NA
η	SA01-JU03-P01	6/19/2018	Wild rose (stems and leaves)	Replicate sample			77	cm
-	SA01-JU03-S01	6/19/2018	Soil	Replicate sample			N/A	NA
	SA01-JU04-P01	6/19/2018	Wild rose (stems and leaves)	Field sample, EPA split			100	cm
	SA01-JU04-S01	6/19/2018	Soil	Field sample			N/A	NA
	SA01-AU01-P01	8/22/2018	Chokecherry	Field sample			76.5	g
	SA01-AU01-S01	8/22/2018	Soil	Field sample			N/A	NA
	SA01-AU02-P01	8/22/2018	Chokecherry	Field sample			82	g
	SA01-AU02-S01	8/22/2018	Soil	Field sample			N/A	NA
	SA01-AU03-P01	8/22/2018	Chokecherry	Replicate sample			112	g
Ist	SA01-AU03-S01	8/22/2018	Soil	Replicate sample			N/A	NA
August	SA01-AU04-P01	8/22/2018	Chokecherry	Field sample			79	g
Au	SA01-AU04-S01	8/22/2018	Soil	Field sample			N/A	NA
	SA01-AU05-P01	8/22/2018	Sarvisberry	Field sample			8.9	g
	SA01-AU05-S01	8/22/2018	Soil	Field sample			N/A	NA
	SA01-AU06-P01	8/22/2018	Sarvisberry	Field sample			10	g
	SA01-AU06-S01	8/22/2018	Soil	Field sample			N/A	NA
	SA01-AU07-P01	8/22/2018	Sarvisberry	Field sample			6.2	g

ampling Event	Sample ID ^a	Sampling Date	Species or Soil	Study Element	Composite Unit Count	Average Composite Sample Measurement	Total Sample Measurement	Sample Measuremer Units
A01 (continued)								
	SA01-AU07-S01	8/22/2018	Soil	Field sample			N/A	NA
	SA01-AU08-P01	8/22/2018	Sarvisberry	Field sample			7.5	g
$\widehat{}$	SA01-AU08-S01	8/22/2018	Soil	Field sample, EPA split			N/A	NA
August (cont.)	SA01-AU09-P01	8/22/2018	Sarvisberry	Field sample			6	g
C C	SA01-AU09-S01	8/22/2018	Soil	Field sample			N/A	NA
st	SA01-AU10-P01	8/22/2018	Pondersosa pine	Field sample			12	cones
snf	SA01-AU10-S01	8/22/2018	Soil	Field sample			N/A	NA
on	SA01-AU11-P01	8/22/2018	Pondersosa pine	Field sample			11	cones
< <	SA01-AU11-S01	8/22/2018	Soil	Field sample			N/A	NA
	SA01-AU12-P01	8/22/2018	Pondersosa pine	Field sample			10	cones
	SA01-AU12-S01	8/22/2018	Soil	Field sample			N/A	NA
A02								
	SA02-SP01-P01	4/25/2018	Spring beauty/Indian potato	Field sample	7	0.33	2.3	g
	SA02-SP01-S01	4/25/2018	Soil	Field sample	7	N/A	NA	NA
	SA02-SP02-P01	4/26/2018	Kinnikinnick	Field sample			6.5	g
	SA02-SP02-S01	4/26/2018	Soil	Field sample			N/A	NA
	SA02-SP03-P01	4/26/2018	Kinnikinnick	Replicate sample, EPA split			5.9	g
5	SA02-SP03-S01	4/26/2018	Soil	Replicate sample			N/A	NA
Spring	SA02-SP04-P01	4/26/2018	Kinnikinnick	Field sample, potential EPA split			11.4	g
br	SA02-SP04-S01	4/26/2018	Soil	Field sample, potential EPA split			N/A	NA
S	SA02-SP05-P01	4/26/2018	Kinnikinnick	Field sample			6	g
	SA02-SP05-S01	4/26/2018	Soil	Field sample			N/A	NA
	SA02-SP06-P01	4/26/2018	Lomatium	Field sample	3	1.30	3.9	g
	SA02-SP06-S01	4/26/2018	Soil	Field sample	3	N/A	NA	NA
	SA02-SP07-P01	4/26/2018	Spring beauty/Indian potato	Field sample	9	0.24	2.2	g
	SA02-SP07-S01	4/26/2018	Soil	Field sample	9	N/A	NA	NA
	SA02-AU01-P01	8/21/2018	HazeInut	Field sample			21	nuts
	SA02-AU01-S01	8/21/2018	Soil	Field sample			N/A	NA
	SA02-AU02-P01	8/21/2018	HazeInut	Field sample			31	nuts
	SA02-AU02-S01	8/21/2018	Soil	Field sample			N/A	NA
	SA02-AU03-P01	8/21/2018	HazeInut	Field sample			21	nuts
sn	SA02-AU03-S01	8/21/2018	Soil	Field sample			N/A	NA
August	SA02-AU04-P01	8/21/2018	Pondersosa pine	Field sample			15	cones
Ā	SA02-AU04-S01	8/21/2018	Soil	Field sample			N/A	NA
	SA02-AU05-P01	8/21/2018	Pondersosa pine	Replicate sample			11	cones
	SA02-AU05-S01	8/21/2018	Soil	Replicate sample			N/A	NA
	SA02-AU06-P01	8/21/2018	Pondersosa pine	Field sample			10	cones
	SA02-AU06-S01	8/21/2018	Soil	Field sample			N/A	NA

Sampling Event	Sample ID ^a	Sampling Date	Species or Soil	Study Element	Composite Unit Count	Average Composite Sample Measurement	Total Sample Measurement	Sample Measurement Units
SA03								
	SA03-SP01-P01	4/26/2018	Kinnikinnick	Field sample			5.6	g
	SA03-SP01-S01	4/26/2018	Soil	Field sample			N/A	NA
	SA03-SP02-P01	4/26/2018	Kinnikinnick	Replicate sample			5.7	g
_	SA03-SP02-S01	4/26/2018	Soil	Replicate sample			N/A	NA
_	SA03-SP03-P01	4/26/2018	Camas	Field sample	3	2.03	6.1	g
-	SA03-SP03-S01 SA03-SP04-P01	4/26/2018 4/27/2018	Soil Camas	Field sample, EPA split Field sample	3 4	N/A 1.35	NA 5.4	NA
	SA03-SP04-P01	4/27/2018	Soil	Field sample	4 4	N/A	5.4 NA	g NA
	SA03-SP04-S01 SA03-SP05-P01	4/27/2018	Camas	Field sample	2	2.30	4.6	
	SA03-SP05-P01 SA03-SP05-S01	4/27/2018	Soil	Field sample	2	2.30 N/A	4.6 NA	g NA
	SA03-SP05-S01	4/27/2018		Field sample	3	1.50	4.5	
Бu	SA03-SP06-P01	4/27/2018	Spring beauty/Indian potato Soil	Field sample	3	N/A	4.5 NA	g NA
Spring	SA03-SP06-S01	4/27/2018		Field sample	4	0.45	1.8	
S	SA03-SP07-P01	4/27/2018	Spring beauty/Indian potato Soil	Field sample	4 4	0.45 N/A	NA	g NA
	SA03-SP07-S01 SA03-SP08-P01	4/27/2018	Lomatium	Field sample		N/A	6.8	
-		4/27/2018	Soil	•			0.8 N/A	g NA
	SA03-SP08-S01			Field sample	6	0.80	4.8	
-	SA03-SP09-P01	4/27/2018	Lomatium Soil	Field sample	6			g
_	SA03-SP09-S01	4/27/2018		Field sample		N/A	NA	NA
	SA03-SP10-P01	4/27/2018	Kinnikinnick Soil	Field sample			5.8	g
_	SA03-SP10-S01	4/27/2018		Field sample,			N/A	NA
-	SA03-SP11-P01	4/27/2018	Kinnikinnick Soil	Field sample, potential EPA split			11.2 N/A	g
-	SA03-SP11-S01	4/27/2018		Field sample, potential EPA split				NA
-	SA03-SP12-P01	4/27/2018	Lomatium Soil	Field sample	9	0.77	6.9	g
	SA03-SP12-S01 SA03-JU01-P01	4/27/2018 6/18/2018		Field sample	9	N/A	NA 70	NA
-			Wild rose (stems and leaves) Soil	Field sample			-	cm
	SA03-JU01-S01	6/18/2018		Field sample			N/A 81	NA
-	SA03-JU02-P01	6/18/2018	Wild rose (stems and leaves) Soil	Field sample				cm NA
σ	SA03-JU02-S01	6/18/2018		Field sample			N/A	
June	SA03-JU03-P01	6/18/2018	Wild rose (stems and leaves) Soil	Field sample			57	cm
	SA03-JU03-S01	6/18/2018		Field sample			N/A	NA
-	SA03-JU04-P01	6/18/2018 6/18/2018	Lomatium Soil	Field sample	4 4	2.15 N/A	8.6 NA	g NA
-	SA03-JU04-S01	6/18/2018		Field sample	4 4	1.95	7.8	
-	SA03-JU05-P01		Lomatium Soil	Field sample	4 4	N/A	7.8 NA	g NA
	SA03-JU05-S01	6/18/2018		Field sample				
_	SA03-AU01-P01	8/21/2018	Hazelnut	Field sample			20	nuts
-	SA03-AU01-S01 SA03-AU02-P01	8/21/2018 8/21/2018	Soil Hazelnut	Field sample			N/A 12	NA
				Field sample				nuts
ist	SA03-AU02-S01	8/21/2018	Soil	Field sample			N/A	NA
August	SA03-AU03-P01	8/21/2018	Hazelnut Soil	Field sample			20	nuts
Au	SA03-AU03-S01	8/21/2018		Field sample			N/A	NA
-	SA03-AU04-P01	8/21/2018	Hazelnut	Field sample, potential EPA split			57	nuts
_	SA03-AU04-S01	8/21/2018	Soil	Field sample, potential EPA split			N/A	NA
_	SA03-AU05-P01	8/21/2018	Chokecherry	Field sample			177	g
	SA03-AU05-S01	8/21/2018	Soil	Field sample			N/A	NA

Sampling Event	Sample ID ^a	Sampling Date	Species or Soil	Study Element	Composite Unit Count	Average Composite Sample Measurement	Total Sample Measurement	Sample Measurement Units
SA03 (continued)								
~	SA03-AU06-P01	8/21/2018	Chokecherry	Field sample			188	g
August (cont.)	SA03-AU06-S01	8/21/2018	Soil	Field sample			N/A	NA
ō	SA03-AU07-P01	8/21/2018	Chokecherry	Field sample			86	g
ţ	SA03-AU07-S01	8/21/2018	Soil	Field sample, EPA split			N/A	NA
sn	SA03-AU08-P01	8/21/2018	Sarvisberry	Field sample, potential EPA split			17	g
6n	SA03-AU08-S01	8/21/2018	Soil	Field sample, potential EPA split			N/A	NA
Ā	SA03-AU09-P01	8/21/2018	Pondersosa pine	Field sample			11	cones
	SA03-AU09-S01	8/21/2018	Soil	Field sample			N/A	NA
SA04	SA04-SP01-P01	4/30/2018	Kinnikinnick	Field sample			5.8	2
_	SA04-SP01-P01	4/30/2018	Soil	Field sample			N/A	g NA
	SA04-SP01-S01	4/30/2018	Kinnikinnick	Replicate sample			6.1	
	SA04-SP02-P01	4/30/2018	Soil	Replicate sample			N/A	g NA
	SA04-SP02-S01	4/30/2018	Kinnikinnick	Field sample, potential EPA split			11.5	
_	SA04-SP03-S01	4/30/2018	Soil	Field sample, potential EPA split			N/A	g NA
_	SA04-SP03-S01	4/30/2018	Kinnikinnick	Field sample, potential EFA spin			6.4	
Spring	SA04-SP04-P01	4/30/2018	Soil	Field sample			0.4 N/A	g NA
J	SA04-SP05-P01	5/1/2018	Kinnikinnick	Field sample			6	
Sc	SA04-SP05-S01	5/1/2018	Soil	Field sample			N/A	g NA
	SA04-SP06-P01	5/1/2018	Kinnikinnick	Field sample			6	g
	SA04-SP06-S01	5/1/2018	Soil	Field sample			N/A	 NA
	SA04-SP07-P01	5/1/2018	Spring beauty/Indian potato	Field sample	10	0.33	3.3	g
	SA04-SP07-S01	5/1/2018	Soil	Field sample	10	N/A	NA	 NA
	SA04-SP08-P01	5/1/2018	Spring beauty/Indian potato	Field sample	6	0.68	4.1	g
	SA04-SP08-S01	5/1/2018	Soil	Field sample	6	N/A	NA	9NA
	SA04-JU01-P01	6/19/2018	Wild rose (stems and leaves)	Field sample, potential EPA split			150	cm
	SA04-JU01-S01	6/19/2018	Soil	Field sample, potential EPA split			N/A	NA
	SA04-JU02-P01	6/19/2018	Wild rose (stems and leaves)	Field sample			70	cm
	SA04-JU02-S01	6/19/2018	Soil	Field sample			N/A	NA
	SA04-JU03-P01	6/19/2018	Wild rose (stems and leaves)	Replicate sample			82	cm
	SA04-JU03-S01	6/19/2018	Soil	Replicate sample			N/A	NA
	SA04-JU04-P01	6/19/2018	Wild rose (stems and leaves)	Field sample			91	cm
	SA04-JU04-S01	6/19/2018	Soil	Field sample			N/A	NA
	SA04-JU05-P01	6/19/2018	Huckleberry	Field sample			17	g
e	SA04-JU05-S01	6/19/2018	Soil	Field sample			N/A	NA
June	SA04-JU06-P01	6/19/2018	Huckleberry	Field sample			18	g
7	SA04-JU06-S01	6/19/2018	Soil	Field sample			N/A	NA
	SA04-JU07-P01	6/19/2018	Huckleberry	Field sample			18	g
	SA04-JU07-S01	6/19/2018	Soil	Field sample			N/A	NA
	SA04-JU08-P01	6/20/2018	Huckleberry	Field sample			16	g
	SA04-JU08-S01	6/20/2018	Soil	Field sample			N/A	NA
	SA04-JU09-P01	6/20/2018	Huckleberry	Field sample			18	g
	SA04-JU09-S01	6/20/2018	Soil	Field sample			N/A	NA
	SA04-JU10-P01	6/20/2018	Huckleberry	Field sample			19	g
	SA04-JU10-S01	6/20/2018	Soil	Field sample, EPA split			N/A	NA

ampling Event	Sample ID ^a	Sampling Date	Species or Soil	Study Element	Composite Unit Count	Average Composite Sample Measurement	Total Sample Measurement	Sample Measuremen Units
A04 (continued)								
	SA04-AU01-P01	8/23/2018	HazeInut	Field sample			22	nuts
	SA04-AU01-S01	8/23/2018	Soil	Field sample			N/A	NA
	SA04-AU02-P01	8/23/2018	Hazelnut	Replicate sample			22	nuts
	SA04-AU02-S01	8/23/2018	Soil	Replicate sample			N/A	NA
st	SA04-AU03-P01	8/23/2018	Hazelnut	Field sample			24	nuts
August	SA04-AU03-S01	8/23/2018	Soil	Field sample			N/A	NA
ň	SA04-AU04-P01	8/23/2018	Pondersosa pine	Field sample			17	cones
•	SA04-AU04-S01	8/23/2018	Soil	Field sample			N/A	NA
	SA04-AU05-P01	8/23/2018	Pondersosa pine	Field sample, potential EPA split			26	cones
	SA04-AU05-S01	8/23/2018	Soil	Field sample, potential EPA split			N/A	NA
	SA04-AU06-P01	8/23/2018	Pondersosa pine	Field sample			16	cones
	SA04-AU06-S01	8/23/2018	Soil	Field sample			N/A	NA
A05								
	SA05-SP01-P01	4/30/2018	Lomatium	Field sample	4	1.18	4.7	g
	SA05-SP01-S01	4/30/2018	Soil	Field sample	4	N/A	NA	NA
	SA05-SP02-P01	4/30/2018	Lomatium	Field sample			7	g
	SA05-SP02-S01	4/30/2018	Soil	Field sample			N/A	NA
	SA05-SP03-P01	4/30/2018	Lomatium	Field sample	8	0.88	7	g
	SA05-SP03-S01	4/30/2018	Soil	Field sample	8	N/A	NA	NA
	SA05-SP04-P01	4/30/2018	Black tree lichen	Field sample	N/A ^b	N/A ^b	5.1	g
	SA05-SP04-S01	4/30/2018	Soil	Field sample	NA ^c	NA ^c	NA	NA
6	SA05-SP05-P01	4/30/2018	Spring beauty/Indian potato	Field sample	3	1.63	4.9	g
Spring	SA05-SP05-S01	4/30/2018	Soil	Field sample	3	N/A	NA	NA
br	SA05-SP06-P01	4/30/2018	Spring beauty/Indian potato	Field sample	2	1.95	3.9	g
S	SA05-SP06-S01	4/30/2018	Soil	Field sample	2	N/A	NA	NA
	SA05-SP07-P01	4/30/2018	Camas	Field sample	2	2.25	4.5	g
	SA05-SP07-S01	4/30/2018	Soil	Field sample	2	N/A	NA	NA
	SA05-SP08-P01	4/30/2018	Camas	Field sample	6	0.80	4.8	g
	SA05-SP08-S01	4/30/2018	Soil	Field sample	6	N/A	NA	NA
	SA05-SP09-P01	4/30/2018	Camas	Field sample, EPA split	6	0.92	5.5	g
	SA05-SP09-S01	4/30/2018	Soil	Field sample	6	N/A	NA	NA
	SA05-SP10-P01	4/30/2018	Black tree lichen	Field sample	N/A ^b	N/A ^b	4.1	g
	SA05-SP10-S01	4/30/2018	Soil	Field sample	NA ^c	NA°	NA	NA
406				•				
	SA06-SP01-P01	5/1/2018	Kinnikinnick	Field sample			8.7	g
Spring	SA06-SP01-S01	5/1/2018	Soil	Field sample			N/A	NA
pri	SA06-SP02-P01	5/1/2018	Kinnikinnick	Replicate sample			6.4	g
S	SA06-SP02-S01	5/1/2018	Soil	Replicate sample			N/A	NA
	SA06-JU01-P01	6/20/2018	Wild rose (stems and leaves)	Field sample, potential EPA split			218	cm
	SA06-JU01-S01	6/20/2018	Soil	Field sample, potential EPA split			N/A	NA
—	SA06-JU02-P01	6/20/2018	Wild rose (stems and leaves)	Field sample			115	cm
e	SA06-JU02-S01	6/20/2018	Soil	Field sample			N/A	NA
June	SA06-JU03-P01	6/20/2018	Wild rose (stems and leaves)	Replicate sample			149	cm
~	SA06-JU03-S01	6/20/2018	Soil	Replicate sample			N/A	NA
_	SA06-JU04-P01	6/20/2018	Wild rose (stems and leaves)	Field sample			116	cm
	SA06-JU04-S01	6/20/2018	Soil	Field sample			N/A	NA

Sampling Event	Sample ID ^a	Sampling Date	Species or Soil	Study Element	Composite Unit Count	Average Composite Sample Measurement	Total Sample Measurement	Sample Measurement Units
SA06 (continued)								
	SA06-AU01-P01	8/23/2018	Hazelnut	Field sample, potential EPA split			62	nuts
	SA06-AU01-S01	8/23/2018	Soil	Field sample, potential EPA split			N/A	NA
	SA06-AU02-P01	8/23/2018	Hazelnut	Field sample			27	nuts
	SA06-AU02-S01	8/23/2018	Soil	Field sample			N/A	NA
	SA06-AU03-P01	8/23/2018	HazeInut	Field sample			20	nuts
ŭ	SA06-AU03-S01	8/23/2018	Soil	Field sample			N/A	NA
August	SA06-AU04-P01	8/23/2018	Wild rose (hips)	Field sample	2	2.7	5.4	g
ôn	SA06-AU04-S01	8/23/2018	Soil	Field sample	2	N/A	NA	NA
<	SA06-AU05-P01	8/23/2018	Wild rose (hips)	Field sample			7	g
	SA06-AU05-S01	8/23/2018	Soil	Field sample			N/A	NA
	SA06-AU06-P01	8/23/2018	Wild rose (hips)	Field sample			15	g
	SA06-AU06-S01	8/23/2018	Soil	Field sample			N/A	NA
	SA06-AU07-P01	8/23/2018	Wild rose (hips)	Field sample			9.5	g
	SA06-AU07-S01	8/23/2018	Soil	Field sample			N/A	NA
SA07								
	SA07-SP01-P01	5/2/2018	Camas	Field sample	5	0.90	4.5	g
	SA07-SP01-S01	5/2/2018	Soil	Field sample	5	N/A	NA	NA
Spring	SA07-SP02-P01	5/2/2018	Camas	Field sample	4	1.15	4.6	g
pr	SA07-SP02-S01	5/2/2018	Soil	Field sample	4	N/A	NA	NA
S	SA07-SP03-P01	5/2/2018	Camas	Field sample	6	1.07	6.4	g
	SA07-SP03-S01	5/2/2018	Soil	Field sample	6	N/A	NA	NA
	SA07-AU01-P01	8/24/2018	Chokecherry	Field sample			105	g
	SA07-AU01-S01	8/24/2018	Soil	Field sample			N/A	NA
	SA07-AU02-P01	8/24/2018	Chokecherry	Replicate sample			105	g
	SA07-AU02-S01	8/24/2018	Soil	Replicate sample			N/A	NA
	SA07-AU03-P01	8/24/2018	Chokecherry	Field sample			98	g
	SA07-AU03-S01	8/24/2018	Soil	Field sample			N/A	NA
÷	SA07-AU04-P01	8/24/2018	Sarvisberry	Field sample, potential EPA split			21.5	g
August	SA07-AU04-S01	8/24/2018	Soil	Field sample, potential EPA split			N/A	NA
<u> 6</u> n	SA07-AU05-P01	8/24/2018	Sarvisberry	Field sample			22	g
Ā	SA07-AU05-S01	8/24/2018	Soil	Field sample			N/A	NA
	SA07-AU06-P01	8/24/2018	Sarvisberry	Field sample			17	g
	SA07-AU06-S01	8/24/2018	Soil	Field sample			N/A	NA
	SA07-AU07-P01	8/24/2018	Sarvisberry	Replicate sample			17	g
	SA07-AU07-S01	8/24/2018	Soil	Replicate sample			N/A	NA
	SA07-AU08-P01	8/24/2018	Chokecherry	Field sample			85	g
	SA07-AU08-S01	8/24/2018	Soil	Field sample			N/A	NA

Sampling Event	Sample ID ^a	Sampling Date	Species or Soil	Study Element	Composite Unit Count	Average Composite Sample Measurement	Total Sample Measurement	Sample Measurement Units
SA07 (continued)								
	SA07-AU09-P01	8/24/2018	Pondersosa pine	Field sample			13	cones
	SA07-AU09-S01	8/24/2018	Soil	Field sample, EPA split			N/A	NA
August (cont.)	SA07-AU10-P01	8/24/2018	Chokecherry	Field sample			100	g
ō	SA07-AU10-S01	8/24/2018	Soil	Field sample			N/A	NA
<u>0</u>	SA07-AU11-P01	8/24/2018	Chokecherry	Field sample, potential EPA split			212	g
rst	SA07-AU11-S01	8/24/2018	Soil	Field sample, potential EPA split			N/A	NA
ıßı	SA07-AU12-P01	8/24/2018	Pondersosa pine	Field sample			14	cones
٩٢	SA07-AU12-S01	8/24/2018	Soil	Field sample			N/A	NA
	SA07-AU13-P01	8/24/2018	Pondersosa pine	Field sample			12	cones
	SA07-AU13-S01	8/24/2018	Soil	Field sample			N/A	NA
SA08								
	SA08-SP01-P01	5/2/2018	Lomatium	Field sample	3	2.97	8.9	g
	SA08-SP01-S01	5/2/2018	Soil	Field sample	3	N/A	NA	NA
	SA08-SP02-P01	5/2/2018	Lomatium	Field sample	6	1.38	8.3	g
	SA08-SP02-S01	5/2/2018	Soil	Field sample	6	N/A	NA	NA
	SA08-SP03-P01	5/2/2018	Lomatium	Field sample	4	2.45	9.8	g
	SA08-SP03-S01	5/2/2018	Soil	Field sample	4	N/A	NA	NA
	SA08-SP04-P01	5/2/2018	Black tree lichen	Field sample	N/A ^b	N/A ^b	5	g
5	SA08-SP04-S01	5/2/2018	Soil	Field sample	NA ^c	NA ^c	NA	NA
i	SA08-SP05-P01	5/2/2018	Black tree lichen	Field sample	N/A ^b	N/A ^b	4.1	g
Spring	SA08-SP05-S01	5/2/2018	Soil	Field sample, EPA split	NA ^c	NA ^c	NA	NA
S	SA08-SP06-P01	5/2/2018	Black tree lichen	Field sample	N/A ^b	N/A ^b	5.8	g
	SA08-SP06-S01	5/2/2018	Soil	Field sample	NA ^c	NA ^c	NA	NA
	SA08-SP07-P01	5/2/2018	Black tree lichen	Field sample	N/A ^b	N/A ^b	3.8	g
	SA08-SP07-S01	5/2/2018	Soil	Field sample	NA ^c	NA ^c	NA	NA
	SA08-SP09-P01	5/2/2018	Spring beauty/Indian potato	Field sample	9	0.46	4.1	g
	SA08-SP09-S01	5/2/2018	Soil	Field sample	9	N/A	NA	NA
	SA08-SP10-P01	5/2/2018	Spring beauty/Indian potato	Field sample	8	0.48	3.8	g
	SA08-SP10-S01	5/2/2018	Soil	Field sample	8	N/A	NA	NA
it	SA08-AU01-P01	8/27/2018	Sarvisberry	Field sample			25	g
August	SA08-AU01-S01	8/27/2018	Soil	Field sample			N/A	NA
ôn	SA08-AU02-P01	8/27/2018	Sarvisberry	Field sample			13	g
∢	SA08-AU02-S01	8/27/2018	Soil	Field sample			N/A	NA
SA09								
	SA09-AU01-P01	8/25/2018	HazeInut	Field sample			28	nuts
	SA09-AU01-S01	8/25/2018	Soil	Field sample, EPA split			N/A	NA
ы,	SA09-AU02-P01	8/25/2018	Wild rose (hips)	Field sample			17	g
August	SA09-AU02-S01	8/25/2018	Soil	Field sample			N/A	NA
ôn	SA09-AU03-P01	8/25/2018	Wild rose (hips)	Replicate sample			16	g
<	SA09-AU03-S01	8/25/2018	Soil	Replicate sample			N/A	NA
	SA09-AU04-P01	8/25/2018	Chokecherry	Field sample			89	g
	SA09-AU04-S01	8/25/2018	Soil	Field sample			N/A	NA

ompling Event	Samela IDa	Sompling Data	Species or Sail	Study Floment	Composite Unit Court	Average Composite	Total Sample Measurement	Sample Measuremer Units
ampling Event	Sample ID ^a	Sampling Date	Species or Soil	Study Element	Composite Unit Count	Sample Measurement	ivieasurement	Units
A14								
_	SA14-AU01-P01	8/27/2018	Wild Mint	Field sample			11	g
	SA14-AU01-S01	8/27/2018	Soil	Field sample			N/A	NA
	SA14-AU02-P01	8/27/2018	Wild Mint	Field sample	-		10.5	g
	SA14-AU02-S01	8/27/2018	Soil	Field sample			N/A	NA
	SA14-AU03-P01	8/27/2018	Wild Mint	Field sample, potential EPA split			22	g
	SA14-AU03-S01	8/27/2018	Soil	Field sample, potential EPA split			N/A	NA
	SA14-AU04-P01	8/27/2018	Wild Mint	Field sample	-		12	g
	SA14-AU04-S01	8/27/2018	Soil	Field sample			N/A	NA
	SA14-AU05-P01	8/27/2018	Wild Mint	Field sample, EPA split			11	g
	SA14-AU05-S01	8/27/2018	Soil	Field sample			N/A	NA
	SA14-AU06-P01	8/27/2018	Wild Mint	Replicate sample, EPA split			11	g
	SA14-AU06-S01	8/27/2018	Soil	Replicate sample	-		N/A	NA
	SA14-AU07-P01	8/27/2018	Wild Mint	Field sample			12	g
	SA14-AU07-S01	8/27/2018	Soil	Field sample			N/A	NA
August	SA14-AU08-P01	8/27/2018	Tule	Field sample			269	cm
nß	SA14-AU08-S01	8/27/2018	Soil	Field sample			N/A	NA
Ň	SA14-AU09-P01	8/27/2018	Tule	Field sample, EPA split			290	cm
~	SA14-AU09-S01	8/27/2018	Soil	Field sample			N/A	NA
	SA14-AU10-P01	8/27/2018	Tule	Replicate sample, EPA split			260	cm
_	SA14-AU10-S01	8/27/2018	Soil	Replicate sample			N/A	NA
	SA14-AU11-P01	8/27/2018	Tule	Field sample			233	cm
_	SA14-AU11-S01	8/27/2018	Soil	Field sample			N/A	NA
_	SA14-AU12-P01	8/27/2018	Tule	Field sample, potential EPA split			412	cm
_	SA14-AU12-S01	8/27/2018	Soil	Field sample, potential EPA split			N/A	NA
_	SA14-AU13-P01	8/27/2018	Tule	Field sample			272	cm
_	SA14-AU13-S01	8/27/2018	Soil	Field sample			N/A	NA
_	SA14-AU14-P01	8/27/2018	Tule	Field sample			277	cm
_	SA14-AU14-S01	8/27/2018	Soil	Field sample			N/A	NA
_	SA14-AU15-P01	8/27/2018	Wild rose (hips)	Field sample			7.2	g
_	SA14-AU15-S01	8/27/2018	Soil	Field sample			N/A	NA
_	SA14-AU16-P01	8/27/2018	Sarvisberry	Field sample			8.15	g
	SA14-AU16-S01	8/27/2018	Soil	Field sample			N/A	NA
A15								
_	SA15-AU01-P01	8/28/2018	Willow	Field sample, potential EPA split			411	cm
	SA15-AU01-S01	8/28/2018	Soil	Field sample, potential EPA split			N/A	NA
August	SA15-AU02-P01	8/28/2018	Willow	Field sample			190	cm
6n	SA15-AU02-S01	8/28/2018	Soil	Field sample			N/A	NA
Ā	SA15-AU03-P01	8/28/2018	Willow	Field sample			202	cm
	SA15-AU03-S01	8/28/2018	Soil	Field sample			N/A	NA
	SA15-AU04-P01	8/28/2018	Willow	Replicate sample	-		233	cm

Sampling Event	Sample ID ^a	Sampling Date	Species or Soil	Study Element	Composite Unit Count	Average Composite Sample Measurement	Total Sample Measurement	Sample Measurement Units
SA15 (continued)								
<u> </u>	SA15-AU04-S01	8/28/2018	Soil	Replicate sample			N/A	NA
nt	SA15-AU05-P01	8/28/2018	Willow	Field sample			218	cm
8	SA15-AU05-S01	8/28/2018	Soil	Field sample			N/A	NA
August (cont.)	SA15-AU06-P01	8/28/2018	Willow	Field sample			203	cm
sh	SA15-AU06-S01	8/28/2018	Soil	Field sample			N/A	NA
วิทา	SA15-AU07-P01	8/28/2018	Willow	Field sample			208	cm
<	SA15-AU07-S01	8/28/2018	Soil	Field sample			N/A	NA
SA16								
	SA16-SP01-P01	5/1/2018	Willow	Field sample			190	cm
	SA16-SP01-S01	5/1/2018	Soil	Field sample			N/A	NA
	SA16-SP02-P01	5/1/2018	Willow	Replicate sample			190	cm
	SA16-SP02-S01	5/1/2018	Soil	Replicate sample			N/A	NA
	SA16-SP03-P01	5/1/2018	Willow	Field sample, potential EPA split			405	cm
5	SA16-SP03-S01	5/1/2018	Soil	Field sample, potential EPA split			N/A	NA
Spring	SA16-SP04-P01	5/1/2018	Willow	Field sample			205	cm
b	SA16-SP04-S01	5/1/2018	Soil	Field sample			N/A	NA
0	SA16-SP05-P01	5/1/2018	Willow	Field sample			215	cm
	SA16-SP05-S01	5/1/2018	Soil	Field sample			N/A	NA
	SA16-SP06-P01	5/1/2018	Willow	Field sample			217	cm
	SA16-SP06-S01	5/1/2018	Soil	Field sample			N/A	NA
	SA16-SP07-P01	5/1/2018	Willow	Field sample, EPA split			203	cm
	SA16-SP07-S01	5/1/2018	Soil	Field sample, EPA split			N/A	NA

Notes:

^a Sample IDs in bold were tested for mercury in addition to other analytes

^b Number of individual samples composited not counted/weighed due to large number needed to reach target sample mass.

^c One soil sample was taken from the center of the circular plot where lichen was collected.

-- Not a composite sample.

N/A - not analyzed

NA - not applicable

SA - sampling area

Table 2-3. Analytical Methods and Sample Mass Requirements

	Sample	Preparation	Quantitati	ve Analysis		Sample Mass Req (g d	
Analyte	Protocol	Procedure	Protocol	Procedure	– Holding Time ^a	Soil/Sediment	Plant Tissue
Conventional Parameters - Plant Tiss	sue						
Total Mass	NA	NA	NA	NA	NA	NA	8-12 ^b
Total solids/percent moisture	ALS SOP MET-TISP	Freeze-dry	ALS SOP MET-TISP	Freeze-dry	1 year at -20°C	NA	NA ^c
TAL Metals/Metalloids - Plant Tissue							
TAL metals (except calcium, magnesium, potassium, and sodium)	ALS SOP MET-TDIG	Acid digestion	EPA 6020A MET-6020	ICP-MS	180 days at -20°C	NA	0.3 ^d
Total mercury	ALS SOP MET 1631	Acid digestion	EPA 1631E	CVAFS	1 year at -20°C	NA	0.4 ^d
Conventional Parameters - Soil/Sedin	ment						
Total Solids	NA	NA	EPA 160.3	Gravimetric	1 year at -20°C	5	NA
TAL Metals/Metalloids - Soil/Sedimer	nt						
TAL metals (except calcium, magnesium, potassium, and sodium)	MET-3050B	Acid digestion	EPA 6020A MET-6020	ICP-MS	180 days at room temperature	2	NA
Total mercury	ALS SOP MET 1631	Acid digestion	EPA 1631E	CVAFS	1 year at < -15°C	NA ^e	NA

Notes:

Sample masses do not include additional mass for field splits, laboratory duplicates, or re-extraction.

^a Holding time based on applicable standard operating procedure (SOP).

^b Wet weight mass in grams.

^c Percent moisture was analyzed with target analyte list (TAL) metals; no additional sample mass required.

^d The target sample mass for analysis listed achieves the reporting limits listed in Table 2-4.

^e The total target sample mass for TAL metals (except calcium, magnesium, potassium, and sodium) in soil/sediment was sufficient for additional analysis of mercury in soil/sediment.

ALS - ALS Environmental

CVAFS - cold vapor atomic fluorescence spectrometry

MET-TISP - tissue sample preparation

MET-TDIG - sample preparation of biological tissue for metals analysis by inductively-coupled plasma - optical emission spectrometry (ICP-OES) and inductively-coupled plasma - mass spectrometry (ICP-MS). NA - not applicable

MET - metal

Table 2-4. Plant Tissue and Soil TAL Metals and ACGs

		Plant Tiss	ue			Soil		
	Human Health RBCs	Lab	oratory (mg/kg	dw)	Human Health	Lat	ooratory (mg/kg	g dw)
Analyte	(mg/kg dw) ^a	MRL⁵	MRL ^b MDL ^b		RBCs (mg/kg dw) ^a	MRL⁵	MDL ^b	ACG℃
Conventional Param	eters							
Total mass	na	na	na	na	N/A	N/A	N/A	N/A
Moisture content	na	na	na	na	na	na	na	na
Metals/Metalloids								
Aluminum	28	2	0.6	28	5,000	2	0.6	5,000
Antimony	0.01	0.05	0.02	0.05	2	0.05	0.02	2
Arsenic	0.0004	0.5	0.2	0.5	0.29	0.5	0.2	0.5
Barium	5.6	0.05	0.02	5.6	1,000	0.05	0.02	1,000
Beryllium	0.06	0.02	0.005	0.06	10	0.02	0.005	10
Cadmium	0.03	0.02	0.009	0.03	5	0.02	0.009	5
Chromium	42	0.2	0.07	42	7,500	0.2	0.07	7,500
Cobalt	0.008	0.02	0.009	0.02	1.5	0.02	0.009	1.5
Copper	1.1	0.1	0.04	1.1	200	0.1	0.04	200
Iron	19	1	2	19	3,500	4	2	3,500
Lead	0.09	0.02	0.02	0.09	143	0.05	0.02	143
Manganese	3.9	0.05	0.02	3.9	120	0.05	0.02	120
Mercury	0.008	0.001	0.00009	0.008	1.5	0.001	0.00009	1.5
Nickel	0.56	0.2	0.04	0.56	100	0.2	0.04	100
Selenium	0.14	1	0.2	1	25	1	0.2	25
Silver	0.14	0.02	0.005	0.14	25	0.02	0.005	25
Thallium	0.0003	0.02	0.002	0.02	0.05	0.02	0.002	0.05
Vanadium	0.14	0.2	0.08	0.2	25	0.2	0.08	25
Zinc	8.3	0.5	0.2	8.3	1,500	0.5	0.2	1,500

Notes:

^a Risk-based concentrations (RBCs) for human health are based on exposure assumptions and calculation methods specified in the 2016 Plant Tissue data quality objectives (DQOs) (USEPA 2016). The RBC shown represents the lower of the non-cancer child RBC or the cancer RBC based on a time-weighted average child and adult. RBC exposure assumptions are based on the Spokane Tribe and are not directly applicable to Confederated Tribes of the Colville Reservation (CCT) exposures. RBCs will be updated to reflect CCT exposure assumptions in the human health risk assessment.

^b Method reporting limits (MRLs) and method detection limits (MDLs) for metals were obtained from ALS Environmental (ALS).

^c Analytical concentration goals (ACGs) represent the RBC value for human health. If the RBC is lower than the MRL, the MRL was used as the ACG.

N/A - not analyzed

na - not available

Table 4-1. Summary of Qualifiers Applied to Equipment Blank Samples

	Number of	Number of Rejected	Number of Accepted	Count of Results with			Accepted			Cour		epted Res or Flags	sults			oratory Fla			%		or Flags, ited Resu	lts
Analyte	Samples	Results	Results	No Flags	No Flag	J	U	#	#J	No Flag	J	U	UJ	No Flag	J	U	#	#J	No Flag	J	U	UJ
Aluminum	38	0	38	9	9	29	0	0	0	9	29	0	0	24	76	0	0	0	24	76	0	0
Antimony	38	0	38	1	1	0	37	0	0	1	0	37	0	3	0	97	0	0	3	0	97	0
Arsenic	38	0	38	0	0	2	36	0	0	0	2	36	0	0	5	95	0	0	0	5	95	0
Barium	38	0	38	7	7	6	25	0	0	7	6	25	0	18	16	66	0	0	18	16	66	0
Beryllium	38	0	38	0	0	1	37	0	0	0	1	37	0	0	3	97	0	0	0	3	97	0
Cadmium	38	0	38	0	0	13	25	0	0	0	13	25	0	0	34	66	0	0	0	34	66	0
Chromium	38	0	38	6	6	22	10	0	0	6	22	10	0	16	58	26	0	0	16	58	26	0
Cobalt	38	0	38	0	0	7	31	0	0	0	7	31	0	0	18	82	0	0	0	18	82	0
Copper	38	0	38	27	27	7	4	0	0	27	7	4	0	71	18	11	0	0	71	18	11	0
Iron	38	0	38	17	17	18	3	0	0	17	18 ^a	0	3	45	47	8	0	0	45	47	0	8
Lead	38	0	38	20	20	15	3	0	0	20	15	3	0	53	39	8	0	0	53	39	8	0
Manganese	38	0	38	4	4	18	16	0	0	4	18	16	0	11	47	42	0	0	11	47	42	0
Mercury	17	0	17	0	0	13	4	0	0	0	13	4	0	0	76	24	0	0	0	76	24	0
Nickel	38	0	38	17	17	7	14	0	0	17	7	14	0	45	18	37	0	0	45	18	37	0
Selenium	38	0	38	0	0	0	38	0	0	0	0	38	0	0	0	100	0	0	0	0	100	0
Silver	38	0	38	1	1	4	33	0	0	1	4	33	0	3	11	87	0	0	3	11	87	0
Thallium	38	0	38	5	5	13	20	0	0	5	13	20	0	13	34	53	0	0	13	34	53	0
Vanadium	38	0	38	0	0	0	38	0	0	0	0	38	0	0	0	100	0	0	0	0	100	0
Zinc	38	0	38	12	12	21	5	0	0	12	21	5	0	32	55	13	0	0	32	55	13	0

Notes:

^a Three iron results were J- flagged (estimated, potential low bias) by the validator due to negative instrument bias. However, because the three results were also detected between the detection limit (DL) and the reporting limit (RL) with an unknown direction of bias, they were retained as J in the database.

Laboratory

J - The result is an estimated value that was detected between the DL and the RL.

U - The analyte was analyzed for, but was not detected at or above the method reporting limit/method detection limit (MRL/MDL).

- The control limit criteria is not applicable. See case narrative.

#J - The result is an estimated value and the control limit criteria is not applicable. See case narrative.

Validator

J - Quantitation is approximate due to limitations identified during the quality assurance (QA) review (data validation).

U - The analyte was not detected at or above the associated DL.

UJ - The result is not detected and the DL is considered approximate due to bias identified during data validation.

	Number of	Number of Rejected	Number of Accepted	Count of Results with	Count Results L	of Acce aborato		Cour	nt of Acc	epted Re	esults Va	lidator Fl	ags	Laborato Accep	ory Flag		Val	lidator F	lags, % c	of Accept	ed Resul	ts
Analyte	Samples	Results	Results	No Flags	No Flag	J	U	No Flag	J	J-	U	UJ	U*	No Flag	J	U	No Flag	J	J-	U	UJ	U*
Conventional Paran					0			Ŭ									0					
All Plant Tissue																						
Solids	174	0	174	174	174	0	0	174	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Metals/Metalloids																						
All Plant Tissue																						
Aluminum	174	0	174	0	155	18	1	0	13	148	0	1	12	89	10	1	0	7	85	0	1	7
Antimony	174	0	174	58	58	62	54	58	59	0	54	0	3	33	36	31	33	34	0	31	0	2
Arsenic	174	0	174	41	41	87	46	41	87	0	46	0	0	24	50	26	24	50	0	26	0	0
Barium	174	0	174	174	174	0	0	174	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Beryllium	174	0	174	14	14	21	139	14	21	0	139	0	0	8	12	80	8	12	0	80	0	0
Cadmium	174	0	174	151	151	22	1	151	22	0	1	0	0	87	13	1	87	13	0	1	0	0
Chromium	174	0	174	128	128	43	3	128	43	0	3	0	0	74	25	2	74	25	0	2	0	0
Cobalt	174	0	174	134	134	36	4	134	36	0	4	0	0	77	21	2	77	21	0	2	0	0
Copper	174	0	174	174	174	0	0	174	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Iron	174	0	174	165	174	0	0	165	9	0	0	0	0	100	0	0	95	5	0	0	0	0
Lead	174	0	174	157	158	14	2	157	10	0	2	0	5	91	8	1	90	6	0	1	0	3
Manganese	174	0	174	174	174	0	0	174	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Mercury	63	0	63	44	62	1	0	44	1	18	0	0	0	98	2	0	70	2	29	0	0	0
Nickel	174	0	174	110	154	20	0	110	20	44	0	0	0	89	11	0	63	11	25	0	0	0
Selenium	174	0	174	0	0	83	91	0	83	0	91	0	0	0	48	52	0	48	0	52	0	0
Silver	174	0	174	66	66	74	34	66	49	0	34	0	25	38	43	20	38	28	0	20	0	14
Thallium	174	0	174	52	52	57	65	52	52	0	65	0	5	30	33	37	30	30	0	37	0	3
Vanadium	174	0	174	6	50	82	42	6	82	44	27	15	0	29	47	24	3	47	25	16	9	0
Zinc	174	0	174	174	174	0	0	174	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Black Tree Lichen - E	Bryoria fremon	tii																				
Aluminum	12	0	12	0	12	0	0	0	0	12	0	0	0	100	0	0	0	0	100	0	0	0
Antimony	12	0	12	12	12	0	0	12	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Arsenic	12	0	12	12	12	0	0	12	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Barium	12	0	12	12	12	0	0	12	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Beryllium	12	0	12	0	0	5	7	0	5	0	7	0	0	0	42	58	0	42	0	58	0	0
Cadmium	12	0	12	12	12	0	0	12	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Chromium	12	0	12	12	12	0	0	12	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Cobalt	12	0	12	12	12	0	0	12	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Copper	12	0	12	12	12	0	0	12	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Iron	12	0	12	8	12	0	0	8	4	0	0	0	0	100	0	0	67	33	0	0	0	0
Lead	12	0	12	12	12	0	0	12	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Manganese	12	0	12	12	12	0	0	12	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Nickel	12	0	12	8	12	0	0	8	0	4	0	0	0	100	0	0	67	0	33	0	0	0
Selenium	12	0	12	0	0	12	0	0	12	0	0	0	0	0	100	0	0	100	0	0	0	0
Silver	12	0	12	12	12	0	0	12	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Thallium	12	0	12	8	8	4	0	8	4	0	0	0	0	67	33	0	67	33	0	0	0	0
Vanadium	12	0	12	0	12	0	0	0	0	12	0	0	0	100	0	0	0	0	100	0	0	0
Zinc	12	0	12	12	12	0	0	12	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Camas - Camassia q										-								-				
Aluminum	12	0	12	0	12	0	0	0	0	12	0	0	0	100	0	0	0	0	100	0	0	0
Antimony	12	0	12	12	12	0	0	12	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Arsenic	12	0	12	9	9	3	0	9	3	0	0	0	0	75	25	0	75	25	0	0	0	0
Barium	12	0	12	12	12	0	0	12	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Beryllium	12	0	12	3	3	9	0	3	9	0	0	0	0	25	75	0	25	75	0	0	0	0
Cadmium	12	0	12	12	12	0	0	12	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Chromium	12	0	12	10	10	2	0	10	2	0	0	0	0	83	17	0	83	17	0	0	0	0
Cobalt	12	0	12	12	12	0	0	12	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Copper	12	0	12	12	12	0	0	12	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Iron	12	0	12	12	12	0	0	12	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Lead	12	0	12	12	12	0	0	12	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Manganese	12	0	12	12	12	0	0	12	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Nickel	12	0	12	12	12	0	0	12	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Selenium	12	0	12	0	0	8	4	0	8	0	4	0	0	0	67	33	0	67	0	33	0	0
Silver	12	0	12	12	12	0	0	12	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Thallium	12	0	12	12	12	0	0	12	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Vanadium	12	0	12	0	11	1	0	0	1	11	0	0	0	92	8	0	0	8	92	0	0	0
Zinc	12	0	12	12	12	0	0	12	0	0	0	0	0	100	0	0	100	0	0	0	0	0
ZINC	12	U	12	12	12	U	U	12	U	U	U	U	U	100	U	U	100	U	U	U	U	(

	Number of	Number of Rejected	Number of Accepted	Count of Results with	Count Results L	of Acce aborato		Coun	t of Acc	epted Re	sults Val	lidator Fl	ags	Laborate Accep	ory Flag oted Res		Val	dator Fl	ags, % c	of Accepte	ed Result	ts
Analvte	Samples	Results	Results	No Flags	No Flag	J	U	No Flag	J	J-	U	UJ	U*	No Flag	J	U	No Flag	J	J-	U	UJ	U*
Metals/Metalloids (rtoouno	rtoouno	nornago	5	-		5	-		-		-	<u> </u>		-	<u> </u>	-	-			
Chokecherry - Prunu																						
Aluminum	14	0	14	0	9	5	0	0	4	6	0	0	4	64	36	0	0	29	43	0	0	29
Antimony	14	0	14	0	0	3	11	0	2	0	11	0	1	0	21	79	0	14	0	79	0	7
Arsenic	14	0	14	0	0	1	13	0	1	0	13	0	0	0	7	93	0	7	0	93	0	0
Barium	14	0	14	14	14	0	0	14	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Beryllium	14	0	14	0	0	0	14	0	0	0	14	0	0	0	0	100	0	0	0	100	0	0
	14	0	14	0	0	13	14	0	13	0	14	0	0	0	93	7	0	93	0	7	0	0
Cadmium Chromium	14	0	14	4	4	10	0	4	10	0	0	0	0	29	71	0	29	71	0	0	0	0
Cobalt	14	0	14	0	0	14	0	0	14	0	0	0	0	0	100	0	0	100	0	0	0	0
Copper	14	0	14	14	14	0	0	14	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Iron	14	0	14	14	14	0	0	14	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Lead	14	0	14	14	14	1	0	14	0	0	0	0	1	93	7	0	93	0	0	0	0	7
		•					•	13	-		•	•			•	-		0	•	0	•	
Manganese	14	0	14	14	14	0	0	14	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Nickel	14	0	14	10 0	<u>14</u> 0	0			0	4	-	0	0	100	0	0	71	-	29	-	0	
Selenium	14	0	14	0	0	0	14 8	0	-		14	0	0	0	0		0	0	0	100	0	0
Silver Thallium	14	0	14	0	0	6 8	8	0	3	0	8	0	3	0	43 57	57 43	0	21 50	0	57 43	0	21
		-		-	-		-		-		-	-		-			-		-			
Vanadium	14	0	14	0	0	1	13	0	1	0	9	4	0	0	7	93	0	7	0	64	29	0
Zinc	14	0	14	14	14	0	0	14	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Hazelnut - Corylus c						40							-									
Aluminum	14	0	14	0	0	13	1	0	9	0	0	1	4	0	93		0	64	0	0		29
Antimony	14	0	14	0	0	2	12	0	2	0	12	0	0	0	14	86	0	14	0	86	0	0
Arsenic	14	0	14	0	0	2	12	0	2	0	12	0	0	0	14	86	0	14	0	86	0	0
Barium	14	0	14	14	14	0	0	14	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Beryllium	14	0	14	0	0	0	14	0	0	0	14	0	0	0	0	100	0	0	0	100	0	0
Cadmium	14	0	14	11	11	3	0	11	3	0	0	0	0	79	21	0	79	21	0	0	0	0
Chromium	14	0	14	7	7	6	1	7	6	0	1	0	0	50	43	7	50	43	0	7	0	0
Cobalt	14	0	14	10	10	4	0	10	4	0	0	0	0	71	29	0	71	29	0	0	0	0
Copper	14	0	14	14	14	0	0	14	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Iron	14	0	14	14	14	0	0	14	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Lead	14	0	14	0	1	11	2	0	9	0	2	0	3	7	79	14	0	64	0	14	0	21
Manganese	14	0	14	14	14	0	0	14	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Nickel	14	0	14	6	14	0	0	6	0	8	0	0	0	100	0	0	43	0	57	0	0	0
Selenium	14	0	14	0	0	3	11	0	3	0	11	0	0	0	21	79	0	21	0	79	0	0
Silver	14	0	14	0	0	8	6	0	2	0	6	0	6	0	57	43	0	14	0	43	0	43
Thallium	14	0	14	0	0	1	13	0	1	0	13	0	0	0	7	93	0	7	0	93	0	0
Vanadium	14	0	14	0	0	3	11	0	3	0	11	0	0	0	21	79	0	21	0	79	0	0
Zinc	14	0	14	14	14	0	0	14	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Huckleberry - Vaccir	nium cespitosun																					
Aluminum	6	0	6	0	6	0	0	0	0	6	0	0	0	100	0	0	0	0	100	0	0	0
Antimony	6	0	6	0	0	3	3	0	3	0	3	0	0	0	50	50	0	50	0	50	0	0
Arsenic	6	0	6	0	0	3	3	0	3	0	3	0	0	0	50	50	0	50	0	50	0	0
Barium	6	0	6	6	6	0	0	6	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Beryllium	6	0	6	0	0	0	6	0	0	0	6	0	0	0	0	100	0	0	0	100	0	0
Cadmium	6	0	6	6	6	0	0	6	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Chromium	6	0	6	0	0	4	2	0	4	0	2	0	0	0	67	33	0	67	0	33	0	0
Cobalt	6	0	6	1	1	1	4	1	1	0	4	0	0	17	17	67	17	17	0	67	0	0
Copper	6	0	6	6	6	0	0	6	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Iron	6	0	6	6	6	0	0	6	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Lead	6	0	6	6	6	0	0	6	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Manganese	6	0	6	6	6	0	0	6	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Nickel	6	0	6	0	4	2	0	0	2	4	0	0	0	67	33	0	0	33	67	0	0	0
Selenium	6	0	6	0	0	0	6	0	0	0	6	0	0	0	0	100	0	0	0	100	0	0
Silver	6	0	6	0	0	4	2	0	4	0	2	0	0	0	67	33	0	67	0	33	0	0
Thallium	6	0	6	0	0	0	6	0	0	0	6	0	0	0	0	100	0	0	0	100	0	0
Vanadium	6	0	6	0	0	0	6	0	0	0	0	6	0	0	0	100	0	0	0	0	100	0
Zinc	6	0	6	6	6	0	0	6	0	0	0	0	0	100	0	0	100	0	0	0	0	0
	-		-	-	-			-			1				1							

	Number of	Number of Rejected	Number of Accepted	Count of Results with	Count Results La	of Acce aborato		Coun	t of Acce	epted Re	sults Vali	dator FI	ags	Laborato Accep	ory Flage		Vali	dator Fl	ags, % o	f Accepte	ed Resul	ts
Analyte	Samples	Results	Results	No Flags	No Flag	J	U	No Flag	J	J-	U	UJ	U*	No Flag	J	U	No Flag	J	J-	U	UJ	U*
Metals/Metalloids (d	continued)																					
Kinnikinnick - Arctosi	taphylos uva-ui	rsi																				
Aluminum	16	0	16	0	16	0	0	0	0	16	0	0	0	100	0	0	0	0	100	0	0	0
Antimony	16	0	16	4	4	12	0	4	12	0	0	0	0	25	75	0	25	75	0	0	0	0
Arsenic	16	0	16	0	0	16	0	0	16	0	0	0	0	0	100	0	0	100	0	0	0	0
Barium	16	0	16	16	16	0	0	16	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Beryllium	16	0	16	0	0	1	15	0	1	0	15	0	0	0	6	94	0	6	0	94	0	0
Cadmium	16	0	16	16	16	0	0	16	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Chromium	16	0	16	5	5	11	0	5	11	0	0	0	0	31	69	0	31	69	0	0	0	0
Cobalt	16	0	16	7	7	9	0	7	9	0	0	0	0	44	56	0	44	56	0	0	0	0
Copper	16	0	16	16	16	0	0	16	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Iron	16	0	16	16	16	0	0	16	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Lead	16	0	16	16	16	0	0	16	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Manganese	16	0	16	16	16	0	0	16	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Mercury	16	0	16	2	15	1	0	2	1	13	0	0	0	94	6	0	13	6	81	0	0	0
Nickel	16	0	16	4	4	12	0	4	12	0	0	0	0	25	75	0	25	75	0	0	0	0
Selenium	16	0	16	0	0	3	13	0	3	0	13	0	0	0	19	81	0	19	0	81	0	0
Silver	16	0	16	10	10	6	0	10	6	0	0	0	0	63	38	0	63	38	0	0	0	0
Thallium	16	0	16	2	2	12	2	2	12	0	2	0	0	13	75	13	13	75	0	13	0	0
Vanadium	16	0	16	0	0	16	0	0	16	0	0	0	0	0	100	0	0	100	0	0	0	0
Zinc	16	0	16	16	16	0	0	16	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Lomatium - Lomatium																						
Aluminum	12	0	12	0	12	0	0	0	0	12	0	0	0	100	0	0	0	0	100	0	0	0
Antimony	12	0	12	12	12	0	0	12	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Arsenic	12	0	12	12	12	0	0	12	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Barium	12	0	12	12	12	0	0	12	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Beryllium	12	0	12	10	10	1	1	10	1	0	1	0	0	83	8	8	83	8	0	8	0	0
Cadmium	12	0	12	12	12	0	0	12	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Chromium	12	0	12	12	12	0	0	12	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Cobalt	12	0	12	12	12	0	0	12	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Copper	12	0	12	12	12	0	0	12	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Iron	12	0	12	9	12	0	0	9	3	0	0	0	0	100	0	0	75	25	0	0	0	0
Lead	12	0	12	12	12	0	0	12	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Manganese	12	0	12	12	12	0	0	12	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Nickel	12	0	12	7	12	0	0	/	0	5	0	0	0	100	0	0	58	0	42	0	0	0
Selenium	12	0	12	0	0	11	1	0	11	0	1	0	0	0	92	8	0	92	0	8	0	0
Silver	12	0	12	12	12	0	0	12	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Thallium	12	0	12	12	12	0	0	12	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Vanadium	12	0	12	0	12	0	0	0	0	12	0	0	0	100	0	0	0	0	100	0	0	0
Zinc	12	0	12	12	12	0	0	12	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Ponderosa Pine - Pir		0	10	0	40	0	0	0	0	10	0	0	0	100	-	0	0	0	100	0	0	
Aluminum	13	0	13	0	13	0	0	0	0	13	0	0	0	100	0	0	0	•	100	•	0	0
Antimony	13	0	13	3	3	3	7	3	3	0	7	0	0	23	23	54	23	23	0	54	0	0
Arsenic	13	-	13	0	0	13	-	0	13	0	0	0	0	0	100	0	0	100	0	0	0	0
Barium	13	0	13	13	13	0	0	13	0	0	0	0	0	100	0	0	100	0	•	•	•	0
Beryllium	13	0	13	0	0	0	13	0	0	0	13	0	0	0	0	100	0	0	0	100	0	0
Cadmium	13	0	13	13	13	0	0	13	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Chromium	13	0	13	12	12	1	0	12	1	0	0	0	0	92	8	0	92	8	0	•	0	0
Cobalt	13	0	13	13	13	0	0	13	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Copper	13	0	13	13	13	0	0	13	0	0	0	0	0	100 100	0	0	100	0	0	0	0	0
Iron	13	0	13	13	13	0	•	13	1	-		-	1		-	•	100	•	•	•	•	
Lead	13	0	13	11	11	2	0	11	1	0	0	0	1	85	15	0	85	8	0	0	0	8
Manganese	13	0	13	13	13	0	0	13	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Nickel	13	0	13	9	13	0	0	9	0	4	0	0	0	100	0	0	69	0	31	0	0	0
Selenium	13	0	13	0	0	0	13	0	0	0	13	0	0	0	0	100	0	0	0	100	0	0
Silver	13	0	13	2	2	5	6	2	0	0	6	0	5	15	38	46	15	0	0	46	0	38
Thallium	13	0	13	0	0	3	10	0	0	•	10	0	3	0	23	77	0	•	•	77	•	23
Vanadium	13	0	13	0	0	12	1	0	12	0	0	1	0	0	92	8	0	92	0	0	8	0
Zinc	13	0	13	13	13	0	0	13	0	0	0	0	0	100	0	0	100	0	0	0	0	0

Number of Rejected Results in Telesions Junction Processor Instantion Proge Locating Accessor Instantion Locating Accessor Instantion <thlocatinstantion< th=""> Locatinstantion</thlocatinstantion<>	pted Results	d Resu	esults	
Servicency - Arrestory: a result of the service of the ser	UJ	UJ	JL	U*
Aluminyini 13 0 13 0 <t< td=""><td></td><td></td><td></td><td></td></t<>				
Animony 13 0 13 1 1 7 5 1 5 0 2 8 64 38 0 38 0 38 0 38 0 38 0 38 0 38 0 38 0				
Asson 13 0 13 0 8 5 0 8 0 62 38 0 62 38 0 62 0 <t< td=""><td>0</td><td>0</td><td>3</td><td>31</td></t<>	0	0	3	31
Barkum 13 0 13 0 0 0 0 </td <td>0</td> <td>0</td> <td>1</td> <td>15</td>	0	0	1	15
Berglium 13 0 13 0 0 13 0 0 13 0 0 100 0 0 <	0	0	(0
Cadmint 13 0 13 13 13 13 0 13 0 0 <t< td=""><td>0</td><td>0</td><td>(</td><td>0</td></t<>	0	0	(0
Chromum 13 0 13 0 13 0 13 0 <th< td=""><td>0</td><td>0</td><td>(</td><td>0</td></th<>	0	0	(0
Cobalt 13 0 13 0 13 0	0	0	(0
Copper 13 0 13 13 0 13 0 0 0 0 0 100 0 0 100 0 <	0			0
icn 13 0 13 13 13 0 0 13 0<	0			0
Lead 13 0 13 13 13 13 0 0 13 0	0			0
Manganese 13 13 13 0 0 0 0 100 0 <	0			0
Identify 3 3 3 3 0 0 0 0 100 0	0	-		0
Nickef 13 0 13 0 0 1 0 0 0 0 92 0 8 0 Silver 13 0 13 1 1 10 2 0 1 0 0 0 15 85 0 55 Silver 13 0 13 0 0 0 13 0 0 13 0 0 13 0 0 13 0 0 13 0 0 13 0 0 13 0 0 13 0 0 13 0 0 13 0	0	-		0
Selection 13 0 13 1 10 2 1 0 1 0 15 0 15 0 15 0 15 0 15 0 15 0 15 0 15 0 10 0 0 0 13 0 13 0 0 0 13 0 0 13 0 0 13 0	0			0
Silver 13 0 13 1 1 10 2 1 6 0 2 0 4 8 77 15 8 46 0 15 Vanadium 13 0 13 0 0 13 0 0 13 0	0			0
Thailum 13 0 13 0 13 0 0 13 0 0 13 0 0 13 0 0 13 0 0 13 0 0 13 0 0 13 0	0			0
Vanadum 13 0 13 0 5 8 0 5 0 4 4 0 0 86 20 88 0 51 Zinc 13 0 12 0 12 0	0	-	-	31
Zinc 13 0 13 13 0 0 10 0<	0			0
Spring Beaulylindian Potato - <i>Cisytonia lanceolata</i>	31			0
Aluminum 12 0 12 0 0 12 0 0 100 <	0	0	(0
Antennor 12 0 12 12 0 0 12 0 0 0 100 0				
Arsenic 12 0 12 8 8 4 0 8 4 0 0 0 67 33 0 67 33 0 0 Baryllum 12 0 12 1 1 4 7 1 4 0 7 0 0 833 58 8 33 0 58 Cadmium 12 0 12 12 12 0 0 12 0 0 0 0 0 100 0 0 100 0 0 100 0	0			0
Barum 12 0 12 12 0 0 0 0 00 0 00 0 00 0 00 0 </td <td>0</td> <td></td> <td></td> <td>0</td>	0			0
Beryllium 12 0 12 1 1 4 7 1 4 0 7 0 0 8 33 58 8 33 0 58 Cadmium 12 0 12 12 12 12 12 0 10 0 0 100 0 100 0 100 0 100 0 100 0 100 0 100 0 100 0 100 0	0	-		0
Cadimum 12 0 12 12 0 12 0 <th< td=""><td>0</td><td></td><td></td><td>0</td></th<>	0			0
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	Number of	Number of Rejected	Number of Accepted	Count of Results with	Count Results La	of Acce aborato	•	Cour	nt of Acc	epted Re	sults Val	idator Fla	ags	Laborato Accep	ory Flag		Vali	dator F	lags, % c	of Accept	ed Resul	ts
Analyte	Samples	Results	Results	No Flags	No Flag	J	U	No Flag	J	J-	U	UJ	U*	No Flag	J	U	No Flag	J	J-	U	UJ	U*
Metals/Metalloids (co	ontinued)																					
Willow - Salix exigua																						
Aluminum	14	0	14	0	14	0	0	0	0	14	0	0	0	100	0	0	0	0	100	0	0	0
Antimony	14	0	14	0	0	7	7	0	7	0	7	0	0	0	50	50	0	50	0	50	0	0
Arsenic	14	0	14	0	0	10	4	0	10	0	4	0	0	0	71	29	0	71	0	29	0	0
Barium	14	0	14	14	14	0	0	14	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Beryllium	14	0	14	0	0	0	14	0	0	0	14	0	0	0	0	100	0	0	0	100	0	0
Cadmium	14	0	14	14	14	0	0	14	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Chromium	14	0	14	13	13	1	0	13	1	0	0	0	0	93	7	0	93	7	0	0	0	0
Cobalt	14	0	14	14	14	0	0	14	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Copper	14	0	14	14	14	0	0	14	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Iron	14	0	14	14	14	0	0	14	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Lead	14	0	14	14	14	0	0	14	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Manganese	14	0	14	14	14	0	0	14	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Mercury	14	0	14	9	14	0	0	9	0	5	0	0	0	100	0	0	64	0	36	0	0	0
Nickel	14	0	14	14	14	0	0	14	0	0	0	0	0	100	0	0	100	0	0	0	0	0
Selenium	14	0	14	0	0	13	1	0	13	0	1	0	0	0	93	7	0	93	0	7	0	0
Silver	14	0	14	3	3	11	0	3	4	0	0	0	7	21	79	0	21	29	0	0	0	50
Thallium	14	0	14	6	6	6	2	6	5	0	2	0	1	43	43	14	43	36	0	14	0	7
Vanadium	14	0	14	0	0	11	3	0	11	0	3	0	0	0	79	21	0	79	0	21	0	0
Zinc	14	0	14	14	14	0	0	14	0	0	0	0	0	100	0	0	100	0	0	0	0	0

Laboratory

J - The result is an estimated value that was detected between the detection limit (DL) and the reporting limit (RL).

U - The analyte was analyzed for, but was not detected at or above the method reporting limit/method detection limit (MRL/MDL).

Validator

J - Quantitation is approximate due to limitations identified during the quality assurance (QA) review (data validation).

J- - The result is considered estimated and may be biased low.

U - The analyte was analyzed for, but was not detected at or above the MRL/MDL.

UJ - The result is not detected and the DL is considered approximate due to bias identified during data validation.

U* - The result is considered not detected because a similar concentration was detected in an associated blank sample.

Table 4-3. Summary of Qualifiers Applied to Soil Data

	Number of	Number of Rejected	Number of Accepted	Count of Results with	Count of A Results La Flaç	boratory		of Acce Validato	pted Re r Flags	sults	Laboratory % of Acc Resu	cepted	Validato	or Flags, Res	% of Ac ults	cepted
Analyte	Samples	Results	Results	No Flags	No Flag	J	No Flag	J	J+	U*	No Flag	J	No Flag	J	J+	U*
Conventional Parameters																
Solids	174	0	174	174	174	0	174	0	0	0	100	0	100	0	0	0
Metals/Metalloids																
Aluminum	174	0	174	172	174	0	172	2	0	0	100	0	99	1	0	0
Antimony	174	0	174	0	174	0	0	174	0	0	100	0	0	100	0	0
Arsenic	174	0	174	172	174	0	172	2	0	0	100	0	99	1	0	0
Barium	174	0	174	163	174	0	163	11	0	0	100	0	94	6	0	0
Beryllium	174	0	174	143	174	0	143	31	0	0	100	0	82	18	0	0
Cadmium	174	0	174	141	174	0	141	33	0	0	100	0	81	19	0	0
Chromium	174	0	174	165	174	0	165	9	0	0	100	0	95	5	0	0
Cobalt	174	0	174	127	174	0	127	9	38	0	100	0	73	5	22	0
Copper	174	0	174	158	174	0	158	16	0	0	100	0	91	9	0	0
Iron	174	0	174	172	174	0	172	2	0	0	100	0	99	1	0	0
Lead	174	0	174	168	174	0	168	6	0	0	100	0	97	3	0	0
Manganese	174	0	174	172	174	0	172	2	0	0	100	0	99	1	0	0
Mercury	63	0	63	61	63	0	61	2	0	0	100	0	97	3	0	0
Nickel	174	0	174	149	174	0	149	25	0	0	100	0	86	14	0	0
Selenium	174	0	174	69	69	105	69	105	0	0	40	60	40	60	0	0
Silver	174	0	174	116	174	0	116	58	0	0	100	0	67	33	0	0
Thallium	174	0	174	127	174	0	127	31	0	16	100	0	73	18	0	9
Vanadium	174	0	174	174	174	0	174	0	0	0	100	0	100	0	0	0
Zinc	174	0	174	170	174	0	170	4	0	0	100	0	98	2	0	0

Notes:

Laboratory

J - The result is an estimated value that was detected between the detection limit (DL) and the reporting limit (RL).

Validator

J - The result is considered estimated due to limitations identified during the quality assurance (QA) review (data validation).

J+ - The result is considered estimated and may be biased high.

U* - The result is considered not detected because a similar concentration was detected in an associated blank sample.

Table 5-1a. Summary of Black Tree Lichen (Bryoria fremontii) and Co-Located Soil Samples

				ant Tissue Samp					cated Soil Sa		
Analyte	High or Lower Lead Area ^a	Number of Samples ^b	Number of Detected Values	Minimum Detected Values	Mean Detected Values	Maximum Detected Values	Number of Samples ^b	Number of Detected Values	Minimum Detected Values	Mean Detected Values	Maximum Detected Values
,	rameters (percent)	•									
Solids	High	6 6	6 6	26.4 87.1	44.5 89.5	68.4 91.2	6 6	6 6	92.6 95.6	94.8 96.2	97.4 96.9
Metals/Metalloids				0111	00.0	0112			00.0	0012	00.0
	High	6	6	214	310	415	6	6	13,300	18,500	27,800
Aluminum	Lower	6	6	98.7	227	354	6	6	8,170	15,963	23,200
	High	6	6	1.37	1.67	1.86	6	6	3.84	16.2	32.7
Antimony	Lower	6	6	0.452	1.12	1.82	6	6	2.95	4.77	7.13
	High	6	6	1.52	1.79	2.17	6	6	25.8	62.6	132
Arsenic	Lower	6	6	0.93	1.39	1.85	6	6	25.0	31.7	39.4
	High	6	6	6.55	9.99	13.5	6	6	242	308	422
Barium	Lower	6	6	17.5	28.0	31.1	6	6	231	362	650
	High	6	3	0.009	0.009	0.01	6	6	0.585	0.714	0.971
Beryllium	Lower	6	2	0.009	0.010	0.011	6	6	0.471	0.63	0.824
	High	6	6	2.79	3.00	3.31	6	6	9.17	24.3	40.0
Cadmium	Lower	6	6	1.49	2.48	3.51	6	6	9.34	10.6	12.7
	High	6	6	0.57	1.07	1.58	6	6	14.9	17.6	19.8
Chromium	Lower	6	6	0.24	0.48	0.66	6	6	18.6	26.9	38.7
<u></u>	High	6	6	0.153	0.189	0.209	6	6	5.85	6.72	7.90
Cobalt	Lower	6	6	0.093	0.141	0.174	6	6	7.58	9.96	12.7
2	High	6	6	4.91	5.57	6.35	6	6	31.6	68.0	111
Copper	Lower	6	6	2.12	4.02	6.12	6	6	42.1	49.9	55.1
	High	6	6	318	430	534	6	6	14,300	16,017	18,000
Iron	Lower	6	6	139	298	418	6	6	11,500	16,313	19,100
	High	6	6	60.3	69.8	78.6	6	6	297	1,121	2,140
Lead	Lower	6	6	16.6	49.7	87.7	6	6	82.4	253	390
	High	6	6	27.7	35.7	40.0	6	6	494	733	1,050
Manganese	Lower	6	6	13.2	20.0	30.5	6	6	287	514	746
N 12 1 1	High	6	6	0.3	0.523	1.18	6	6	12.3	13.8	15.6
Nickel	Lower	6	6	0.23	0.31	0.35	6	6	15.9	28.2	42.6
0.1	High	6	6	0.39	0.4	0.4	6	6	0.46	1.10	1.93
Selenium	Lower	6	6	0.1	0.3	0.4	6	6	0.55	1.03	1.65
Cilver	High	6	6	0.465	0.554	0.73	6	6	0.365	1.04	1.72
Silver	Lower	6	6	0.141	0.349	0.574	6	6	0.544	0.807	1.01
The all lines	High	6	6	0.026	0.050	0.093	6	6	0.38	0.746	1.04
Thallium	Lower	6	6	0.012	0.027	0.045	6	6	0.353	0.388	0.434
	High	6	6	0.77	0.950	1.11	6	6	30.2	34.3	36.7
Vanadium	Lower	6	6	0.38	0.72	0.98	6	6	39.5	54.1	73.9
 -	High	6	6	266	284	310	6	6	353	943	1,670
Zinc	Lower	6	6	95.7	212	346	6	6	209	346	467

Notes:

^a SA01, SA02, and SA03 were designated "high lead" in the QAPP (Ramboll 2018) because the average soil concentrations reported in the 2014 residential soil study (CH2M Hill 2016) were above the timecritical removal action level of 700 mg/kg. The remaining sampling areas (SAs) were designated "lower lead" in the QAPP because the reported soil concentrations were below 700 mg/kg in the soil studies where these SAs were sampled.

^b For samples with a field replicate, summary statistics are based on the average of the field sample and replicate results at that sample location.

Table 5-1b. Summary of Camas (Camassia quamash) and Co-Located Soil Samples

				nt Tissue Samp					cated Soil Sa		
	High or Lower	Number of	Number of Detected	Minimum Detected	Mean Detected	Maximum Detected	Number of	Number of Detected	Minimum Detected	Mean Detected	Maximum Detected
Analyte	Lead Area ^a	Samples ^⁵	Values	Values	Values	Values	Samples [♭]	Values	Values	Values	Values
Conventional Pa	rameters (percent)										
Solids	High	6	6	11.8	20.6	26.4	6	6	93	93.9	94.7
Solids	Lower	6	6	14.1	20.7	26.3	6	6	95.2	96.1	97.4
letals/Metalloid	s (mg/kg dw)										
Aluminum	High	6	6	237	417	894	6	6	13,600	16,500	21,400
Adminum	Lower	6	6	371	485	644	6	6	5,840	15,600	21,200
Antimony	High	6	6	0.435	0.969	1.80	6	6	8.31	11.9	18.8
Anumony	Lower	6	6	0.384	1.01	1.77	6	6	5.97	8.15	13.6
Arsenic	High	6	6	0.48	0.778	1.57	6	6	42.3	55.3	95.3
Algenie	Lower	6	6	0.37	0.887	1.69	6	6	21.8	47.1	81.1
Barium	High	6	6	47.3	82.1	108	6	6	251	294	321
Danum	Lower	6	6	44.6	103	208	6	6	165	237	278
Beryllium	High	6	6	0.008	0.017	0.035	6	6	0.644	0.713	0.764
Deryman	Lower	6	6	0.013	0.017	0.025	6	6	0.375	0.682	0.83
Cadmium	High	6	6	6.14	8.79	11.3	6	6	18.0	21.3	26.4
Caumum	Lower	6	6	4.88	8.30	16.7	6	6	10.3	13.3	18.6
Chromium	High	6	6	0.13	0.522	1.63	6	6	11.0	21.0	32.4
Chromium	Lower	6	6	0.36	0.52	0.74	6	6	17.0	19.2	20.4
Cobalt	High	6	6	0.111	0.222	0.391	6	6	5.11	7.90	10.8
Cobait	Lower	6	6	0.114	0.160	0.219	6	6	5.15	7.01	7.95
Connor	High	6	6	4.69	6.18	8.71	6	6	55.9	85.2	113
Copper	Lower	6	6	5.06	6.41	7.11	6	6	35.6	51.1	80.3
	High	6	6	125	385	1,020	6	6	11,800	15,200	17,300
Iron	Lower	6	6	250	355	503	6	6	8,720	13,600	17,800
Lood	High	6	6	31.6	72.2	114	6	6	751	905	1,450
Lead	Lower	6	6	15.1	45.3	93.6	6	6	206	478	768
	High	6	6	36.4	69.0	134	6	6	593	801	1,060
Manganese	Lower	6	6	31.1	49.3	78.5	6	6	278	467	629
	High	6	6	0.32	0.688	1.23	6	6	9.52	15.9	22.3
Nickel	Lower	6	6	0.35	0.44	0.6	6	6	11.6	15.0	16.5
Calariana	High	6	5	0.03	0.04	0.07	6	6	0.76	0.968	1.16
Selenium	Lower	6	3	0.04	0.05	0.07	6	6	0.51	0.690	1.02
0.1	High	6	6	0.06	0.0770	0.101	6	6	0.574	0.927	1.50
Silver	Lower	6	6	0.037	0.0708	0.154	6	6	0.525	0.666	0.857
The allie was	High	6	6	0.048	0.172	0.368	6	6	0.505	0.606	0.749
Thallium	Lower	6	6	0.085	0.158	0.309	6	6	0.443	0.498	0.719
	High	6	6	0.18	0.868	2.66	6	6	24.3	36.4	52.6
Vanadium	Lower	6	6	0.52	0.737	1.13	6	6	28.8	35.7	40.2
	High	6	6	221	422	688	6	6	562	682	756
Zinc		-	-				-	-			

Notes:

^a SA01, SA02, and SA03 were designated "high lead" in the QAPP (Ramboll 2018) because the average soil concentrations reported in the 2014 residential soil study (CH2M Hill 2016) were above the timecritical removal action level of 700 mg/kg. The remaining sampling areas (SAs) were designated "lower lead" in the QAPP because the reported soil concentrations were below 700 mg/kg in the soil studies where these SAs were sampled.

^b For samples with a field replicate, summary statistics are based on the average of the field sample and replicate results at that sample location.

Table 5-1c. Summary of Chokecherry (Prunus virginiana) and Co-Located Soil Samples

			Pla	ant Tissue Sam	oles			Co-Loo	cated Soil Sa	amples	
Analyte	High or Lower Lead Area ^a	Number of Samples ^b	Number of Detected Values	Minimum Detected Values	Mean Detected Values	Maximum Detected Values	Number of Samples ^b	Number of Detected Values	Minimum Detected Values	Mean Detected Values	Maximum Detected Values
,	rameters (percent)										
0.111	High	6	6	25.3	28.6	35.6	6	6	95.3	96.2	97.5
Solids	Lower	6	6	23.3	26.8	36.7	6	6	96.3	97.6	99.5
Metals/Metalloid	s (mg/kg dw)										
A	High	6	6	1.30	2.53	3.70	6	6	12,700	17,200	24,300
Aluminum	Lower	6	2	6.55	6.88	7.20	6	6	9,790	15,800	23,400
A	High	6	2	0.005	0.006	0.007	6	6	2.99	7.95	10.6
Antimony	Lower	6	0	NA	NA	NA	6	6	0.598	2.73	5.36
A	High	6	1	0.03	0.03	0.03	6	6	23.3	31.5	37.6
Arsenic	Lower	6	0	NA	NA	NA	6	6	5.90	21.0	33.9
Barium	High	6	6	5.79	10.2	17.0	6	6	196	306	381
Barium	Lower	6	6	2.20	5.28	12.6	6	6	108	227	298
D	High	6	0	NA	NA	NA	6	6	0.458	0.633	0.84
Beryllium	Lower	6	0	NA	NA	NA	6	6	0.4	0.572	0.692
<u> </u>	High	6	6	0.003	0.005	0.008	6	6	10.8	19.9	25.6
Cadmium	Lower	6	5	0.004	0.004	0.005	6	6	1.79	8.09	10.00
o	High	6	6	0.05	0.15	0.29	6	6	10.4	14.2	21.1
Chromium	Lower	6	6	0.04	0.072	0.25	6	6	12.9	22.7	31.6
o	High	6	6	0.007	0.0097	0.012	6	6	4.38	6.49	9.25
Cobalt	Lower	6	6	0.005	0.010	0.016	6	6	4.28	6.93	8.82
~	High	6	6	1.46	3.64	6.05	6	6	51.0	71.4	120
Copper	Lower	6	6	2.46	3.33	4.70	6	6	11.5	34.0	42.4
•	High	6	6	10.2	11.1	13.5	6	6	11,900	14,900	19,200
Iron	Lower	6	6	8.00	11.1	13.1	6	6	13,900	19,300	23,500
	High	6	6	0.035	0.044	0.053	6	6	441	857	1,170
Lead	Lower	6	5	0.037	0.056	0.15	6	6	75.6	331	466
	High	6	6	8.05	10.2	13.5	6	6	549	1,022	1,690
Manganese	Lower	6	6	4.18	6.77	8.72	6	6	282	798	1,120
	High	6	6	0.25	0.55	0.74	6	6	9.06	13.2	18.9
Nickel	Lower	6	6	0.26	0.559	1.19	6	6	9.60	15.4	20.1
_	High	6	0	NA	NA	NA	6	6	0.4	0.7	0.9
Selenium	Lower	6	0	NA	NA	NA	6	6	0.2	0.5	0.6
0.1	High	6	0	NA	NA	NA	6	6	0.479	0.889	1.32
Silver	Lower	6	2	0.003	0.004	0.004	6	6	0.124	0.519	1.32
	High	6	2	0.002	0.003	0.005	6	6	0.457	0.563	0.702
Thallium	Lower	6	4	0.002	0.002	0.003	6	6	0.24	0.351	0.536
	High	6	0	NA	NA	NA	6	6	18.9	23.7	31.8
Vanadium	Lower	6	1	0.02	0.02	0.02	6	6	22.6	33.0	41.7
	High	6	6	3.02	3.99	5.92	6	6	496	790	1,070
Zinc	Lower	6	6	2.66	3.72	6.93	6	6	116	398	513

Notes:

^a SA01, SA02, and SA03 were designated "high lead" in the QAPP (Ramboll 2018) because the average soil concentrations reported in the 2014 residential soil study (CH2M Hill 2016) were above the timecritical removal action level of 700 mg/kg. The remaining sampling areas (SAs) were designated "lower lead" in the QAPP because the reported soil concentrations were below 700 mg/kg in the soil studies where these SAs were sampled.

^b For samples with a field replicate, summary statistics are based on the average of the field sample and replicate results at that sample location.

NA - not applicable

Table 5-1d. Summary of Hazelnut (Corylus cornuta) and Co-Located Soil Samples

			Pla	int Tissue Sam				Co-Loo	cated Soil S	amples	
Analvte	High or Lower Lead Area ^a	Number of Samples ^b	Number of Detected Values	Minimum Detected Values	Mean Detected Values	Maximum Detected Values	Number of Samples ^b	Number of Detected Values	Minimum Detected Values	Mean Detected Values	Maximum Detected Values
,	rameters (percent)						-				
	High	6	6	70.1	75.1	79.9	6	6	96.4	97.5	98.6
Solids	Lower	6	6	66.2	71.9	73.9	6	6	95.3	97.4	98.7
Metals/Metalloid	ls (mg/kg dw)										
	High	6	5	0.4	0.792	1.20	6	6	12,600	17,783	25,900
Aluminum	Lower	6	3	0.6	0.7	0.8	6	6	9,210	13,474	18,000
A	High	6	1	0.008	0.008	0.008	6	6	2.59	4.76	12.9
Antimony	Lower	6	1	0.007	0.007	0.007	6	6	2.16	5.98	12.5
Araania	High	6	0	NA	NA	NA	6	6	21.0	29.6	40.7
Arsenic	Lower	6	1	0.03	0.03	0.03	6	6	17.9	29.2	43.4
Dorium	High	6	5	9.02	15.9	25.9	6	6	123	260	426
Barium	Lower	6	6	9.54	15.9	28.6	6	6	78.7	205	324
Dondlium	High	6	0	NA	NA	NA	6	6	0.453	0.67	0.896
Beryllium	Lower	6	0	NA	NA	NA	6	6	0.362	0.567	0.862
Cadmium	High	6	6	0.02	0.047	0.093	6	6	6.29	16.3	50.4
Caumum	Lower	6	6	0.017	0.0461	0.126	6	6	4.98	13.0	19.5
Ohmennikum	High	6	6	0.05	1.80	3.84	6	6	15.4	23.4	28.8
Chromium	Lower	6	5	0.07	0.159	0.245	6	6	12.6	25.3	44.2
O - h - h	High	6	6	0.013	0.044	0.075	6	6	5.11	8.51	11.4
Cobalt	Lower	6	6	0.012	0.026	0.046	6	6	3.59	7.53	12.0
Conner	High	6	6	10.1	13.1	14.9	6	6	21.5	69.5	195
Copper	Lower	6	6	7.80	11.6	15.6	6	6	33.8	53.0	71.9
1	High	6	6	32.3	38.5	42.2	6	6	15,900	20,133	23,300
Iron	Lower	6	6	21.8	30.7	40.9	6	6	12,650	19,625	29,300
Lood	High	6	4	0.006	0.0077	0.012	6	6	267	736	2,410
Lead	Lower	6	4	0.003	0.005	0.01	6	6	228	637	1,125
Manganaga	High	6	6	39.6	55.2	95.4	6	6	530	1,135	2,240
Manganese	Lower	6	6	34.3	99.2	236	6	6	367	863	1,250
Niekel	High	6	6	0.58	2.43	3.73	6	6	11.2	19.3	24.1
Nickel	Lower	6	6	0.62	1.26	2.11	6	6	8.98	17.6	29.5
Calanium	High	6	0	NA	NA	NA	6	6	0.3	0.608	1.05
Selenium	Lower	6	3	0.1	0.1	0.1	6	6	0.5	0.739	1.20
Cilver	High	6	0	NA	NA	NA	6	6	0.285	0.759	2.46
Silver	Lower	6	2	0.004	0.005	0.005	6	6	0.251	0.545	0.697
Thellium	High	6	0	NA	NA	NA	6	6	0.322	0.531	1.12
Thallium	Lower	6	1	0.011	0.011	0.011	6	6	0.329	0.531	0.797
Vanadium	High	6	2	0.03	0.03	0.03	6	6	28.3	33.6	39.0
Vanadium	Lower	6	0	NA	NA	NA	6	6	20.1	32.4	47.3
Zine	High	6	6	21.7	27.4	35.0	6	6	363	734	1,845
Zinc	Lower	6	6	16.0	24.3	36.2	6	6	283	564	812

Notes:

^a SA01, SA02, and SA03 were designated "high lead" in the QAPP (Ramboll 2018) because the average soil concentrations reported in the 2014 residential soil study (CH2M Hill 2016) were above the time-critical removal action level of 700 mg/kg. The remaining sampling areas (SAs) were designated "lower lead" in the QAPP because the reported soil concentrations were below 700 mg/kg in the soil studies where these SAs were sampled.

^b For samples with a field replicate, summary statistics are based on the average of the field sample and replicate results at that sample location.

NA - not applicable

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Table 5-1e. Summary of Huckleberry (Vaccinium cespitosum) and Co-Located Soil Samples

				int Tissue Sam				Co-Lo	cated Soil Sa		
	High or Lower	Number of	Number of Detected	Minimum Detected	Mean Detected	Maximum Detected	Number of	Number of Detected	Minimum Detected	Mean Detected	Maximum Detected
Analyte	Lead Area ^a	Samples ^₅	Values	Values	Values	Values	Samples ^₅	Values	Values	Values	Values
Conventional Pa	arameters (percent)										
Solids	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Lower	6	6	20.7	27.2	36.6	6	6	96.3	97.2	97.8
Aetals/Metalloid											
Aluminum	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Lower	6	6	17.1	21.1	28.1	6	6	11,600	14,017	15,600
Antimony	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
, anamony	Lower	6	3	0.006	0.007	0.01	6	6	4.06	6.42	8.86
Arsenic	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
7400110	Lower	6	3	0.03	0.04	0.04	6	6	35.3	42.8	57.5
Barium	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Danum	Lower	6	6	5.74	7.80	9.29	6	6	104	151	200
Beryllium	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	Lower	6	0	NA	NA	NA	6	6	0.336	0.447	0.503
Cadmium	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Caumum	Lower	6	6	0.156	0.247	0.303	6	6	6.09	8.81	13.6
<u>.</u>	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	Lower	6	4	0.03	0.04	0.04	6	6	13.7	15.0	15.7
0-114	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	Lower	6	2	0.004	0.019	0.034	6	6	4.32	4.93	5.69
0	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	Lower	6	6	2.36	3.08	4.14	6	6	27.4	36.5	44.5
	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	Lower	6	6	5.86	8.08	10.3	6	6	15,900	16,600	17,400
	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	Lower	6	6	0.033	0.048	0.07	6	6	454	861	1,180
	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	Lower	6	6	19.3	27.3	45.0	6	6	228	481	809
	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	Lower	6	6	0.1	0.28	0.58	6	6	11.3	12.3	13.2
	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	Lower	6	0	NA	NA	NA	6	6	0.5	0.6	0.7
	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	Lower	6	4	0.003	0.004	0.005	6	6	0.292	0.497	0.726
	High	0	NA	NA	0.004 NA	0.003 NA	NA	NA	0.232 NA	NA	0.720 NA
Thallium	Lower	6	0	NA	NA	NA	6	6	0.489	0.640	0.821
		0	NA	NA			NA		0.489 NA	NA	0.82 I NA
Vanadium	High	6	0		NA	NA	6 NA	NA			
	Lower	0	NA	NA	NA	NA NA		6	22.7	24.1	25.7
Zinc	High			NA	NA 5.00		NA	NA	NA	NA	NA
	Lower	6	6	3.87	5.32	7.37	6	6	271	421	646

Notes:

^a SA01, SA02, and SA03 were designated "high lead" in the QAPP (Ramboll 2018) because the average soil concentrations reported in the 2014 residential soil study (CH2M Hill 2016) were above the timecritical removal action level of 700 mg/kg. The remaining sampling areas (SAs) were designated "lower lead" in the QAPP because the reported soil concentrations were below 700 mg/kg in the soil studies where these SAs were sampled.

^b For samples with a field replicate, summary statistics are based on the average of the field sample and replicate results at that sample location.

Table 5-1f. Summary of Kinnikinnick (Arctostaphylos uva-ursi) and Co-Located Soil Samples

				ant Tissue Samp		<u>.</u>			cated Soil Sa		
Analyte	High or Lower Lead Areaª	Number of Samples ^b	Number of Detected Values	Minimum Detected Values	Mean Detected Values	Maximum Detected Values	Number of Samples ^b	Number of Detected Values	Minimum Detected Values	Mean Detected Values	Maximun Detected Values
	rameters (percent)	Gumpico	Valueo	Values	Valdeo	Valueo	Cumpico	Values	Valueo	Values	Values
	High	6	6	50.6	51.5	53.5	6	6	93.3	95.1	96.8
Solids	Lower	6	6	47.5	49.9	53.4	6	6	97	97.9	98.4
/letals/Metalloids		0	0	47.5	40.0	55.4	0	0	51	51.5	30.4
	High	6	6	15.5	33.1	68.2	6	6	11,100	16,825	23,800
Aluminum	Lower	6	6	26.5	32.2	44.5	6	6	7,060	8,124	10,310
	High	6	6	0.013	0.034	0.059	6	6	2.73	8.94	17.4
Antimony	Lower	6	6	0.025	0.032	0.052	6	6	2.44	5.77	15.4
	High	6	6	0.04	0.0792	0.155	6	6	37.8	46.0	60.1
Arsenic	Lower	6	6	0.05	0.075	0.11	6	6	17.6	29.3	73.5
	High	6	6	30.2	68.9	144	6	6	144	288	513
Barium	Lower	6	6	38.9	58.4	74.2	6	6	118	168	270
	High	6	1	0.018	0.018	0.018	6	6	0.607	0.838	1.08
Beryllium	Lower	6	0	NA	NA	NA	6	6	0.402	0.549	0.637
	High	6	6	0.038	0.108	0.188	6	6	5.88	15.4	36.7
Cadmium	Lower	6	6	0.098	0.113	0.159	6	6	4.55	7.57	17.7
	High	6	6	0.13	0.238	0.46	6	6	15.9	27.3	37.6
Chromium	Lower	6	6	0.09	0.181	0.25	6	6	14.6	27.1	38.0
	High	6	6	0.014	0.02	0.031	6	6	4.68	10.1	13.4
Cobalt	Lower	6	6	0.015	0.019	0.024	6	6	4.39	7.54	10.1
-	High	6	6	2.28	2.70	3.65	6	6	35.8	72.0	142
Copper	Lower	6	6	2.28	3.01	3.31	6	6	19.2	48.2	58.8
	High	6	6	26.7	34.6	43.9	6	6	14,150	19,117	27,800
Iron	Lower	6	6	28.1	42.4	48.4	6	6	8,220	12,106	14,300
	High	6	6	0.563	1.31	2.36	6	6	160	678	1,730
Lead	Lower	6	6	0.965	1.08	1.47	6	6	126	339	1,004
	High	6	6	10.9	23.5	51.5	6	6	222	855	1,260
Manganese	Lower	6	6	18.3	26.1	50.9	6	6	233	375	430
	High	6	6	0.00192	0.00419	0.00852	6	6	0.0677	0.140	0.212
Mercury ^c	Lower	6	6	0.000780	0.00162	0.00390	6	6	0.0410	0.0811	0.162
NR-11	High	6	6	0.15	0.21	0.3	6	6	11.5	20.5	26.7
Nickel	Lower	6	6	0.13	0.15	0.17	6	6	10.9	18.3	24.5
0.1	High	6	1	0.03	0.03	0.03	6	6	0.56	0.903	1.37
Selenium	Lower	6	1	0.11	0.11	0.11	6	6	0.36	0.716	0.955
Silver	High	6	6	0.007	0.028	0.047	6	6	0.301	0.703	1.24
Silver	Lower	6	6	0.018	0.023	0.033	6	6	0.206	0.360	0.741
Thellium	High	6	4	0.003	0.0085	0.021	6	6	0.293	0.600	0.838
Thallium	Lower	6	6	0.004	0.009	0.023	6	6	0.272	0.457	0.942
Vanadium	High	6	6	0.04	0.05	0.07	6	6	32.7	45.4	54.5
Vanadium	Lower	6	6	0.03	0.1	0.1	6	6	25.6	34.4	40.4
Zine	High	6	6	54.2	92.2	133	6	6	196	503	934
Zinc	Lower	6	6	78.4	102	159	6	6	148	210	396

Notes:

^a SA01, SA02, and SA03 were designated "high lead" in the QAPP (Ramboll 2018) because the average soil concentrations reported in the 2014 residential soil study (CH2M Hill 2016) were above the time-critical removal action level of 700 mg/kg. The remaining sampling areas (SAs) were designated "lower lead" in the QAPP because the reported soil concentrations were below 700 mg/kg in the soil studies where these SAs were sampled.

^b For samples with a field replicate, summary statistics are based on the average of the field sample and replicate results at that sample location.

^c Mercury units were converted to mg/kg from ng/g values reported by ALS.

Table 5-1g. Summary of Lomatium (Lomatium triternatum) and Co-Located Soil Samples

			Pla	ant Tissue Samp	oles			Co-Lo	cated Soil Sa	amples	
Analyte	High or Lower Lead Area ^a	Number of Samples ^b	Number of Detected Values	Minimum Detected Values	Mean Detected Values	Maximum Detected Values	Number of Samples ^b	Number of Detected Values	Minimum Detected Values	Mean Detected Values	Maximum Detected Values
	rameters (percent)						•				
Solids	High	6	6	25.7	27.0	33.3	6	6	91.9	94.5	95.6
Solids	Lower	6	6	21.6	24.9	28.1	6	6	95.6	97.4	98.6
Aetals/Metalloid	s (mg/kg dw)										
Aluminum	High	6	6	136	746	1,360	6	6	12,100	17,720	20,800
	Lower	6	6	1,120	1,365	2,040	6	6	11,600	16,550	22,600
Antimony	High	6	6	0.756	1.45	2.36	6	6	6.96	9.02	14.0
, and monly	Lower	6	6	0.494	0.941	1.49	6	6	2.36	4.56	6.44
Arsenic	High	6	6	0.52	1.17	1.80	6	6	42.7	61.7	76.5
,	Lower	6	6	1.09	1.54	2.03	6	6	21.7	31.3	41.9
Barium	High	6	6	43.7	133	217	6	6	264	355	560
	Lower	6	6	162	209	294	6	6	189	246	287
Beryllium	High	6	5	0.016	0.030	0.046	6	6	0.672	0.926	1.08
,	Lower	6	6	0.039	0.053	0.077	6	6	0.494	0.672	0.915
Cadmium	High	6	6	1.09	5.05	6.95	6	6	19.9	30.1	45.3
	Lower	6	6	1.77	3.89	4.98	6	6	6.18	8.83	12.5
Chromium	High	6	6	0.49	4.52	8.65	6	6	23.9	33.5	40.7
	Lower	6	6	1.52	7.60	18.1	6	6	19.3	31.1	43.5
Cobalt	High	6	6	0.087	0.419	0.536	6	6	10.6	12.4	13.4
	Lower	6	6	0.458	0.744	1.23	6	6	7.20	11.5	14.8
Copper	High	6	6	7.63	10.8	15.1	6	6	84.0	107	214
Coppo.	Lower	6	6	10.3	13.0	16.5	6	6	42.1	48.3	61.1
Iron	High	6	6	118	617	883	6	6	13,500	19,990	23,600
	Lower	6	6	775	1,225	2,030	6	6	15,700	19,083	23,900
Lead	High	6	6	9.82	50.1	74.6	6	6	477	945	1,590
2000	Lower	6	6	7.71	43.0	81.5	6	6	110	278	468
Manganese	High	6	6	43.0	112	204	6	6	892	1,137	1,980
	Lower	6	6	48.0	69.5	88.3	6	6	331	508	786
Nickel	High	6	6	0.74	3.36	3.88	6	6	21.4	26.2	29.3
	Lower	6	6	2.82	7.29	13.7	6	6	15.2	27.8	40.7
Selenium	High	6	5	0.03	0.081	0.12	6	6	0.8	1.09	1.52
Colonian	Lower	6	6	0.05	0.2	0.5	6	6	0.57	0.807	1.18
Silver	High	6	6	0.02	0.139	0.199	6	6	0.889	1.06	1.59
	Lower	6	6	0.081	0.121	0.185	6	6	0.714	0.781	0.84
Thallium	High	6	6	0.06	0.121	0.174	6	6	0.517	0.870	1.05
	Lower	6	6	0.035	0.0883	0.165	6	6	0.357	0.428	0.487
Vanadium	High	6	6	0.39	1.26	1.91	6	6	35.4	49.7	59.7
• Griddium	Lower	6	6	1.72	6.90	16.3	6	6	38.6	59.4	82.1
Zinc	High	6	6	115	247	306	6	6	446	992	2,120
200	Lower	6	6	61.9	164	275	6	6	213	319	464

Notes:

^a SA01, SA02, and SA03 were designated "high lead" in the QAPP (Ramboll 2018) because the average soil concentrations reported in the 2014 residential soil study (CH2M Hill 2016) were above the timecritical removal action level of 700 mg/kg. The remaining sampling areas (SAs) were designated "lower lead" in the QAPP because the reported soil concentrations were below 700 mg/kg in the soil studies where these SAs were sampled.

^b For samples with a field replicate, summary statistics are based on the average of the field sample and replicate results at that sample location.

Table 5-1h. Summary of Ponderosa Pine (Pinus ponderosa) and Co-Located Soil Samples

				ant Tissue Samp					cated Soil Sa		
Analyte	High or Lower Lead Area ^a	Number of Samples ^b	Number of Detected Values	Minimum Detected Values	Mean Detected Values	Maximum Detected Values	Number of Samples ^b	Number of Detected Values	Minimum Detected Values	Mean Detected Values	Maximum Detected Values
Conventional Pa	rameters (percent)										
Solids	High	6	6	67.7	88.2	94.1	6	6	95.1	96.5	97.9
Solias	Lower	6	6	71.9	79.0	90.8	6	6	96.3	97.9	98.8
Metals/Metalloid	s (mg/kg dw)										
A	High	6	6	12.4	42.0	58.9	6	6	12,600	21,889	34,500
Aluminum	Lower	6	6	7.60	17.9	44.8	6	6	11,200	15,750	23,200
Antimony	High	6	4	0.021	0.044	0.067	6	6	6.24	11.5	21.1
Antimony	Lower	6	1	0.026	0.026	0.026	6	6	2.83	6.49	8.83
Araania	High	6	6	0.04	0.1	0.1	6	6	33.5	84.8	142
Arsenic	Lower	6	6	0.03	0.04	0.06	6	6	15.7	42.3	63.3
Barium	High	6	6	0.199	0.647	1.25	6	6	146	276	368
Danum	Lower	6	6	0.169	0.542	0.884	6	6	106	150	208
Dondlium	High	6	0	NA	NA	NA	6	6	0.482	0.81	1.18
Beryllium	Lower	6	0	NA	NA	NA	6	6	0.406	0.528	0.689
0 I ·	High	6	6	0.352	0.828	1.65	6	6	16.2	25.5	34.9
Cadmium	Lower	6	6	0.233	0.720	1.21	6	6	5.00	10.3	18.8
o	High	6	6	0.03	3.92	9.37	6	6	11.6	18.7	29.5
Chromium	Lower	6	6	5.28	8.57	15.0	6	6	12.5	13.8	15.1
0.1.1	High	6	6	0.023	0.0912	0.187	6	6	4.60	8.16	12.9
Cobalt	Lower	6	6	0.089	0.143	0.246	6	6	4.06	4.77	6.07
2	High	6	6	6.51	8.48	15.1	6	6	39.6	81.2	112
Copper	Lower	6	6	6.02	9.13	16.2	6	6	16.5	30.4	41.9
	High	6	6	74.6	92.1	119	6	6	12,500	18,942	23,900
Iron	Lower	6	6	66.4	102	138	6	6	13,000	14,817	17,000
	High	6	6	0.051	0.845	2.23	6	6	509	920	1,515
Lead	Lower	6	5	0.006	0.137	0.583	6	6	237	493	686
	High	6	6	27.2	50.5	73.2	6	6	689	1,218	1,890
Manganese	Lower	6	6	43.3	73.8	123	6	6	182	444	772
	High	6	6	0.98	3.00	5.73	6	6	8.87	16.0	25.9
Nickel	Lower	6	6	3.44	5.36	8.88	6	6	9.13	10.9	12.1
_	High	6	0	NA	NA	NA	6	6	0.6	0.886	1.00
Selenium	Lower	6	0	NA	NA	NA	6	6	0.3	0.5	0.6
0.1	High	6	2	0.015	0.020	0.025	6	6	0.545	0.932	1.12
Silver	Lower	6	0	NA	NA	NA	6	6	0.209	0.495	0.743
-	High	6	0	NA	NA	NA	6	6	0.547	0.952	1.33
Thallium	Lower	6	0	NA	NA	NA	6	6	0.326	0.649	0.977
	High	6	5	0.02	0.046	0.085	6	6	20.0	32.3	43.6
Vanadium	Lower	6	6	0.03	0.1	0.1	6	6	20.3	23.8	26.9
	High	6	6	55.3	74.6	113	6	6	585	1,094	1,810
Zinc	Lower	6	6	55.1	81.5	102	6	6	263	463	920

Notes:

^a SA01, SA02, and SA03 were designated "high lead" in the QAPP (Ramboll 2018) because the average soil concentrations reported in the 2014 residential soil study (CH2M Hill 2016) were above the timecritical removal action level of 700 mg/kg. The remaining sampling areas (SAs) were designated "lower lead" in the QAPP because the reported soil concentrations were below 700 mg/kg in the soil studies where these SAs were sampled.

^b For samples with a field replicate, summary statistics are based on the average of the field sample and replicate results at that sample location.

Table 5-1i. Summary of Sarvisberry (Amelanchier alnifolia) and Co-Located Soil Samples

				ant Tissue Samp					cated Soil Sa		
Analyte	High or Lower Lead Area ^a	Number of Samples ^b	Number of Detected Values	Minimum Detected Values	Mean Detected Values	Maximum Detected Values	Number of Samples ^b	Number of Detected Values	Minimum Detected Values	Mean Detected Values	Maximun Detecteo Values
,	rameters (percent)						· ·				
	High	6	6	80.7	84.4	86.6	6	6	96.4	97.7	98.5
Solids	Lower	6	6	65.5	78.9	88.4	6	6	96.8	98.5	99.0
/letals/Metalloid		0	0	00.0	10.0	00.4			00.0	00.0	00.0
	High	6	6	4.30	8.86	12.3	6	6	11,000	17,610	20,400
Aluminum	Lower	6	3	8.40	8.90	9.10	6	6	10,700	12,339	14,600
	High	6	5	0.006	0.015	0.051	6	6	1.89	4.93	10.9
Antimony	Lower	6	1	0.007	0.007	0.007	6	6	0.67	1.53	2.26
	High	6	4	0.03	0.04	0.04	6	6	23.0	28.3	44.9
Arsenic	Lower	6	3	0.02	0.03	0.04	6	6	7.00	13.6	22.4
	High	6	6	39.1	47.6	57.0	6	6	175	238	282
Barium	Lower	6	6	22.2	32.6	43.2	6	6	165	227	362
	High	6	0	NA	NA	NA	6	6	0.41	0.645	0.754
Beryllium	Lower	6	0	NA	NA	NA	6	6	0.381	0.426	0.499
	High	6	6	0.068	0.142	0.279	6	6	6.24	12.0	25.7
Cadmium	Lower	6	6	0.125	0.143	0.16	6	6	1.43	5.33	12.0
	High	6	6	0.19	0.55	0.85	6	6	10.5	20.4	29.1
Chromium	Lower	6	6	0.16	0.43	0.85	6	6	14.6	24.0	36.3
	High	6	6	0.03	0.04	0.05	6	6	4.49	7.03	9.02
Cobalt	Lower	6	6	0.022	0.041	0.065	6	6	4.22	7.80	12.0
	High	6	6	6.01	58.4	372	6	6	42.0	47.1	60.3
Copper	Lower	6	6	3.78	5.32	8.45	6	6	17.5	28.0	46.0
	High	6	6	18.2	24.2	27.5	6	6	11,600	18,100	23,000
Iron	Lower	6	6	17.3	23.5	27.4	6	6	12,700	17,900	24,200
	High	6	6	0.109	2.42	14.9	6	6	245	474	896
Lead	Lower	6	6	0.037	0.121	0.296	6	6	25.8	147	289
	High	6	6	32.3	39.8	76.4	6	6	599	652	757
Manganese	Lower	6	6	11.3	21.5	30.0	6	6	361	442	488
	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury ^{c,d}	Lower	3	3	0.00144	0.00162	0.00205	3	3	0.0231	0.0414	0.0750
	High	6	6	0.59	0.924	1.08	6	6	8.56	15.0	20.4
Nickel	Lower	6	6	0.72	0.877	1.27	6	6	9.18	22.8	38.7
	High	6	0	NA	NA	NA	6	6	0.3	0.4	0.7
Selenium	Lower	6	2	0.06	0.11	0.16	6	6	0.2	0.489	1.00
	High	6	1	0.045	0.045	0.045	6	6	0.361	0.555	1.02
Silver	Lower	6	5	0.003	0.004	0.005	6	6	0.12	0.448	0.968
	High	6	0	NA	NA	NA	6	6	0.298	0.399	0.642
Thallium	Lower	6	0	NA	NA	NA	6	5	0.292	0.328	0.365
	High	6	2	0.02	0.03	0.04	6	6	17.8	32.1	43.2
Vanadium	Lower	6	3	0.02	0.03	0.04	6	6	20.1	37.8	76.7
	High	6	6	27.5	62.7	237	6	6	20.1	489	771
Zinc	Lower	6	6	16.7	23.6	237	6	6	104	253	433
	Lower	U	U	10.7	23.0	21.3	U	U	104	200	433

Notes:

^a SA01, SA02, and SA03 were designated "high lead" in the QAPP (Ramboll 2018) because the average soil concentrations reported in the 2014 residential soil study (CH2M Hill 2016) were above the timecritical removal action level of 700 mg/kg. The remaining sampling areas (SAs) were designated "lower lead" in the QAPP because the reported soil concentrations were below 700 mg/kg in the soil studies where these SAs were sampled.

^b For samples with a field replicate, summary statistics are based on the average of the field sample and replicate results at that sample location.

^c Mercury analysis was conducted although not specified in the QAPP (Ramboll 2018).

^d Mercury units were converted to mg/kg from ng/g values reported by ALS.

Plant Tissue Study Data Summary Report

Table 5-1j. Summary of Spring Beauty/Indian Potato (Claytonia lanceolata) and Co-Located Soil Samples

			Pla Number of	ant Tissue Samp	Mean	Maximum			cated Soil Sa		Maxim
Analyte	High or Lower Lead Area ^a	Number of Samples ^b	Detected Values	Minimum Detected Values	Detected Values	Detected Values	Number of Samples ^b	Number of Detected Values	Minimum Detected Values	Mean Detected Values	Maximum Detected Values
	rameters (percent)	•									
	High	6	6	25.9	33.6	46.1	6	6	93.3	95.5	96.9
Solids	Lower	6	6	16.4	34.0	50.0	6	6	95.7	97.35	98.5
/letals/Metalloid			-					-			
	High	6	6	51.6	770	3,370	6	6	11,700	17,200	26,600
Aluminum	Lower	6	6	53.8	212	398	6	6	7,990	12,600	21,700
A 11	High	6	6	0.136	1.02	3.70	6	6	6.82	10.1	13.8
Antimony	Lower	6	6	0.064	0.702	1.22	6	6	3.65	5.13	7.04
A	High	6	6	0.28	2.04	8.60	6	6	26.5	48.9	68.8
Arsenic	Lower	6	6	0.15	0.870	1.44	6	6	22.8	31.4	43.4
Barium	High	6	6	6.81	19.4	43.3	6	6	171	277	449
Barium	Lower	6	6	5.40	17.1	29.8	6	6	140	213	274
D a m dlia ma	High	6	3	0.015	0.038	0.104	6	6	0.569	0.828	0.988
Beryllium	Lower	6	2	0.012	0.014	0.016	6	6	0.407	0.650	1.16
O a day is set	High	6	6	1.80	9.78	28.2	6	6	18.0	23.9	35.1
Cadmium	Lower	6	6	1.76	11.8	23.3	6	6	6.33	10.7	17.1
Ohme and is me	High	6	6	0.16	1.42	5.40	6	6	16.0	28.9	42.0
Chromium	Lower	6	6	0.19	0.49	0.95	6	6	14.3	24.6	40.6
O - h - lh	High	6	6	0.054	0.375	1.37	6	6	5.60	9.89	13.6
Cobalt	Lower	6	6	0.026	0.164	0.415	6	6	4.47	7.74	10.3
0	High	6	6	2.59	6.70	17.8	6	6	56.4	87.3	181
Copper	Lower	6	6	2.65	5.38	8.69	6	6	19.3	34.5	52.8
Iron	High	6	6	62.8	855	3,830	6	6	12,100	20,650	28,800
Iron	Lower	6	6	47.7	212	475	6	6	9,680	14,300	19,100
Lead	High	6	6	7.16	87.3	397	6	6	595	1,030	1,500
Leau	Lower	6	6	2.77	23.2	47.0	6	6	169	330	517
Manganasa	High	6	6	16.1	76.9	193	6	6	524	956	1,410
Manganese	Lower	6	6	9.94	46.7	63.8	6	6	329	496	770
Nickel	High	6	6	0.15	1.08	3.74	6	6	12.0	20.3	26.4
NICKEI	Lower	6	6	0.11	0.763	2.14	6	6	10.8	18.5	28.4
Selenium	High	6	3	0.03	0.1	0.3	6	6	0.75	1.12	1.79
	Lower	6	4	0.04	0.05	0.06	6	6	0.38	0.622	1.02
Silver	High	6	6	0.028	0.136	0.447	6	6	0.888	1.01	1.27
Silver	Lower	6	6	0.037	0.116	0.229	6	6	0.178	0.397	0.726
Thallium	High	6	6	0.031	0.268	0.832	6	6	0.541	0.802	1.07
mallium	Lower	6	6	0.055	0.32	0.6	6	6	0.394	0.606	1.39
Vapadium	High	6	6	0.13	1.59	7.21	6	6	29.4	46.5	63.0
Vanadium	Lower	6	6	0.08	0.573	1.64	6	6	25.4	37.1	46.3
Zino	High	6	6	64.1	196	535	6	6	466	856	1,520
Zinc	Lower	6	6	75.9	207	395	6	6	230	340	498

Notes:

^a SA01, SA02, and SA03 were designated "high lead" in the QAPP (Ramboll 2018) because the average soil concentrations reported in the 2014 residential soil study (CH2M Hill 2016) were above the timecritical removal action level of 700 mg/kg. The remaining sampling areas (SAs) were designated "lower lead" in the QAPP because the reported soil concentrations were below 700 mg/kg in the soil studies where these SAs were sampled.

^b For samples with a field replicate, summary statistics are based on the average of the field sample and replicate results at that sample location.

Table 5-1k. Summary of Tule (Schoenoplectus acutus) and Co-Located Soil Samples

				ant Tissue Sam		<u> </u>			ated Soil Sa		
Analyte	High or Lower Lead Area ^a	Number of Samples ^b	Number of Detected Values	Minimum Detected Values	Mean Detected Values	Maximum Detected Values	Number of Samples ^b	Number of Detected Values	Minimum Detected Values	Mean Detected Values	Maximun Detecteo Values
onventional Pa	rameters (percent)										
Solids	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Solids	Lower	6	6	19.0	24.3	27.8	6	6	92.6	94.8	96.6
letals/Metalloid	s (mg/kg dw)										
Aluminum	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aluminum	Lower	6	6	5.20	26.4	85.2	6	6	4,220	6,398	9,400
Antimony	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anumony	Lower	6	3	0.006	0.0090	0.014	6	6	0.78	1.06	1.64
Arsenic	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	Lower	6	4	0.03	0.1	0.07	6	6	2.30	2.88	4.20
Barium	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Danum	Lower	6	6	28.1	48.2	65.5	6	6	194	252	273
Beryllium	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Derymum	Lower	6	0	NA	NA	NA	6	6	0.164	0.247	0.368
Cadmium	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Caumum	Lower	6	6	0.005	0.012	0.026	6	6	1.88	2.90	4.52
Chromium	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	Lower	6	6	2.56	3.96	5.15	6	6	6.31	8.89	12.5
Cobalt	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobait	Lower	6	6	0.044	0.073	0.094	6	6	2.59	2.91	3.43
Copper	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Coppei	Lower	6	6	1.08	1.74	2.27	6	6	24.2	35.0	60.3
Iron	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IION	Lower	6	6	42.5	58.0	97.9	6	6	4,680	5,731	7,320
Lead	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	Lower	6	6	0.033	0.12	0.29	6	6	21.9	36.7	61.8
Manganese	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	Lower	6	6	101	128	187	6	6	87.4	148	193
Mercury ^c	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	Lower	6	6	0.00273	0.00420	0.00584	6	6	0.0201	0.0330	0.0521
Nickel	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Lower	6	6	0.98	1.70	2.20	6	6	7.76	9.66	14.0
Selenium	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Colonium	Lower	6	5	0.03	0.043	0.055	6	6	2.10	3.53	6.25
Silver	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
0.1101	Lower	6	2	0.002	0.002	0.002	6	6	0.093	0.124	0.173
Thallium	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Lower	6	5	0.002	0.004	0.006	6	0	NA	NA	NA
Vanadium	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
vanaululli	Lower	6	6	0.04	0.098	0.25	6	6	15.2	21.7	33.0
Zinc	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
200	Lower	6	6	5.80	7.56	9.62	6	6	116	138	159

Notes:

^a SA01, SA02, and SA03 were designated "high lead" in the QAPP (Ramboll 2018) because the average soil concentrations reported in the 2014 residential soil study (CH2M Hill 2016) were above the timecritical removal action level of 700 mg/kg. The remaining sampling areas (SAs) were designated "lower lead" in the QAPP because the reported soil concentrations were below 700 mg/kg in the soil studies where these SAs were sampled.

^b For samples with a field replicate, summary statistics are based on the average of the field sample and replicate results at that sample location.

^c Mercury units were converted to mg/kg from ng/g values reported by ALS.

Table 5-1I. Summary of Wild Mint (Mentha arvensis) and Co-Located Soil Samples

				ant Tissue Sam					cated Soil Sa		
Analyte	High or Lower Lead Area ^a	Number of Samples ^b	Number of Detected Values	Minimum Detected Values	Mean Detected Values	Maximum Detected Values	Number of Samples ^b	Number of Detected Values	Minimum Detected Values	Mean Detected Values	Maximun Detecteo Values
Conventional Par	rameters (percent)										
Solids	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Solids	Lower	6	6	12.5	14.0	16.2	6	6	93.7	95.5	97.3
letals/Metalloids	s (mg/kg dw)										
Aluminum	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aluminum	Lower	6	6	63.3	139	373	6	6	4,910	6,863	9,490
Antimony	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anumony	Lower	6	6	0.017	0.033	0.063	6	6	0.38	0.691	1.46
Areania	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	Lower	6	6	0.05	0.083	0.13	6	6	1.80	2.58	3.40
Danisma	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	Lower	6	6	76.3	87.9	110	6	6	235	283	350
5 III	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	Lower	6	1	0.009	0.009	0.009	6	6	0.188	0.235	0.309
o. I. :	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	Lower	6	6	0.025	0.0470	0.101	6	6	1.51	2.23	3.51
	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	Lower	6	6	0.29	0.627	1.45	6	6	5.99	8.96	12.4
	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	Lower	6	6	0.039	0.0757	0.176	6	6	2.76	3.49	4.54
	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	Lower	6	6	4.75	9.44	13.2	6	6	19.8	29.3	45.9
	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	Lower	6	6	109	166	344	6	6	4,560	5,711	6,400
	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	Lower	6	6	0.315	0.654	1.58	6	6	18.4	37.4	61.5
	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	Lower	6	6	39.7	49.6	55.8	6	6	107	203	319
	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury ^c	Lower	6	6	0.0163	0.0183	0.0207	6	6	0.0190	0.0320	0.0527
	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	Lower	6	6	0.17	0.39	0.82	6	6	6.72	9.44	11.4
	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	Lower	6	5	0.03	0.1	0.1	6	6	1.20	2.45	4.80
	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	Lower	6	6	0.004	0.007	0.009	6	6	0.103	0.136	0.186
	High	0	NA	NA	NA	NA	NA	NA	NA	NA	0.180 NA
Thallium	Lower	6	5	0.002	0.004	0.007	6	0	NA	NA	NA
		0	NA	0.002 NA	0.004 NA	0.007 NA	NA	NA	NA	NA	NA
Vanadium	High Lower	6	6	0.17	0.36	0.87	6	6	10.3	14.8	22.5
			NA								
Zinc	High Lower	0	6 NA	NA 41.7	NA 62.3	NA 90.1	NA 6	NA 6	NA 105	NA 144	NA 189

Notes:

^a SA01, SA02, and SA03 were designated "high lead" in the QAPP (Ramboll 2018) because the average soil concentrations reported in the 2014 residential soil study (CH2M Hill 2016) were above the timecritical removal action level of 700 mg/kg. The remaining sampling areas (SAs) were designated "lower lead" in the QAPP because the reported soil concentrations were below 700 mg/kg in the soil studies where these SAs were sampled.

^b For samples with a field replicate, summary statistics are based on the average of the field sample and replicate results at that sample location.

^c Mercury units were converted to mg/kg from ng/g values reported by ALS.

Table 5-1m. Summary of Wild Rose Hips (Rosa sp.) and Co-Located Soil Samples

				ant Tissue Sam					cated Soil S		
Analyte	High or Lower Lead Area ^a	Number of Samples ^b	Number of Detected Values	Minimum Detected Values	Mean Detected Values	Maximum Detected Values	Number of Samples ^b	Number of Detected Values	Minimum Detected Values	Mean Detected Values	Maximun Detected Values
onventional Pa	rameters (percent)										
0	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Solids	Lower	6	6	40.3	43.1	47.9	6	6	96.9	98.0	98.7
letals/Metalloids	s (mg/kg dw)										
A I	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aluminum	Lower	6	6	6.50	10.6	14.0	6	6	10,200	13,100	16,400
Antinen	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	Lower	6	3	0.006	0.008	0.01	6	6	0.645	2.63	4.59
A	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	Lower	6	1	0.03	0.03	0.03	6	6	6.28	19.7	36.8
Di	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	Lower	6	6	3.43	10.8	24.7	6	6	172	205	241
D	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	Lower	6	0	NA	NA	NA	6	6	0.376	0.535	0.778
a	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	Lower	6	6	0.005	0.028	0.055	6	6	1.01	6.76	15.0
a :	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	Lower	6	6	0.18	1.41	2.89	6	6	25.0	30.1	39.7
	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	Lower	6	6	0.009	0.031	0.062	6	6	7.37	9.01	11.0
_	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	Lower	6	6	1.81	2.61	3.19	6	6	16.9	35.0	62.1
	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	Lower	6	6	20.4	28.6	37.3	6	6	19,800	22,200	26,700
	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	Lower	6	6	0.058	0.088	0.159	6	6	30.1	326	695
	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	Lower	6	6	14.8	29.2	63.6	6	6	527	660	926
	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury ^{c,d}	Lower	1	1	0.00104	0.00104	0.00104	1	1	0.0242	0.0242	0.0242
	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	Lower	6	6	0.16	0.963	1.55	6	6	16.3	22.4	26.9
	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	Lower	6	6	0.045	0.13	0.23	6	6	0.4	0.6	0.9
	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	Lower	6	2	0.002	0.003	0.003	6	6	0.142	0.357	0.762
	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	Lower	6	0	NA	NA	NA	6	5	0.334	0.406	0.516
	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	Lower	6	6	0.02	0.04	0.06	6	6	30.3	35.8	41.3
	High	0	NA	NA	NA	NA	NA	NA	NA	NA	
Zinc	Lower	6	6	6.07	7.83	10.5	6	6	90.3	344	708

Notes:

^a SA01, SA02, and SA03 were designated "high lead" in the QAPP (Ramboll 2018) because the average soil concentrations reported in the 2014 residential soil study (CH2M Hill 2016) were above the timecritical removal action level of 700 mg/kg. The remaining sampling areas (SAs) were designated "lower lead" in the QAPP because the reported soil concentrations were below 700 mg/kg in the soil studies where these SAs were sampled.

^b For samples with a field duplicate, summary statistics are based on the average of the field sample and replicate results at that sample location.

^c Mercury analysis was conducted although not specified in the quality assurance project plan (QAPP) (Ramboll 2018).

^d Mercury units were converted to mg/kg from ng/g values reported by ALS.

Table 5-1n. Summary of Wild Rose Stems and Leaves (Rosa sp.) and Co-Located Soil Samples

				ant Tissue Sam		M			cated Soil Sa		Maria
	Likele and arrest	Number of	Number of	Minimum Detected	Mean Detected	Maximum Detected	Number of	Number of Detected	Minimum	Mean	Maximun
	High or Lower	Samples ^b	Detected Values	Values	Values	Values	Samples ^b	Values	Detected Values	Detected Values	Detecteo Values
Analyte	Lead Area ^a	Samples	values	values	values	values	Samples	values	values	Values	values
onventional Pa	arameters (percent)					10.0					
Solids	High	6	6	38.2	42.3	46.9	6	6	90.1	92.9	94.7
	Lower	6	6	30.1	44.1	61.4	6	6	95.3	96.8	98.1
letals/Metalloid											
Aluminum	High	6	6	12.8	17.6	28.7	6	6	13,500	21,200	25,500
	Lower	6	6	18.2	26.3	36.1	6	6	12,900	14,500	16,000
Antimony	High	6	5	0.012	0.015	0.018	6	6	3.27	5.98	11.1
	Lower	6	6	0.014	0.029	0.048	6	6	1.57	6.19	19.1
Arsenic	High	6	6	0.03	0.064	0.095	6	6	25.3	36.4	55.5
/	Lower	6	6	0.05	0.1	0.1	6	6	18.1	29.6	41.3
Barium	High	6	6	40.9	73.8	120	6	6	240	300	350
Danam	Lower	6	6	19.2	64.4	123	6	6	150	172	210
Beryllium	High	6	0	NA	NA	NA	6	6	0.472	0.826	1.35
Derymum	Lower	6	0	NA	NA	NA	6	6	0.474	0.557	0.641
Cadmium	High	6	6	0.121	0.311	0.934	6	6	11.1	15.7	18.5
Caumum	Lower	6	6	0.147	0.485	0.932	6	6	5.40	14.9	21.6
Ohmen	High	6	6	0.65	3.31	8.41	6	6	9.59	15.5	22.5
Chromium	Lower	6	6	1.84	2.64	3.84	6	6	14.7	24.3	34.1
	High	6	6	0.014	0.026	0.049	6	6	4.40	7.38	10.7
Cobalt	Lower	6	6	0.023	0.035	0.044	6	6	4.96	7.41	9.59
-	High	6	6	2.99	3.88	4.65	6	6	38.7	55.9	73.1
Copper	Lower	6	6	4.43	4.74	4.99	6	6	20.6	44.3	68.8
	High	6	6	34.4	61.2	95.0	6	6	11,500	16,700	21,700
Iron	Lower	6	6	50.2	66.1	85.4	6	6	16,500	20,200	24,800
	High	6	6	0.259	0.740	1.66	6	6	471	661	866
Lead	Lower	6	6	0.953	1.97	4.68	6	6	248	853	1,800
	High	6	6	64.5	87.1	112	6	6	594	969	1,400
Manganese	Lower	6	6	60.3	127	199	6	6	481	681	875
	High	6	6	0.00342	0.00560	0.00699	6	6	0.106	0.159	0.244
Mercury ^c	Lower	6	6	0.00303	0.00674	0.00862	6	6	0.0712	0.150	0.244
	High	6	6	0.18	0.505	1.27	6	6	8.85	14.4	20.7
Nickel	Lower	6	6	0.345	0.512	0.71	6	6	12.0	17.7	20.7
	High	6	0	0.345 NA	NA	NA	6	6	0.6	0.95	1.6
Selenium	Lower	6	4	0.04	0.2	0.5	6	6	0.45	0.95	1.3
Silver	High	6	6	0.002	0.006	0.01	6	6	0.466	0.719	1.12
	Lower	6	6	0.007	0.013	0.021	6	6	0.21	0.51	0.88
Thallium	High	6	5	0.004	0.0085	0.013	6	6	0.39	0.698	1.35
	Lower	6	5	0.002	0.0090	0.016	6	6	0.361	0.696	1.25
Vanadium	High	6	6	0.03	0.1	0.08	6	6	16.6	25.3	34.3
	Lower	6	6	0.05	0.077	0.11	6	6	22.9	29.0	35.1
Zinc	High	6	6	11.0	25.7	50.4	6	6	481	632	916
	Lower	6	6	20.3	54.6	102	6	6	420	671	901

Notes:

^a SA01, SA02, and SA03 were designated "high lead" in the QAPP (Ramboll 2018) because the average soil concentrations reported in the 2014 residential soil study (CH2M Hill 2016) were above the timecritical removal action level of 700 mg/kg. The remaining sampling areas (SAs) were designated "lower lead" in the QAPP because the reported soil concentrations were below 700 mg/kg in the soil studies where these SAs were sampled.

^b For samples with a field replicate, summary statistics are based on the average of the field sample and replicate results at that sample location.

^c Mercury units were converted to mg/kg from ng/g values reported by ALS.

Table 5-10. Summary of Willow (Salix exigua) and Co-Located Soil Samples

				ant Tissue Sam		<u> </u>			ocated Soil Sar		
	High or Lower	Number of	Number of Detected	Minimum Detected	Mean Detected	Maximum Detected	Number of	Number of Detected	Minimum Detected	Mean Detected	Maximur Detecte
Analyte	Lead Area ^a	Samples ^b	Values	Values	Values	Values	Samples ^b	Values	Values	Values	Values
onventional Par	rameters (percent)										
Solids	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Solids	Lower	12	12	43.8	65.5	90.8	12	12	99.6	99.8	99.9
letals/Metalloids	s (mg/kg dw)										
Aluminum	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aluminum	Lower	12	12	6.55	20.7	34.1	12	12	2,880	4,358	6,530
Antimony	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	Lower	12	6	0.005	0.010	0.022	12	12	0.071	6.83	43.9
Arsenic	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
74001110	Lower	12	9	0.02	0.065	0.15	12	12	1.85	10.1	36.1
Barium	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Danum	Lower	12	12	14.7	23.6	36.7	12	12	37.7	135	287
Beryllium	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Derymun	Lower	12	0	NA	NA	NA	12	12	0.158	0.225	0.335
Cadmium	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Caumum	Lower	12	12	0.536	2.83	7.94	12	12	0.136	4.77	13.0
Chromium	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chronnum	Lower	12	12	0.19	0.689	1.37	12	12	11.6	16.9	26.8
Cabalt	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	Lower	12	12	0.023	0.049	0.099	12	12	3.19	5.16	9.39
Conner	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	Lower	12	12	2.81	7.53	14.6	12	12	5.86	86.9	358
les e	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	Lower	12	12	12.5	38.5	64.7	12	12	9,500	24,915	67,200
1	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	Lower	12	12	0.085	0.226	0.457	12	12	6.76	193	535
	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	Lower	12	12	4.34	25.6	83.2	12	12	95.6	255	696
	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury ^c	Lower	12	12	0.001	0.002	0.003	12	12	0.001	0.197	0.855
NESIST	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	Lower	12	12	0.2	0.41	0.81	12	12	7.65	14.1	26.9
0-1	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	Lower	12	11	0.03	0.1	0.2	12	12	0.11	0.419	1.10
0:1	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	Lower	12	6	0.006	0.017	0.029	12	12	0.017	0.92	3.42
	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	Lower	12	10	0.004	0.060	0.16	12	12	0.071	0.218	0.444
	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	Lower	12	10	0.04	0.1	0.1	12	12	20.9	30.8	46.4
	High	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	Lower	12	12	34.1	140	337	12	12	34.7	993	2,720

Notes:

^a SA01, SA02, and SA03 were designated "high lead" in the QAPP (Ramboll 2018) because the average soil concentrations reported in the 2014 residential soil study (CH2M Hill 2016) were above the time-critical removal action level of 700 mg/kg. The remaining sampling areas (SAs) were designated "lower lead" in the QAPP because the reported soil concentrations were below 700 mg/kg in the soil studies where these SAs were sampled. ^b For samples with a field replicate, summary statistics are based on the average of the field sample and replicate results at that sample location.

^c Mercury units were converted to mg/kg from ng/g values reported by ALS.

Table 5-2. Plant Tissue Concentrations (mg/kg dw) by SA^a

Table 5-2. Plant			ng/kg dw) by		-																																	
		uminum		mony	Ars	enic	Ba		Bery		Cadm		Chromi		Cob		Cop	per							Mercu		Nicl		Seleni		Silve		Thalli	liam	Vanadiu	am	Zinc	
Sample Area	Mean		Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Black Tree Liche SA01		remontii) 81.2	1.67	0.207	1.79	0.264	9.99	3.02	0.00667 ^b	0.00294	3.00	0.208	1.07	0.343	0.189	0.0215	5.57	0.529	430	90.0	69.8	6.25	35.7	4.63	N/A	N/A	0.523	0.327	0.397	0.00516	0.554	0.0917	0.05	0.0246	0.950	0.165	284	19.1
SA01	310	60.8	1.67	0.207	1.79	0.0707	29.8	1.84	0.00667	0.00294	3.00		0.635	0.0354	0.189	0.0215	5.57	0.529	430	21.9	80.0	10.9	24.8	8.13	N/A N/A	N/A N/A	0.345	0.00707	0.397	0.0495			0.0405	0.00636		0.0778	284	41.7
SA05	143	30.9		0.069		0.0480	26.2		0.004 ^b	0.00141	1.65				0.173	0.0164		0.237	194	40.0	19.3		15.2		N/A	N/A	0.278	0.0427		0.0435		0.0300				0.104	108	22.1
Camas (Camassi	110		0.302	0.009	0.975	0.0400	20.2	5.05	0.004	0	1.05	0.200	0.320	0.0300	0.110	0.0104	2.55	0.231	134	40.0	19.0	2.42	10.2	1.55	19/74	11/71	0.270	0.0427	0.170	0.0470	0.105	0.0231	0.0133	0.00173	0.323	0.104	100	22.1
SA01	321	, 101	1.25	0.578	0.637	0.199	66.8	18.8	0.0123	0.00586	9.71	2.50	0.183	0.0611	0.131	0.0241	6.68	2.01	242	173	91.3	26.3	63.7	18.5	N/A	N/A	0.350	0.0265	0.0333 ^b	0.00577	0.0733	0.0153	0.262	0.0991	0.387	0.291	550	143
SA03	513	331	0.688	0.240	0.920	0.569	97.4	10.9	0.0207	0.0124	7.88	1.68	0.860	0.680	0.313	0.106	5.68	0.740	528	428	53.1	24.1	74.3	52.3	N/A	N/A	1.03	0.176	0.05	0.0173	0.0807	0.0200	0.0827	0.0533	1.35	1.16	293	65.9
SA05	561	106	1.40	0.391	1.27	0.517	132	65.8	0.02	0.005	10.9		0.473	0.147	0.188	0.0412	6.32	1.10	346	89.4	68.3	23.3	58.4	17.4	N/A	N/A	0.503	0.0907	0.0533	0.0153	0.0873	0.0580	0.201	0.0963	0.697	0.170	824	682
SA07	410	39.5	0.620	0.220	0.507	0.158	73.8	29.2	0.0133	0.000577	5.68	1.22	0.567	0.186	0.132	0.0259	6.51	0.512	364	124	22.3	6.67	40.2	10.8	N/A	N/A	0.383	0.0493	0.015 ^b	0	0.0543	0.0192	0.114	0.0300	0.777	0.316	379	102
Chokecherry (Pr	inus virgin	iana)																																				
SA01	1.40	0.100	0.00492 ^b	0.00238	0.0167 ^b	0.0115	8.08	2.45	0.004 ^b	0	0.0065	0.00218	0.172	0.103	0.0100	0.00100	4.84	1.08	11.8	1.62	0.0437	0.00850	8.98	1.57	N/A	N/A	0.628	0.0884	0.015 ^b	0	0.0015 ^b	0.000866	0.0025 ^b	0.00218	0.01 ^b	0	4.73	1.52
SA03	3.67	0.0577	0.003 ^b	6.72E-11	0.01 ^b	0	12.3	5.80	0.004 ^b	0	0.00433		0.127	0.0802	0.00933	0.00252	2.44	0.866	10.4	0.153	0.0443	0.00757	11.4	2.53	N/A	N/A	0.477	0.247	0.015 ^b	0	0.001 ^b			0.000289	0.01 ^b	0	3.24	0.246
SA07	2.33 ^b	2.39	0.0025 ^b	3.68E-11	0.01 ^b	1.47E-10		3.69	0.004 ^b	0	0.0039 ^b		0.104		0.00970	0.00522	3.99	0.920	10.4	1.83	0.0552 ^b	0.0544	7.15	1.78	N/A	N/A	0.528	0.376	0.015 ^b	0				0.000707			4.78	1.46
SA09	7.20	NA	0.003 ^b	NA	0.01 ^b	NA	2.20	NA	0.004 ^b	NA	0.004	NA	0.04	NA	0.0110	NA	2.67	NA	11.8	NA	0.045	NA	6.39	NA	N/A	N/A	0.590	NA	0.015 ^b	NA	0.001 ^b	NA	0.001 ^b	NA	0.02	NA	2.66	NA
Hazelnut (Corylu																																						
SA02	0.633	0.404		0.00029	0.01 ^b	0	15.8	8.93	0.00367 ^b	0.000289	0.068		0.167	0.153	0.0243	0.0147	13.1	2.59	36.0	4.42	0.0033 ^b	0.00318	62.3	29.3	N/A	N/A	1.33	1.07	0.015	0		0.000200	0.001 ^b	0	0.01 ^b		31.5	3.08
SA03	0.733	0.416	0.00433 ^b	0.00275	0.01 ^b	0	16.1	3.22	0.00375 ^b	0.000354	0.025	0.00624	3.44	0.354	0.0642	0.0108	13.1	1.19	41.0	0.993	0.00833	0.00321	48.0	8.29	N/A	N/A	3.53	0.255	0.015	0	0.001 ^b	0	0.001 ^b	0	0.03 ^b	0	23.2	1.36
SA04	0.225	0.0354	0.00275 ^b	0.00035	0.02 ^b	0.0141	19.6	12.6	0.00375 ^b	0.000354	0.098		0.128	0.166	0.0355	0.0106	11.7	5.48	36.4	6.33	0.007 ^b	0.00212	221	20.9	N/A	N/A	1.94	0.247	0.015	0			0.006	0.00707	0.01	0	31.9	6.05
SA06	0.533 ^b	0.306	0.004 ^b	0.00260	0.01 ^b	0	11.2	1.85	0.004 ^b	0	0.0223		0.163	0.0751	0.0290	0.0157	12.5	0.569	33.8	5.25	0.006	0.00361	41.9	6.62	N/A	N/A	1.23	0.205	0.100	0			0.001 ^b	0	0.01 ^b	0	25.2	1.16
SA09	0.600	NA	0.0025 ^b	NA	0.01 ^b	NA	17.0	NA	0.0035 ^b	NA	0.018	NA	0.07	NA	0.0120	NA	10.6	NA	21.8	NA	0.004	NA	34.4	NA	N/A	N/A	0.620	NA	0.015 ^b	NA	0.001 ^b	NA	0.001 ^b	NA	0.01 ^b	NA	16.0	NA
Huckleberry (Vac	21.1	pitosum) 4.06	0.00492 ^b	0.00302	o occeh	0.0151	7.00	4	o co ch	C	0.017	0.0500	o oooch	0.04/7	0.00700	0.0404h	0.00	0.000	0.02	4.00	0.0/00	0.0450	07.0	44.0	N/A	N//2	0.075	0.181	0.015 ^b	0	0.00267 ^b	0.00151	o oc th		0.01 ^b	0	5.00	4.44
SA04			0.00492*	0.00302	0.0233	0.0151	7.80	1.57	0.004 ^b	0	0.247	0.0533	0.0283	0.0147	0.00733	0.0131 ^b	3.08	0.606	8.08	1.86	0.0480	0.0158	27.3	11.9	N/A	N/A	0.275	0.181	0.015	0	0.00267*	0.00151	0.001-		0.01-		5.32	1.41
Kinnikinnick (Arc SA02	42.6		0.0510	0.00755	0.115	0.0350	75.7	60.3	0.00867 ^b	0.00808	0.161	0.0260	0.28	0.156	0.0235	0.00726	2.38	0.131	32.4	0.675	1.87	0.452	35.1	14.4	0.00419	0.00376	0.247	0.0503	0.02 ^b	0.00866	0.0408	0.00530	0.0145	0.00563	0.0467	0.00577	122	10.5
SA02	23.5	5.32	0.0160	0.00361	0.0433	0.00577	62.1	17.9	0.004 ^b	0.00000	0.0545		0.197	0.0764	0.0255	0.00120	3.01	0.553	36.9	9.02	0.757	0.432	12.0	1.3		0.0000984	0.173	0.0404	0.02 0.015 ^b	0.00000						0.0153	62.2	13.4
SA03	37.9	4.07	0.0397 ^b	0.0104	0.100	0.0100	57.4	14.9	0.004 ^b	0	0.0343		0.161 ^b	0.0641	0.0191 ^b	0.00329	2.71	0.310	38.0	7.84	1.17	0.323	30.7	12.7		0.0000304	0.173	0.0404	0.015 ^b	0			0.0140	0.00552		0.0133	126	29.7
SA06	26.5	NA	0.0250	NA	0.05	NA	59.4	NA	0.004 ^b	NA	0.0980	NA	0.2	NA	0.0180	NA	3.31	NA	46.9	NA	0.998	NA	21.5	NA	0.00134	NA	0.135	NA	0.110	NA	0.0195	NA	0.004	NA	0.09	NA	78.4	NA
Lomatium (Loma			0.0200		0.00		00.1	101	0.001	101	0.0000	101	0.2		0.0100		0.01	101	10.0	101	0.000		21.0		0.00101		0.110		0.110	101	0.0100		0.001		0.00		10.1	101
SA02	737	NA	1.10	NA	1.21	NA	120	NA	0.0280	NA	6.95	NA	5.23	NA	0.476	NA	10.4	NA	675	NA	64.2	NA	114	NA	N/A	N/A	3.88	NA	0.12	NA	0.199	NA	0.0960	NA	1.22	NA	306	NA
SA03	756	532	1.81	0.655	1.13	0.558	146	68.5	0.0268 ^b	0.0181	3.16	1.89	3.80	3.04	0.363	0.191	11.2	2.70	559	334	36.0	27.8	109	58.7	N/A	N/A	2.85	1.21	0.037 ^b	0.0164	0.0796	0.0587	0.145	0.0479	1.30	0.698	189	74.3
SA05	1,250	170	1.28	0.182	1.79	0.222	225	62.0	0.0473	0.00764	4.26		3.16	1.44	0.545	0.101	13.3	2.97	882	96.8	76.9	4.02	82.0	5.64	N/A	N/A	3.53	1.10	0.0567	0.00577	0.0967	0.0214	0.131	0.0345	2.04	0.298	244	26.6
SA08	1,480	482	0.602	0.118	1.28	0.303	192	27.9	0.0580	0.0166	3.51	1.52	12.0	5.54	0.943	0.249	12.6	2.79	1,570	403	9.06	1.52	57.0	11.2	N/A	N/A	11.0	3.54	0.37	0.114	0.146	0.0551	0.0453	0.00907	11.8	4.16	83.5	19.9
Ponderosa Pine	Pinus pon	derosa)																																				
SA01	29.1	19.6	0.024 ^b	0.0372	0.0600	0.0346	0.470	0.380	0.004 ^b	0	0.496	0.210	2.69	1.19	0.0637	0.00153	11.7	3.60	91.2	7.96	0.864	1.19	57.5	15.1	N/A	N/A	2.57	1.11	0.015 ^b	0	0.009 ^b	0.0139	0.001 ^b	0	0.03 ^b	0.0200	93.3	20.1
SA02	55.2	5.23	0.0428	0.0209	0.0675	0.0106	1.08	0.241	0.004 ^b	0	1.40	0.343	9.03	0.470	0.187	0	6.93	0.605	111	12.0	1.22	0.696	66.7	9.09	N/A	N/A	5.45	0.385	0.015 ^b	0		0.00795	0.001 ^b	0		0.0106	75.3	11.0
SA03	41.7	NA	0.0210	NA	0.07	NA	0.390	NA	0.004 ^b	NA	0.585	NA	0.03	NA	0.0230	NA	6.78	NA	74.6	NA	0.453	NA	27.2	NA	N/A	N/A	0.98	NA	0.015 ^b	NA	0.003 ^b	NA	0.001 ^b	NA	0.02	NA	55.3	NA
SA04	24.7	18.1	0.0105 ^b	0.0134	0.0433	0.0153	0.502	0.0829	0.00383 ^b	0.000289	1.07	0.123	8.36	2.21	0.142	0.0295	9.92	5.49	104	17.9	0.251	0.287	89.3	32.0	N/A	N/A	5.43	0.807	0.015 ^b	0			0.00117 ^b			0.00577	73.9	24.8
SA07	11.1		0.0025 ^b	0	0.0333	0.00577	0.582	0.370	0.004 ^b	0	0.368	0.197	8.77	5.41	0.144	0.0884	8.34	1.89	100	36.0	0.0173 ^b	0.0188	58.3	15.0	N/A	N/A	5.29	3.11	0.015 ^b	0	0.001 ^b	0	0.001 ^b	0	0.0567	0.0379	89.0	12.8
Sarvisberry (Ame	_		h		h				h																				a a cab	-			h		h			
SA01	5.42	1.37	0.0189 ^b	0		0.0122	43.9	7.74	0.004 ^b	0	0.216		0.248	0.0482	0.0372	0.00804	111	148	20.9	3.25	4.72	5.85	47.3	17.5	N/A	N/A	0.888	0.186	0.015 ^b	0	0.0129 ^b		0.001 ^b	0		0.00447	97.9	80.6
SA03	12.3	NA	0.00600	NA	0.01 ^b	NA	51.3	NA	0.0035 ^b	NA	0.068	NA	0.850	NA	0.0500	NA	6.01	NA	27.5	NA	0.109	NA	32.3	NA	N/A	N/A	0.960	NA	0.015 ^b	NA	0.001	NA	0.001 ^b	NA 0	0.04	NA	27.5	NA
SA07	2.33 ^b 8.70	0.126	0.00267 ^b	0	0.0167 ^b	0.00577	37.2	5.56 0.354	0.004 ^b	0	0.150		0.202	0.0325	0.0555	0.0100	6.18	1.99	20.0	2.38	0.224	0.0780	27.2	2.65	N/A	N/A	0.760	0.0608	0.015	0	0.00367	0	0.001 ^b		0.01 ^b	0	25.2	1.87
SA08	9.70	0.424 NA	0.00475 0.0025 ^b	U NA	0.01 ^b	U NA	38.6	0.354 NA	0.004 0.004 ^b	0	0.136		0.240	0.113 NA	0.0365	0.0205 NA	4.43	0.912 NA	23.0	0.990 NA	0.101	0.0382 NA	12.7 24.5	1.98 NA	0.00180	0.000361 NA	1.01	0.368 NA	0.11 0.015 ^b	0 NA	0.004 0.001 ^b	0 NA	0.001 ^b	0 NA	0.03	-	19.4 26.3	3.75 NA
Spring Beauty/In	0.10	101	0.0020	IN/A	0.04	19/5	22.2	INA	0.004	INA	0.143	IN/A	0.000	11/5	0.0310	INA	5.57	INA	27.4	11/1	0.037	INA	24.3	11/5	0.00144	IN/A	0.000	11/4	0.015	11/4	0.001		0.001		0.02		20.5	110
SA01	257	192	0.361	0.125	0.46	0.0707	19.3	9.12	0.0095 ^b	0.00778	4.44	2.05	0.36	0.283	0.186	0.168	4.46	1.46	262	134	13.2	7.50	58.0	10.6	N/A	N/A	0.370	0.113	0.0225 ^b	0.0106	0.0725	0.00778	0.168	0.0905	0.355	0.262	139	12.7
SA01	1,960		2.49	1.72	5.36	4.59	30.9	17.5	0.0615	0.0601	22.9	7.50	3.21	3.10	0.842	0.747	12.8	7.10	2,200	2,310	242	220	143	70.6	N/A	N/A	2.43	1.86	0.185	0.163	0.296	0.214	0.577	0.361	4.18	4.29	376	225
SA03	93.3	59.0	0.207	0.100	0.3	0.0283	7.91	1.55	0.004 ^b	0	2.01	0.29	0.68	0.679	0.0970	0.0608	2.85	0.368	106	61.7	7.26	0.141	29.6	19.1	N/A	N/A	0.435	0.403	0.0150 ^b	0	0.04	0.0170	0.0580	0.0382		0.170	72.8	12.2
SA04	304	48.1	1.04	0.0983	1.09	0.113	24.8	7.07	0.008 ^b	0.00566	17.5	8.27	0.39	0.226	0.149	0.0431	6.80	2.67	251	64.3	35.7	3.46	53.8	0.283	N/A	N/A	0.735	0.290	0.05	0.0141	0.164	0.0339	0.445	0.219	0.200	0.311	288	152
SA05	98.4	63.1	0.642	0.817	0.44	0.410	15.8	14.6	0.004 ^b	0	6.18		0.485	0.417	0.0760	0.0707	5.06	3.40	103	78.0	24.9	31.3	24.6	20.7	N/A	N/A	0.230	0.170	0.0275 ^b	0.0177	0.140	0.127	0.103	0.0672		0.212	179	146
SA08	234	232	0.424	0.107	1.08	0.509	10.8	5.10	0.01 ^b	0.00849	11.8		0.585	0.516	0.268	0.209	4.29	1.84	283	272	9.06	3.17	61.9	2.76	N/A	N/A	1.33	1.15	0.0325 ^b		0.0435	0.00919	0.402	0.270	0.950	0.976	155	7.07
Tule (Schoenople	ctus acutu	s)																																				
SA14	26.4	31.7	0.00575 ^b	0.00450	0.0383 ^b	0.0256	48.2	15.8	0.004 ^b	0	0.0124	0.00944	3.96	0.966	0.0733	0.0184	1.74	0.423	58.0	21.7	0.121	0.104	128	35.2	0.00420	0.00121	1.70	0.474	0.0383 ^b	0.0144	0.00133 ^b	0.000516	0.00383 ^b	0.00204	0.0975	0.0824	7.56	1.63
Wild Mint (Menth	a arvensis)																																					
SA14	139	116	0.0333	0.0166	0.0825	0.0279	87.9	12.4	0.00483 ^b	0	0.0470	0.0272	0.627	0.417	0.0757	0.0500	9.44	3.23	166	88.1	0.654	0.460	49.6	6.55	0.0183	0.00166	0.388	0.229	0.0508 ^b	0.0304	0.00683	0.00183	0.00367 ^b	0.00242	0.356	0.256	62.3	19.0
Wild Rose (hips -	Rosa sp.)																																					
SA06	7.95	1.37	0.00638 ^b	0.00309	0.015 ^b	0.0100	18.6	5.87	0.004 ^b	0	0.0495		0.653	0.712	0.0165	0.00733	2.83	0.174	24.2	3.60	0.141	0.0209	48.1	14.6	N/A	N/A	0.398	0.363	0.125	0.0311		0.000957	0.001 ^b	0		0.00816	9.70	0.588
SA09	9.75	NA	0.003 ^b	NA	0.01 ^b	NA	10.4	NA	0.004 ^b	NA	0.0295	NA	0.695	NA	0.0150	NA	3.19	NA	24.4	NA	0.0635	NA	24.7	NA	N/A	N/A	0.940	NA	0.0450	NA	0.001 ^b	NA	0.001 ^b	NA	0.035	NA	7.74	NA
SA14	14.0	NA	0.0025 ^b	NA	0.01 ^b	NA	3.43	NA	0.004 ^b	NA	0.005	NA	2.89	NA	0.0620	NA	1.81	NA	37.3	NA	0.058	NA	14.8	NA	0.00104	NA	1.55	NA	0.230	NA	0.001 ^b	NA	0.001 ^b	NA	0.06	NA	6.07	NA
Wild Rose (stems	1						-																						h									
SA01	13.1	0.301	0.0155	0.00218	0.075	0.0180	78.3	39.7	0.004 ^b	0	0.419		2.62	1.81	0.759	1.48	3.87	0.329	52.5	22.0	1.07	0.514	78.8	13.9		0.00190	0.260	0.0693	0.0150 ^b	0			0.0115			0.00577	32.5	16.1
SA03	22.1	6.02	0.0108 ^b	0.00782	0.0533	0.0252	69.4	13.8	0.004 ^b	0	0.203	0.0441	4.01	3.91	0.0347	0.0150	3.88	0.837	69.8	23.8	0.411	0.146	95.4	24.5		0.000891	0.750	0.454	0.0150 ^b	0			0.004			0.0115	19.0	7.05
SA04	27.2	7.00	0.0388	0.0121	0.0817	0.0161	94.8	30.2	0.004 ^b	0	0.727	0.221	2.50	0.584	0.0340	0.00964	4.79	0.310	58.8	7.68	2.73	1.77	168	27.0		0.000671	0.552	0.135	0.0233	0.0144			0.0113			0.0153	86.5	19.7
SA06	25.3	9.51	0.0198	0.00629	0.0533	0.00577	34.0	12.8	0.004 ^b	0	0.243	0.148	2.77	1.00	0.0365	0.00901	4.69	0.205	73.4	10.4	1.22	0.294	85.0	22.1	0.00541	0.00208	0.472	0.207	0.335	0.185	0.00817	0.00247	0.00167*	0.000577	0.0867	0.0208	22.6	3.53
Willow (Salix exig		5.04	0.01367 ^b	0.00740	0.01930	0.00000	00.5	0.05	0.00300b	0.00000.1	0.00	4.70	0.007	0.400	0.0040	0.00570	40.0	4.07	00.0	7.40	0.057	0.400	0.74	0.40	0.00000	0.000074	0.000	0.0700	0.1210	0.0040	0.00267 ^b	0.00157	0.0660 ^b	0.0055	0.0333p	0.0407	470	
SA15	13.3	0.01		0.00712					0.00392 ⁵ 0.004 ^b	0.000204	2.82	1.70 2.72		0.186		0.00579	10.8	4.87	22.6	7.42		0.160			0.00206			0.0736				0.00101		0.0655		0.0197	179	114
6/110	28.0	6.38	0.00292	0.00102	0.103	0.0339	23.1	4.82	0.004	U	∠.୪5	2.12	0.992	0.233	0.0067	0.0180	4.29	1.05	54.4	10.4	0.195	0.0306	41.4	22.1	0.00158	0.000194	0.567	0.142	0.0908	0.0461	0.0173	0.0110	U.U2U4	0.0167	0.0825	0.0172	102	0.00
Notes:																																						

Notes: * For samples with a field replicate, summary statistics are based on the average of the field sample and replicate results at that sample location. * Contains nondetected results. Half the detection limit (DL) was used as the concentration in nondetected values. * Marcury units were converted to mg/kg from ng/g values reported by ALS. NA - not applicable (n=1) C = contains = conta

SA - sampling area SD - standard deviation

Table 5-3. Soil Concentrations (mg/kg dw) by SA^a

	Alum	inum	Anti	timony	Ars	senic	Bar	rium	Bery	/llium	Cadr	nium	Chro	mium	Co	balt	Co	oper	Ire	on	Le	ad	Mang	ganese	Merc	cury ^b	Nick	kel	Sele	nium	Sil	ver	Thal	llium	Vana	adium	2	Zinc
ample Area	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	S
SA01	17,288	5,803	11.0	6.16	45.9	25.2	256	69.9	0.653	0.176	20.2	6.98	13.5	3.18	5.68	1.001	58.7	19.9	14,212	2,103	850	373	717	181	0.189	0.0642	11.1	2.04	0.864	0.408	0.907	0.297	0.616	0.172	26.1	7.10	761	2
SA02	18,477	4,969	9.31	6.07	61.4	38.1	208	68.8	0.782	0.225	16.7	9.26	25.1	9.77	8.15	3.18	56.1	22.9	20,282	4,619	831	476	757	301	0.175	0.0639	17.7	6.70	0.839	0.323	0.721	0.319	0.807	0.365	40.4	11.9	680	3
SA03	18,279	4,329	7.62	4.10	42.9	11.6	362	72.6	0.811	0.155	22.9	11.7	26.1	5.70	10.7	1.74	101	45.0	19,277	3,339	861	530	1283	397	0.117	0.0355	21.9	3.09	0.885	0.319	0.917	0.486	0.667	0.271	39.8	9.10	826	4
SA04	11,791	2,953	7.48	4.07	39.7	12.7	151	42.0	0.459	0.0490	9.79	4.28	15.1	1.48	4.89	0.712	35.0	12.5	13,678	3,101	683	402	435	184	0.139	0.0777	11.9	1.35	0.597	0.221	0.442	0.199	0.641	0.228	25.0	2.94	381	
SA05	20,890	1,873	7.54	2.35	46.9	15.8	245	29.1	0.810	0.145	12.9	3.21	20.4	2.96	8.33	1.43	54.7	10.6	17,940	1,619	500	128	646	103	N/A	N/A	16.8	1.50	0.728	0.168	0.733	0.0996	0.560	0.307	40.9	4.52	454	8
SA06	14,414	2,649	3.04	1.06	24.4	7.87	187	26.7	0.700	0.0873	10.1	5.46	36.9	4.10	10.2	1.059	50.1	8.34	24,077	3,989	452	306	738	136	0.109	0.0498	24.7	2.80	0.911	0.154	0.478	0.150	0.457	0.145	38.5	4.62	487	
SA07	14,166	5,454	4.05	2.56	24.9	13.7	183	50.6	0.540	0.149	8.74	4.62	15.2	2.44	5.33	1.10	28.4	10.8	13,822	2,580	316	139	459	166	N/A	N/A	11.3	2.08	0.407	0.144	0.487	0.301	0.418	0.152	25.7	5.00	352	
SA08	11,249	2,589	3.02	0.643	24.1	2.27	335	135	0.516	0.0521	9.19	2.25	35.7	5.27	11.7	1.89	44.6	8.99	17,309	4,181	148	49.1	387	55.4	0.0597	0.0217	36.1	6.02	1.09	0.341	0.782	0.293	0.405	0.0573	64.5	14.0	288	(
SA09	14,600	1,572	4.42	1.59	24.5	4.42	278	58.1	0.536	0.0607	13.5	5.24	27.8	3.32	8.07	0.73	50.9	18.3	21,283	1,966	597	203	1,009	312	N/A	N/A	18.2	1.93	0.567	0.058	0.565	0.120	0.445	0.115	38.1	3.11	611	
SA14	7,205	2,281	0.84	0.391	3.29	1.56	258	42.9	0.261	0.0804	2.37	0.952	11.3	6.61	3.98	2.05	30.2	12.2	7,704	5,109	35.7	15.8	222	131	0.0312	0.0117	11.6	5.59	2.60	1.71	0.130	0.0314	0.046	0.00934 ^c	19.8	7.29	134	;
SA15	4,576	1,081	13.6	15.7	17.9	10.7	224	65.0	0.260	0.0426	9.25	2.77	19.3	4.63	6.73	1.68	167	140	38,250	17,002	367	139	382	157	0.388	0.272	18.8	5.31	0.708	0.233	1.82	1.13	0.290	0.111	35.5	6.88	1,915	
SA16	4,140	997	0.0926	0.0198	2.31	0.402	46.8	7.78	0.189	0.0205	0.294	0.156	14.5	1.89	3.59	0.277	7.03	1.16	11,580	2,016	18.5	11.5	127	16.3	0.00576	0.00460	9.46	1.24	0.129	0.0233	0.0254	0.00632	0.146	0.0879	26.0	4.58	71.0	
gh Lead S	ampling Are	as ^d																																				
Mean	17,	903	9	9.34	4	7.5	2	90	0.7	740	20	.7	2).7	8	.13	7	5.2	17,	351	8	51	g	951	0.1	49	16.	.6	0.8	68	0.8	377	0.6	671	34	4.2		772
Minimum	11,	000	1	1.89	2	1.0	1:	23	0.4	410	5.	38	9	59	4	.38	2	1.5	11,	500	16	50	2	222	0.0	68	8.5	6	0.3	00	0.2	285	0.2	293	16	6.6	· ·	196
Maximum	34,	500	3	32.7	1	42	56	60	1.	.35	50	.4	4	2.0	1	3.6	2	14	28,	800	2,4	10	2,	240	0.2	44	29.	.3	1.9	3	2.	46	1.1	35	63	3.0	2	2,120
SD	5,0	47	5	5.54	2	4.5	93	3.2	0.1	190	9.	63	8	40	2	.91	38	3.7	4,1	129	4	52	4	06	0.0	57	6.1	3	0.3	54	0.3	388	0.2	261	11	1.2		396
ower Lead	Sampling Ar	rease					-																															
Mean	11,	814	4	1.82	2	5.3	20	08	0.4	486	8.	33	2	0.6	6	.70	4	5.2	16,	522	36	54	4	54	0.1	12	17.	.0	0.9	45	0.5	540	0.4	106	33	3.2	4	434
Minimum	2,8	80	0.0	0710	1.	.80	37	7.7	0.1	158	0.1	36	5	99	2	.59	5.	86	4,5	560	6.	76	8	7.4	0.0	01	6.7	2	0.1	10	0.0	170	0.0	345	10	0.3	3	34.7
Maximum	23,4			13.9		1.1		50		.16	21	-		4.2		4.8		58	67,			300		250	0.8		42.		6.:	-	3.	42		39		2.1		2,720
SD	5,4	10	5	5.47	1	7.3	91	1.5	0.2	203	5.	09	1	0.0	3	.01	4	7.7	8,8	392	33	26	2	42	0.1	64	8.9	9	0.9	82	0.5	508	0.2	257	14	4.8	4	450

 Notes:
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N/A - not analyzed SA - sampling area SD - standard deviation

Upper Columbia River Plant Tissue Study Data Summary Report

Table 5-4. Comparison of ACGs to MRLs for Nondetected Metals

		Minimum MRL for	Maximum MRL for	Planned MRL for		
	ACG	Nondetected Results	Nondetected Results	Nondetected Results	No. of Nondetected	No. of Nondetected
Analyte	(mg/kg dw)	(mg/kg dw)	(mg/kg dw)	(mg/kg dw)	Results	Results Exceeding ACC
Plant Tissue						
Antimony	0.05	0.042	0.05	0.05	57	0
Arsenic	0.5	0.42	0.5	0.5	46	0
Beryllium	0.06	0.017	0.02	0.02	139	0
Chromium	42	0.18	0.2	0.2	3	0
Cobalt	0.02	0.02	0.02	0.02	4	0
Selenium	1	0.84	1	1	91	0
Silver	0.14	0.017	0.02	0.02	59	0
Thallium	0.02	0.017	0.02	0.02	70	0
Vanadium	0.2	0.17	0.2	0.2	42	0
Soil						
Thallium	0.05	0.069	0.123	0.02	16	16

Notes:

Only the analytes with at least one nondetected result are shown.

Field replicates are included in the count for nondetected results.

ACG - analytical concentration goal

MRL - method reporting limit

Table 5-5. Summary of Replicate Plant Tissue Samples RPDs

		All Plant Tissue Duplicate Samples (Prunus virginiana))		Hazelnut rylus cornuta)			nnikinnick aphylos uva-u	ırsi)		nderosa Pine us ponderosa)		Sarvisberry anchier alnifolia)	(Schoe	Tule enoplectus acutus)		Wild Mint ha arvensis)		Wild Rose Hips (<i>Rosa</i> sp.)		Wild Rose Stems and Leaves (<i>Rosa</i> sp.)				(Si	Willow alix exigua)			
Analyte	N	Minimum RPD (%)	Mean RPD (%)	Maximum RPD (%)	N	Minimum RPD (%)	Mean RPD (%)	Maximum RPD (%)	N	RPD (%)	N	Minimum RPD (%)	Mean RPD (%)	Maximum RPD (%)	N	RPD (%)	N	RPD (%)	N	RPD (%)	N	RPD (%)	N	RPD (%)	1	Minimum RPD (%)	Mean RPD (%)	Maximum RPD (%)		Minimum RPD (%)	Mean RPD (%)	Maximum RPD (%)
Conventional Pa	rameter	s																														
Solids	17	0	9.78	64.9	2	0.375	0.782	1.19	1	8.13	4	0.395	0.928	1.50	1	0.537	1	0	1	50.1	1	1.60	1	3.46	3	2.07	26.4	64.9	2	3.72	8.85	14.0
/letals/Metalloids	s																															
Aluminum	17	0	21.9	90.7	2	0	9.92	19.8	1	18.2	4	4.72	17.4	32.5	1	25.8	1	4.65	1	9.52	1	90.7	1	27.7	3	19.3	21.3	25.1	2	13.7	21.4	29.1
Antimony	17	0	31.6	131	2	0	65.5	131	1	18.2	4	3.08	16.1	32.0	1	19.1	1	0	1	0	1	48.6	1	18.2	3	18.2	62.6	117	2	0	25.0	50.0
Arsenic	17	0	16.1	100	2	0	0	0	1	0	4	0	9.84	20.0	1	13.3	1	100	1	0	1	15.4	1	0	3	13.3	35.3	52.6	2	0	0	0
Barium	17	0.310	13.3	36.9	2	5.18	15.2	25.3	1	6.65	4	2.32	19.6	36.9	1	22.1	1	0.310	1	0.81	1	12.1	1	19.3	3	6.22	11.4	18.9	2	3.81	10.7	17.7
Beryllium	17	0	1.57	13.3	2	0	0	0	1	13.3	4	0	0	0	1	0	1	0	1	0	1	0	1	13.3	3	0	0	0	2	0	0	0
Cadmium	17	3.92	29.8	80.0	2	66.7	73.3	80.0	1	34.3	4	3.92	26.5	42.9	1	17.6	1	20.6	1	15.4	1	39.0	1	16.9	3	9.92	28.7	54.7	2	5.33	12.1	18.8
Chromium	17	11.1	58.7	159	2	32.0	46.4	60.9	1	159	4	11.1	29.1	54.5	1	60.5	1	80.9	1	12.4	1	65.2	1	82.0	3	52.7	80.2	129	2	40.0	43.9	47.7
Cobalt	17	4.32	36.8	90.9	2	19.4	39.7	60.0	1	27.9	4	16.2	41.4	90.9	1	46.0	1	5.31	1	4.32	1	62.1	1	53.3	3	18.9	42.5	66.7	2	23.0	27.3	31.6
Copper	17	2.72	16.0	98.2	2	6.27	52.2	98.2	1	4.50	4	2.72	4.95	8.47	1	25.7	1	43.0	1	4.90	1	14.4	1	12.9	3	4.97	6.65	8.14	2	7.69	11.0	14.2
Iron	17	2.72	19.9	52.7	2	8.37	29.2	50.1	1	5.14	4	2.72	11.4	20.3	1	21.4	1	9.66	1	4.48	1	37.4	1	25.1	3	5.21	27.6	52.7	2	20.5	24.3	28.2
Lead	17	3.08	36.1	168	2	38.5	103	168	1	5.71	4	7.32	19.5	36.6	1	11.7	1	10.7	1	3.08	1	59.7	1	67.7	3	8.99	45.0	111	2	10.5	18.2	25.9
Manganese	17	1.21	16.9	43.1	2	11.5	15.1	18.8	1	4.36	4	1.64	22.9	43.1	1	29.4	1	1.21	1	6.51	1	3.34	1	16.6	3	9.58	20.6	37.7	2	15.1	21.1	27.0
Mercury	17	0.700	22.9	87.6	N/A	N/A	N/A	N/A	N/A	N/A	4	0.700	11.3	18.4	N/A	N/A	N/A	N/A	1	12.2	1	24.7	N/A	N/A	3	11.9	39.1	87.6	2	16.1	26.3	36.6
Nickel	17	2.90	30.2	119	2	5.13	35.3	65.5	1	32.2	4	6.90	22.1	40.0	1	42.1	1	14.5	1	15.9	1	17.6	1	119	3	2.90	16.6	40.0	2	16.0	31.3	46.6
Selenium	17	0	12.7	66.7	2	0	0	0	1	0	4	0	4.55	18.2	1	0	1	0	1	18.2	1	28.6	1	22.2	3	0	17.3	51.9	2	10.5	38.6	66.7
Silver	17	0	38.0	125	2	50	50.0	50.0	1	40.0	4	11.3	33.9	87.2	1	125	1	0	1	100	1	33.3	1	0	3	11.8	26.3	46.2	2	10.5	16.4	22.2
Thallium	17	0	30.0	100	2	0	33.3	66.7	1	0	4	14.3	32.6	50.0	1	40.0	1	0	1	0	1	100	1	0	3	11.8	48.4	100	2	0	14.3	28.6
Vanadium	17	0	16.7	82.4	2	0	0	0	1	0	4	0	5.56	22.2	1	35.3	1	0	1	22.2	1	82.4	1	28.6	3	0	19.0	28.6	2	0	17.6	35.3
Zinc	17	1.94	19.2	95.0	2	9.30	52.1	95.0	1	1.94	4	6.38	17.5	24.7	1	10.1	1	5.06	1	8.22	1	10.2	1	13.3	3	3.13	26.6	70.4	2	8.74	11.9	15.1

Notes:

A data quality indicator was not applied to plant tissue field replicate results because a set criterion is not biologically meaningful. Different plant parts all contain the same concentration of the plant, sap does not circulate throughout the plant. Different roots are likely to sample soil with differing chemical signatures, making it unlikely that different plant parts all contain the same concentration of analytes.

N/A - not analyzed

N - number of samples RPD - relative percent difference

Table 5-6.	Summary	/ of Replicate	Soil Sam	ple RPDs
10010-0-0.	Garminar	, or repriorie		

	Number of Samples	Number of RPDs <u>+</u> 40% ^a	Minimum RPD (%)	Mean RPD (%)	Maximum RPD (%)
Conventional Pa	rameters				
Solids	17	0	0	0.345	1.56
Metals/Metalloids	5				
Aluminum	17	1	1.48	11.3	42.5
Antimony	17	3	0.411	20.5	59.4
Arsenic	17	1	3.99	18.6	43.5
Barium	17	1	1.28	12.3	49.1
Beryllium	17	1	1.26	14.5	47.3
Cadmium	17	2	0.451	20.6	60.8
Chromium	17	0	0	8.93	24.4
Cobalt	17	0	0.787	12.0	33.3
Copper	17	0	0.407	12.4	34.5
Iron	17	1	0.531	11.7	45.1
Lead	17	3	0.192	29.1	82.8
Manganese	17	1	2.26	19.9	79.9
Mercury	11	1	0.976	26.0	127
Nickel	17	0	0	8.00	24.3
Selenium	17	3	0	17.1	66.7
Silver	17	1	1.14	18.2	40.5
Thallium	17	1	1.71	15.9	42.8
Vanadium	17	0	0.855	10.9	30.3
Zinc	17	2	0.985	21.0	60.1

Notes:

^a 40% is a data quality indicator used to assess precision in the measurements between primary and duplicate discrete soil field samples. The relative percent difference (RPD) is calculated as the difference between the primary and duplicate sample results divided by the average of those results and expressed as a percentage. RPDs that fall within the range of -40% to +40% are considered to have met the RPD data quality indicator.

APPENDIX A

FIELD SUMMARY REPORT



Sampling Area SA08

Field Summary Report

Upper Columbia River

Plant Tissue Study Stevens and Ferry Counties, Washington

Project Number: 60570352

November 2018

Teck American Incorporated 501 North Riverpoint Blvd, Suite 300 Spokane, WA 99202

Field Summary Report

Upper Columbia River

Plant Tissue Study Stevens and Ferry Counties, Washington

Prepared for:

Teck American Incorporated

501 North Riverpoint Blvd, Suite 300 Spokane, WA 99202 Contact: Kris McCaig

Prepared by:

AECOM 1111 Third Avenue, Suite 1600 Seattle, WA 98101

November 2018

Executive Summary

The plant tissue study was conducted during three separate field sampling events in 2018: April 25 to May 4 (spring), June 18 to 21, and August 20 to 28. Sampling was conducted on portions of several Confederated Tribes of the Colville Reservation (CCT) tribal allotments and two publicly accessible areas where CCT members use wild plant resources. These sampling areas are located in mainly upland areas near the Upper Columbia River in Northeast Washington.

Survey and collection activities followed protocols and standard operating procedures provided in the Field Sampling Plan for the Plant Tissue Study (Appendix A of the Quality Assurance Project Plan [Ramboll 2018]).

The spring sampling event included six species collected in sufficient quantities to meet target sample masses. One species was found but not sampled due to lack of sufficient leaf growth. Spring 2018 plant tissue collection occurred on the three high lead sampling areas (SA01, SA02, and SA03) and six lower lead sampling areas (SA04, SA05, SA06, SA07, SA08, and SA16). SA09, SA11, SA12, and SA15 were also surveyed but either lacked target species for collection or were not needed to attain target sample masses. SA10 was not accessible due to a road washout. SA13 and SA14 were not surveyed in spring 2018.

The June sampling event included three species collected in sufficient quantities to meet target sample masses. Two additional target species were found in the SAs but did not have sufficient or mature fruit to meet target sample masses. June 2018 plant tissue collection occurred on two high lead SAs (SA01 and SA03) and two lower lead SAs (SA04 and SA06). SA02 and SA07 were also surveyed but either lacked target species for collection or were not needed to attain target sample masses. The following SAs were not sampled in June 2018: SA05, SA08, SA09, SA10, SA11, SA12, SA13, SA14, SA15, and SA16.

The August sampling event included seven species collected in sufficient quantities to meet target sample masses. August 2018 plant tissue collection occurred on three high lead SAs (SA01, SA02, and SA03) and seven lower lead SAs (SA04, SA06, SA07, SA08, SA09, SA14, and SA15). The following SAs were not sampled in August 2018: SA05, SA10, SA11, SA12, SA13 and SA16.

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- Appendix A Daily Tailgate Task Hazard Assessment Forms
- Appendix B Project Permits
- Appendix C Protocol Modification Forms
- Appendix D Chain of Custody Forms
- Appendix E ALS Confirmation of Sample Receipt Forms
- Appendix F Plant Tissue and Soil/Sediment Data Forms (electronic copy only)
- Appendix G Daily Logbook Entries
- Appendix H Sample Information Sheets (electronic copy only)
- Appendix I Field Sampling Data

Acronyms and Abbreviations

AECOM	AECOM Technical Services, Inc.
ALS	ALS Environmental
BIA	U.S. Bureau of Indian Affairs
ССТ	Confederated Tribes of the Colville Reservation
COI	contaminant of interest
CRCP	Cultural Resources Coordination Plan
DGPS	differential global positioning system
DU	decision unit
EPA	U.S. Environmental Protection Agency
FSP	Field Sampling Plan
GIS	geographic information system
GPS	global positioning system
ppm	parts per million
QAPP	Quality Assurance Project Plan
RI/FS	remedial investigation and feasibility study
SA	sampling area
SHSP	Site health and safety plan
SOP	Standard Operating Procedure
ТА	tribal allotment
TAI	Teck American Incorporated
TCRA	time critical removal action
UCR	Upper Columbia River
U.S.	United States

1.0 Introduction

This Field Summary Report provides information for the Upper Columbia River site (UCR; hereafter, the Site¹) (Figure 1) Plant Tissue Study (hereafter, "the Study") that was conducted by AECOM Technical Services, Inc. (AECOM) during three separate sampling events in 2018: April 25 to May 4 (spring), June 18 to 21, and August 20 to 28.

The Study will measure the concentration of metals and mercury in some of the plant species typically consumed or otherwise used by members of the Confederated Tribes of the Colville Reservation (CCT). The Study represents one of several tasks being completed as part of the remedial investigation and feasibility study (RI/FS) under a settlement agreement between Teck American Incorporated (TAI) and the U.S. Environmental Protection Agency (EPA). TAI is leading the Study under EPA oversight. The objective of the Study is to collect data to support the human health risk assessment. Specifically, the Study is focused on exposures to contaminants of interest (COIs) that members of the CCT may experience if they consume vegetation growing in the Study area. Traditional tribal activities, such as handling or mouthing of plants, may also result in potential exposures to COIs on or in plants.

1.1 Project Background

In June 2017, EPA directed TAI to "Conduct a study that will primarily be focused on collection of plant tissue from the three TAs [tribal allotments] sampled in the 2014 Residential Soil Study that had concentrations of lead in soil above the TCRA [time critical removal action] action level (700 ppm [parts per million]) plus a reference area" (USEPA 2017). Specifically, EPA's directive refers to three decision units (DUs) sampled from three CCT TAs as part of EPA's 2014 Residential Soil Study. For the plant tissue study, these DUs are referred to as "high lead sampling areas" (SAs).² At this time, plant tissue reference areas have not been determined. Therefore, in lieu of a reference area, the Study focused on surveying and collecting target plant tissues present at the high lead SAs and at one or more DUs with lower concentrations of lead in soils (hereafter, "lower lead SAs") that are located on TAs within the UCR Study Area (Figure 1). Potential lower lead SAs were identified using soil data from prior soil studies conducted as part of the UCR RI/FS (Ramboll Environ 2017; CH2M Hill 2016; Windward et al. 2015).

The CCT also identified willows as a plant of cultural significance. Willows were not present on the three high lead TAs or lower lead TAs surveyed during the August 2017 field reconnaissance phase of this Study (AECOM 2017). Two SAs were added to the Study after the August 2017 reconnaissance to incorporate willows; these are not located on TAs, but are in publicly-accessible areas that were sampled as part of the 2014 Upland Soil Study (Windward et al. 2015) and the 2010 Beach Sediment Study (Integral 2014).

¹ The Site, as defined within the June 2, 2006, Settlement Agreement, is the areal extent of hazardous substances contamination within the United States (U.S.) in or adjacent to the UCR, including Franklin D. Roosevelt Lake, from the U.S.-Canada border to the Grand Coulee Dam and those areas in proximity to the contamination that are suitable and necessary for implementation of response actions.

 $^{^{2}}$ For the plant tissue study, the residential soil study DUs where target plant species were present during the reconnaissance survey conducted in August 2017 (AECOM 2017) and were expected to have sufficient abundance for sampling are referred to as sampling areas.

1.2 Sampling Area Description

The Study area is on the west side of the Columbia River and extends southward from the United States– Canada border to Barnaby Island (south of Kettle Falls) (Figure 1). Sixteen potential SAs were identified in the Field Sampling Plan (FSP) in the Quality Assurance Project Plan (QAPP; Ramboll 2018).

1.3 Sampling Overview

Field sampling was conducted using techniques described in the FSP contained in Appendix A of the QAPP (Ramboll 2018). The results of the August 2017 field reconnaissance (AECOM 2017) were used to prioritize target species and outline a sampling pathway based on the likelihood of finding each species at the SAs. The following objectives were developed for the 2018 plant tissue sampling:

- For each targeted plant tissue, collect sufficient mass from six individual plants from across the high lead SAs to address the principal study question.
- For each targeted plant tissue, collect sufficient mass from six individual plants from across one or more lower lead SAs to address the secondary study question.

Co-located soil samples were collected along with each plant tissue sample in accordance with Standard Operating Procedure (SOP)-9A and SOP-9B of Attachment A2 of the FSP (Appendix A of the QAPP [Ramboll 2018]). In cases where individual plants and/or plant tissue mass were insufficient to meet the target objectives, plant tissues were still collected if at least three samples were available from each targeted tissue. In addition, where sample target mass could not be met from an individual plant, a composite sample of adjacent individual plants was collected. In this case, the co-located soil sample was also collected as a composite.

SAs are listed in Table A1 of the FSP, along with rationale for inclusion and average soil lead concentrations. Target plant species and tissues are listed by sampling event in Table A2 of the FSP, along with target and minimum sample masses. Target sample masses are generally two times the minimum mass expected to result in a 1-gram (dry weight) sample for analysis (Ramboll 2018).

1.4 Project Staffing

The staffing structure for the overall Study is provided in Section A4.2, Task Organization, of the QAPP and includes a description of the responsibilities of EPA, TAI, and key task personnel. This section describes field staff deployed for the 2018 sampling events.

AECOM plant tissue sampling team members and primary roles are listed in Table 1. The field supervisor was responsible for overseeing all sample collection and packaging as well as coordinating with TAI, maintaining the field logbook, and ensuring chain-of-custody procedures were met. The survey team was deployed ahead of the sampling team when appropriate in order to prioritize SAs to be visited by the sampling team. The survey team identified the availability of target plant tissues, flagged potential sample locations, identified potential access issues, and communicated results with the sampling team.

The sampling team was responsible for plant tissue and soil sample collection, including weighing, photographing, packaging, and labeling samples; filling out data forms and photo logbook; locating sample locations using handheld global positioning system (GPS) units; and decontaminating sampling equipment. The sampling team was assisted by the field supervisor, survey team, and cultural resources monitor when possible. An AECOM or CCT cultural resources monitor was present when any ground-

disturbing activity occurred, including excavations for soil sample collection and collection of targeted bulbs, roots, or corms. The monitor observed the areas of excavation and bagged soil samples for artifacts or other cultural deposits. The monitor also acted as the primary Site safety officer and conducted morning safety briefings.

Drimory Toom Dolog	Name	Sa	ampling Eve	ent
Primary Team Roles	IName	Spring	June	August
Field Supervisor	Dr. Jennifer Pretare – Project Manager	Х	Х	
Field Supervisor	Jeff Walker – Botanist			Х
Diant Sumor	Jeff Walker – Botanist	Х	Х	Х
Plant Survey	Paul Hamidi – Biologist	Х		Х
	Linda Howard – Biologist	Х	Х	Х
Diant Tianua Comulia a	Glen Mejia – Biologist	X	Х	
Plant Tissue Sampling	Josie Smith – Environmental Scientist			Х
	Anders Utter – Environmental Scientist			Х
Call Compline	Stuart Holmes – Geologist	X		Х
Soil Sampling	Dave Lewis – Geologist		Х	
Cultural Resources	Michelle Stegner – Archaeologist	X	Х	Х

Table 1: Plant Tissue Sampling Team

Additional support was provided by the following AECOM staff:

- Cultural Resources Coordinators Sarah McDaniel, Mike Kelly
- Sample Transport Josie Smith
- Spatial Data Management Cary Kindberg
- Health and Safety Fred Merrill

1.5 Health and Safety

A Site health and safety plan (SHSP) addendum to the general SHSP (TCAI 2009) was prepared for the plant tissue sampling events and included as Attachment A1 of the FSP (Ramboll 2018). The SHSP includes sections on driving and traffic safety, deer collision hazards, work in remote areas, wildfire hazards, outdoor heat exposure and weather-related hazards, air quality, biological hazards (contact with wildlife, bees/wasps, ticks, mosquitos, poison ivy, thorned plants), and exposure to high lead soils.

Health and safety protocols, expectations, and overview of the SHSP addendum were provided to supervisor and field staff prior to and during the kick-off meeting for the Study. Tailgate health and safety briefings (or task hazard assessments) were conducted each day prior to starting work. Appendix A contains the daily tailgate task hazard assessment forms.

1.6 Cultural Resources Monitoring

A Cultural Resources Coordination Plan (CRCP) was included in Appendix C of the QAPP to provide relevant background information about Site-related cultural resources, define measures for protecting

resources, and define procedures for consulting with the appropriate state, federal, and tribal parties with interests in the cultural resources of the Site. TAI coordinated with EPA to ensure all necessary consultation and coordination with CCT representatives occurred prior to sample collection on all of the SAs for this Study.

In accordance with the CRCP, a cultural resource monitor and/or tribal representative were present during implementation of the Study. Cultural resources monitoring for the Study was conducted by Pendleton Moses (CCT) and/or an AECOM archaeologist. The cultural resources monitor cleared the area surrounding the plant tissue and soil sampling locations prior to any collection activities and ensured avoidance of culturally sensitive areas.

1.7 Technical Oversight and Observers

EPA and its contractor (Jacobs/CH2M) provided technical oversight of the survey and sampling activities during each of the three sampling events. Technical oversight personnel were present with both the survey and sampling teams each day and were given the opportunity to observe all field tasks. AECOM personnel were available for discussions and to answer questions regarding field activities. TAI and Ramboll personnel were also present during the field sampling events to ensure consistency with the QAPP. A CCT member and/or contractor were present during portions of the field sampling. They provided information on harvesting and cultural uses of targeted plant species and, when necessary, directions for accessing SAs. Technical oversight personnel and observers are listed in Table 2.

Affiliation	Personnel
	Monica Tonel – Project Manager (Spring, June)
EPA Region 10	Marc Stifelman – Human Health Risk Assessment Lead
	Mark Follansbee – Contractor, Syracuse Research Corporation, Inc. (Spring)
	Marilyn Gauthier (Spring)
	Kelly O'Neal (Spring, June)
Jacobs/CH2M	Jonathan Espinoza (Spring)
	Ellie Traudt (June, August)
	Anna Iverson (August)
	Kris McCaig – Project Coordinator
TAI	Denise Mills – Assistant Project Coordinator (Spring)
	Cristy Kessel – Analytical Chemistry Laboratory Coordinator (August)
	Dina Johnson – Principal Investigator (Spring)
Ramboll	Rosalind Schoof - Principal Investigator (June, August)
Kalliboli	Lis Castillo Nelis – Task Manager
	Julie Weicheld (Spring)
	Pendleton Moses (Spring)
CCT	Whitney Fraser - Contractor, Lodestone Environmental Consulting
	Kali Robson – Contractor (Spring)

Table 2: Technical Oversight Personnel and Observers

2.0 Sampling Activities and Documentation

The following sections summarize the scope of work, training and preparation, sampling activities, and documentation associated with the Study.

2.1 Scope of Work

The scope of work for the 2018 sampling efforts was to survey and collect targeted plant tissues and colocated soil samples from three high lead SAs and up to 13 lower lead SAs. Sampling during each of three field events followed the appropriate sampling area selection flow chart in SOP-1 of the FSP. Some target plant tissues that could not be collected in sufficient quantities during the spring and June sampling events were targeted for supplemental sampling during the subsequent sampling events.

Tasks during each sampling event included the following:

- Safety tailgate briefing each morning with the entire group.
- Survey of SAs to identify availability of target plant tissues and flag potential sampling locations.
- Collection of plant tissue samples from targeted plant species. Where available, samples from 12 individual plants or composites were collected. Otherwise, samples from at least three individual plants or composites were collected.
- Collection of co-located soil samples.
- Communication and coordination with property owners or land managers to schedule sampling activities. TAI contacted property owners and land managers to obtain permission to access and conduct plant tissue sampling. TAI obtained a research permit from the CCT to conduct survey and sampling activities on TAs, and a limited use agreement from the U.S. Bureau of Indian Affairs (BIA), Colville Indian Agency, for accessing SAs on tribal trust lands. TAI also obtained permission from Washington State Department of Natural Resources to sample at Deadman's Eddy (SA15). Project permits are reproduced in Appendix B.
- Maintenance of field records including field logbooks, photographic documentation, and field data forms.
- Collection of position coordinates (x, y, and z) for each sampling location.
- Decontamination of sampling equipment in accordance with the QAPP.
- Sample labeling, storage, packaging, and transport to ALS Environmental (ALS) laboratory in Kelso, Washington, using defined chain-of-custody procedures. ALS was selected and contracted by TAI.
- Close coordination with TAI and ALS to ensure proper storage and transportation procedures were followed and chain of custody documented.
- Preparation and submittal of this field investigation summary report to document field activities, modifications (changes) to the QAPP, and associated justifications.

2.2 Training and Preparation

Prior to field work, AECOM biologists prepared for plant tissue sampling and identification. An internal AECOM project kick-off meeting was held on April 4 for the Study field team. Biologists read over the FSP and SOPs and reviewed the Field Reconnaissance Summary Report (AECOM 2017). They became

familiar with data collection methods on subsequent sampling practice. A photographic plant identification guide and other field sampling aids were prepared for the Study and reviewed by the sampling team. Biologists also reviewed a presentation on cultural resources prepared for previous UCR RI/FS sampling efforts.



Photo 1: Spring 2018 field sampling kick-off meeting at SA02

At the beginning of the spring 2018 sampling event, a kick-off meeting was held at the Northport Community Center on April 25. The meeting was attended by representatives from TAI, EPA, CCT, Ramboll, AECOM, and Jacobs/CH2M. TAI, Ramboll, and AECOM representatives provided an overview of the Study purpose and methods, the health and safety plan, and the Study schedule. Members of the CCT shared information on their traditional cultural perspective on plants and plant collecting. After the meeting, attendees travelled to a nearby sampling area (SA02) to initiate sampling (Photo 1).

2.3 Sample Collection

Tables 3 and 4 summarize the combined results for the three sampling events. The SA locations are shown on Figures 2 to 13. Sample collection locations are identified on the figures by species name and sample number. Most of the sample collection locations are within the pre-determined SA boundaries. However, in a few instances, samples were collected just outside of the SA boundaries, but within the TA boundaries. Results by sampling event are presented in sections 2.3.1, 2.3.2, and 2.3.3.

	High Lead SAs								L	ower	Lead S	SAs			
Plant Species	Sampling Event	SA 01	SA 02	SA 03	Total	SA 04	SA 05	SA 06	SA 07	SA 08	SA 09	SA 14	SA 15	SA 16	Total
Black tree lichen (Bryoria fremontii)	Spring	6	-	-	6	-	2	-	-	4	-	-	-	-	6
Camas (Camassia quamash)	Spring	3	-	3	6	-	3	-	3	-	-	-	-	-	6
Chokecherry (Prunus virginiana)	August	3 ^a	-	3	6	-	-	-	5 ^{a,b}	-	1	-	-	-	6
Green willow (Salix exigua)	Spring	-	-	-	0	-	-	-	-	-	-	-	-	6 ^{a,b}	12
Green willow (Salix exigua)	August	-	-	-	0	-	-		-	-	-	-	6 ^{a,b,c}	-	12
Hazelnut (Corylus cornuta var. californica)	August	-	3	3 ^{a,b}	6	2 ^a	-	3 ^b	-	-	1	-	-	-	6
Huckleberry (Vaccinium cespitosum)	June	-	-	-	0	6	-	-	-	-	-	-	-	-	6
Kinnikinnick (Arctostaphylos uva-ursi)	Spring	-	3 ^{a,b}	3 ^{a,b}	6	5 ^{a,b}	-	1 ^a	-	-	-	-	-	-	6
Lomatium (Lomatium triternatum)	Spring	-	1	3		-	3	-	-	3	-	-	-	-	(
Lomatium (Lomatium triternatum)	June	-	-	2	6	-	-	-	-	-	-	-	-	-	6
Ponderosa pine (Pinus ponderosa)	August	3	2^{a}	1	6	3 ^b	-	-	3	-	-	-	-	-	6
Sarvisberry (Amelanchier alnifolia)	August	5	-	1 ^b	6	-	-	-	3 ^{a,b}	2	-	1	-	-	6
Spring beauty / Indian potato (<i>Claytonia lanceolata</i>)	Spring	2	2	2	6	2	2	-	_	2	-	-	-	-	6
Tule (Schoenoplectus acutus)	August	-	-	-	0	-	-	-	-	-	-	6 ^{a,b}	-	-	6
Wild mint (Mentha arvensis)	August	-	-	-	0	-	-	-	-	-	-	6 ^{a,b}	-	-	6
Wild rose (<i>Rosa nutkana</i> , <i>R. woodsii</i>) (stems and leaves)	June	3 ^{a,b}	-	3	6	3 ^{a,b}	-	3 ^{a,b}	-	-	-	-	-	-	6
Wild rose (Rosa nutkana, R. woodsia) (hips)	August	-	-	-	0	-	-	4	-	-	1 ^a	1	-	-	6
Total ^c					60										96
Frequency of Replicate Samples Collected					8.2%										12.5%
Frequency of Split Samples Colle	ctea				8.2%										11.5%

Table 3: Sample Numbers by Plant Species and Location

Notes:

^a One replicate sample collected

^bOne split sample collected

^c SA15 was not identified as a "high lead" sampling area in the QAPP because the average soil lead concentration at SA15 was 389 mg/kg, which is below the time-critical removal action level of 700 ppm.

Plant Species	Reason not Collected			
Bitterroot (Lewisia rediviva)	Lack of suitable habitat.			
Indian carrot (Perideridia gairdneri)	Not found.			
Morel (Morchella esculenta)	Observed outside of SAs.			
Puffball (Calvatia gigantea)	Correct species not found.			
Red willow / red-osier dogwood (Cornus sericea)	Found only on SA09, but not sampled. ^a			
Shaggy mane (Coprinus comatus)	Not found.			
Wild strawberry (Fragaria vesca, F. virginiana)	Insufficient fruit mass.			

Table 4: Target Plant Species not Collected

^aCCT confirmed that this species is not mouthed (Lodestone 2018). It was removed from the list of targeted species after the spring event.

2.3.1 Spring Sampling

Samples were collected from April 25 to May 2, 2018. Samples were packaged on May 3 and transported to the lab on May 4. A total of 69 individual or composite plant tissue and co-located soil samples, including 5 field replicate samples, were collected from 9 SAs. Twenty-eight samples and 2 field replicate samples were collected from high lead SAs, and 36 samples and 3 field replicate samples were collected from lower lead SAs (Table 3). In addition to the successfully collected samples, there were two samples that were initiated but had to be abandoned due to either insufficient mass available for the sample (SA01-SP03-P01) or later identified as an incorrect species (SA08-SP08-P01).

Six of the 13 plant and fungi species targeted for spring collection were found in sufficient quantities to meet target sample masses. Seven species were not collected for various reasons, as indicated in Table 4. Species-by-species collection results are summarized in the following subsections.

Black Tree Lichen

Black tree lichen (*Bryoria fremontii*) was identified growing on several SAs. It was collected on one high lead and two lower lead SAs. It was most abundant on older ponderosa pine and western larch trees and several species of shrubs (sarvisberry, hawthorn, and chokecherry). A summary of sampling results for black tree lichen is provided in Table 5. The protocols for sampling black tree lichen for the Study are provided in SOP-4 of Attachment A2 of the FSP (Appendix A of the QAPP [Ramboll 2018]).

The target sample mass was 2.3 grams, which required collection from multiple individuals growing on multiple trees or shrubs (Photos 2 and 3). A composite sample was collected from lichens growing within an approximately 20-meter-diameter circle. Lichens were removed from branches and twigs and often had small pieces of bark or other lichens attached to them. This extraneous material was removed as much as possible during sample collection. Additional mass was collected beyond the target mass to compensate for extraneous material that could not be removed as well as for lichens that appeared to contain excess moisture from rainfall. No field replicates and no split samples were collected for black tree lichen. A single soil sample was taken from the center of the circular sampling area. The GPS location was taken at the soil sample location.

Sampling Area	Sampling Date	Sample Number	Sample Mass (grams)	Notes		
		SP05	2.3			
		SP07	16.0	Collected from ponderosa pine trees		
SA01	Amril 29	SP08	9.0	and a few surrounding shrubs. Samples include minor amounts of bark and		
SAUI	April 28	SP10	6.1	other lichens. Sufficient mass for TAL		
		SP11	5.3	metals analysis.		
		SP12	10.3			
SA05	A	SP04	5.1	Collected from hawthorn trees and surrounding shrubs. Sufficient mass for TAL metals analysis.		
SAUS	April 30	SP10	4.1	Collected from chokecherry shrubs. Sufficient mass for TAL metals analysis.		
		SP04	5.0			
SA08	Moy 2	SP05	4.1	Collected from sarvisberry and		
SAUS	May 2	SP06	5.8	hawthorn trees in gulch. Sufficient mass for TAL metals analysis.		
		SP07	3.8	······ · · ······ · ······ · ······ · ····		

Table 5: Black Tree Lichen Sampling Summary



Photo 2: Sample of black tree lichen being bagged



Photo 3: Black tree lichen at SA08

Camas

Camas (*Camassia quamash*) was growing on several SAs. It was collected on two high lead and two lower lead SAs. It was most abundant on flat grassy fields and the edge of open ponderosa pine forests (Photo 4). It is known to prefer soils that are very moist or saturated in the early part of the growing season but dry out by summer. A summary of sampling results for camas is provided in Table 6. The protocols for sampling camas for the Study are provided in SOP-4 of Attachment A2 of the FSP (Appendix A of the QAPP [Ramboll 2018]).

This herbaceous species was only noted from one dried stalk with empty seed capsules during the August 2017 field reconnaissance. The fleshy leaves and flower heads generally dry out by mid-summer and are difficult to find in the grassy fields where they grow. Vegetative growth was apparent at the beginning of the spring 2018 survey. The lack of flowers required observation of the bulbs for a positive identification as there are other plants in the same family that have similar vegetative growth. These include *Brodiaea* species and *Toxicoscordion* (=*Zigadenus*) species (death camas), both of which were observed on some of the SAs. CCT members and their consultants made the positive identifications of camas on the SAs. Toward the end of the spring sampling event, flower heads began to emerge, which confirmed the identification (Photo 5).

The target plant tissue for camas was the bulb, which required destruction of the plants to collect samples. Sampling areas were selected where the species was generally abundant to avoid over-collection. The minimum number of bulbs were dug up to meet the target sample mass, which was 4.5 grams. The few bulbs that were dug up but not needed for a sample were reburied in place. The mass of the bulbs varied greatly between individuals and was not always discernable based on the vegetative growth of the plants. Individual bulbs weighed between 0.4 and 3.4 grams, with an average weight of 1.2 grams.

Sampling Area	Sampling Date	Sample Number	Sample Mass (grams)	Number of Bulbs in Composite	Notes	
		SP01	4.9	3		
SA01	April 27	SP02	4.9	6	Sufficient mass for TAL metals analysis.	
		SP09	4.6	2		
	April 26	SP03	6.1	3	Sufficient mass for TAL metals analysis.	
SA03	Amril 27	SP04	5.4	4		
	April 27	SP05	4.6	2		
		SP07	4.5	2		
SA05	April 30	SP08	4.8	6	Sufficient mass for TAL metals analysis.	
		SP09	5.5	6		
		SP01	4.5	5	Collected in flat, grassy field	
SA07	May 2	SP02	4.6	4	with scattered ponderosa pine.	
		SP03	6.4	6	Sufficient mass for TAL metals analysis.	

Table 6: Camas Sampling Summary



Photo 4: Camas patch at SA01



Photo 5: Camas in bloom at SA07

Between two and six camas bulbs were required for a composite sample to meet the target mass. Bulbs for the composite samples were collected within a short distance of each other.

Each bulb making up the composite sample was weighed individually and recorded on the data sheets. The proportion of the sample mass represented by each bulb was calculated. A co-located soil sample was taken next to each individual bulb. A representative proportion of soil near each bulb was then used to make a composite soil sample. A single GPS location was taken from the center of the sampling area, unless individual plants were more than 3 meters apart, in which case GPS locations were taken for each plant.

Kinnikinnick

Kinnikinnick (*Arctostaphylos uva-ursi*) was observed on all high lead SAs and several lower lead SAs. It was collected on two high lead and two lower lead SAs. This trailing evergreen shrub was most abundant in ponderosa pine forests under a wide range of canopy conditions. Samples were collected from large clumps with multiple branches (Photos 6 and 7). Individual kinnikinnick plants send out ground-trailing stems that can take root. Rooted branches within a large patch were assumed to be genetically identical for sampling. Distinct samples were taken from widely separated patches, at least 20 feet apart. A summary of sampling results for kinnikinnick is provided in Table 7. The protocols for sampling kinnikinnick for the Study are provided in SOP-4 of Attachment A2 of the FSP (Appendix A of the QAPP [Ramboll 2018]).

The target plant tissue for kinnikinnick was the leaves. Samples were collected where patches of the plant were relatively abundant. The target sample mass for analysis was 5.3 grams, which required removing numerous leaves from multiple branches in the patch. Sample collection did not result in destruction of any plants. Leaves were abundant enough to take both a replicate sample and for a potential EPA split

sample. Two replicate and two split samples were collected on high lead SAs. Two replicates and one split sample were collected on lower lead SAs. A single co-located soil sample and GPS location were collected from the center of the sampling area.

Lomatium

Lomatium was observed growing on several SAs. It was collected on two high lead and two lower lead SAs. It was most abundant on dry, rocky slopes and ridges (Photo 8). A summary of sampling results for lomatium is provided in Table 8. The protocols for sampling lomatium for the Study are provided in SOP-4 of Attachment A2 of the FSP (Appendix A of the QAPP [Ramboll 2018]).

Sampling Area	Sampling Date	Sample Number	Sample Mass (grams)	Notes			
		SP02	6.5	Sufficient mass for both TAL metals and mercury analyses.			
SA02	April 26	SP03	5.9	Replicate sample of SA02-SP02-P01 . Sufficient mass for both TAL metals and mercury analysis.			
SA02	April 20	SP04	11.4	Sufficient mass for potential EPA split sample for both TAL metals and mercury analysis.			
		SP05	6.0	Sufficient mass for both TAL metals and mercury analysis.			
		SP01	5.6	Sufficient mass for both TAL metals and mercury analysis.			
SA03	A	SP02	5.7	Replicate sample of SA03-SP01-P01 . Sufficient mass for both TAL metals and mercury analysis.			
5A05	April 27	SP10	5.8	Sufficient mass for both TAL metals and mercury analysis.			
		SP11	11.2	Sufficient mass for potential EPA split sample for both TAL metals and mercury analysis.			
		SP01	5.8	Sufficient mass for both TAL metals and mercury analysis.			
	A	SP02	6.1	Replicate sample of SA04-SP01-P01 . Sufficient mass for both TAL metals and mercury analysis.			
SA04	April 30	April 30	April 30	April 30	SP03	11.5	Sufficient mass for potential EPA split sample for both TAL metals and mercury analysis.
		SP04	6.4	Sufficient mass for both TAL metals and mercury analysis.			
	M. 1	SP05	6.0	Sufficient mass for both TAL metals and mercury analysis.			
	May 1	SP06	6.0	Sufficient mass for both TAL metals and mercury analysis.			
		SP01	8.7	Sufficient mass for both TAL metals and mercury analysis. Many leaves are discolored.			
SA06	May 1	SP02	6.4	Replicate sample of SA06-SP01-P01 . Sufficient mass for both TAL metals and mercury analysis. Many leaves are discolored.			

Table 7: Kinnikinnick Sampling Summary



Photo 6: Kinnikinnick patch at SA04-SP06



Photo 7: Kinnikinnick patch at SA03-SP11

Sampling Area	Sampling Date	Sample Number	Sample Mass (grams)	Number of Roots in Composite	Notes	
SA02	April 26	SP06	3.9	3	Individual "c" collected 6.8 meters from other individuals. Sample mass is within 5% of minimum mass. Sufficient mass for TAL metals analysis.	
SA03 April 27	April 27	SP08	6.8	1	Three roots from one plant. Not a composite sample. Sufficient mass for TAL metals analysis.	
51100		SP09	4.8	6	Sufficient mass for TAL metals analysis.	
		SP12	6.9	9	Sufficient mass for TAL metals analysis.	
		SP01	4.7	4	Sufficient mass for TAL metals analysis.	
SA05	April 30	April 30	~~ ~~		1	Not a composite sample. Sufficient mass for TAL metals analysis.
	I	SP03	7.0	8	Individuals "f," "g," and "h" collected 121 meters from other individuals. Sufficient mass for TAL metals analysis.	
		SP01	8.9	3	Collected on open rocky slope near ridge.	
SA08	May 2	SP02	8.3	6	Sufficient mass for TAL metals analysis.	
5400	iviay 2	SP03	9.8	4	Collected on open rocky slope. Sufficient mass for TAL metals analysis.	

Table 8: Lomatium Sampling Summary

This herbaceous species was generally not identifiable during the August 2017 field reconnaissance. It blooms in spring and early summer and is otherwise difficult to locate. Several species of lomatium are used by the CCT. Only one species, nineleaf biscuitroot (*Lomatium triternatum*), was identified and collected on the SAs during the spring sampling event (Photo 9). It is possible that other species grow on the SAs but had not yet flowered.

The target plant tissue for lomatium was the root, which required destruction of the plants to collect samples. Sampling areas were selected where the species was generally abundant to avoid over-collection. The minimum number of roots were dug up to meet the target sample mass of 8.1 grams or the minimum sample mass of 4.1 grams. The few roots that were dug up but not needed for a sample were reburied in place. The mass of the roots varied greatly between individuals and was not always discernable based on the vegetative growth of the plants. Individual roots weighed between 0.1 and 7.0 grams and averaged 1.5 grams. Some plants had up to three roots. Between three and nine lomatium roots were required for a composite sample to meet the target or minimum mass. Roots for the composite samples were collected within a short distance of each other when possible.



Photo 8: Lomatium sampling location at SA08





Photo 9: Lomatium plant and root collected at SA08

Each root making up the composite samples was weighed individually and recorded on the data sheets. The proportion of the sample mass represented by each root was calculated. A co-located soil sample was collected next to each individual root. A representative proportion of soil near each bulb was then used to make a composite soil sample. A single GPS location was taken from the center of the sampling area, unless individual plants were more than 3 meters apart, in which case GPS locations were taken for each plant.

Spring Beauty/Indian Potato

Spring beauty/Indian potato (*Claytonia lanceolata*) was observed growing on several SAs. It was collected on three high lead and three lower lead SAs. It tended to grow in small patches beneath the canopy of ponderosa pine forests on level to gently sloping areas (Photo 10). This herbaceous species blooms in spring and early summer and was not observed during the August 2017 field reconnaissance. A summary of sampling results for this species is provided in Table 9. The protocols for sampling spring beauty for the Study are provided in SOP-4 of Attachment A2 of the FSP (Appendix A of the QAPP [Ramboll 2018]).

Sampling Area	Sampling Date	Sample Number	Sample Mass (grams)	Number of Corms in Composite	Notes
SA01	April 28	SP04	4.6	9	Sufficient mass for TAL metals analysis.
SAU	April 28	SP06	4.4	11	Sufficient mass for TAL metals analysis.
SA02	April 25	SP01	2.3	7	Sufficient mass for TAL metals analysis.
5402	April 26	SP07	2.2	9	Sufficient mass for TAL metals analysis.
SA03	April 27	SP06	4.5	3	Sufficient mass for TAL metals analysis.
5405	ripin 27	SP07	1.8	4	Sufficient mass for TAL metals analysis.
		SP07	3.3	10	Collected in ponderosa pine forest
SA04	May 1	SP08	4.1	6	Sufficient mass for TAL metals analysis.
SA05	Amil 20	SP05	4.9	3	Sufficient mass for TAL metals analysis.
SAUS	April 30	SP06	3.9	2	Sufficient mass for TAL metals analysis.
SA08	May 2	SP09	4.1	9	Sufficient mass for TAL metals analysis.
5408	May 2	SP10	3.8	8	Sufficient mass for TAL metals analysis.

Table 9: Spring Beauty/Indian Potato Sampling Summary



Photo 10: Patch of spring beauty/Indian potato growing below ponderosa pine canopy



Photo 11: Spring beauty/Indian potato with corm collected at SA05

The target plant tissue for spring beauty was the corm, which required destruction of the plants to collect samples (Photo 11). Sampling areas were selected where the species was generally abundant to avoid over-collection. The minimum number of corms were dug up to meet the target sample mass of 3.8 grams or the minimum sample mass of 1.9 grams. The few corms that were dug up but not needed for a sample were reburied in place. The mass of the corms varied greatly between individuals and was not always discernable based on the vegetative growth of the plants. Individual corms weighed between 0.1 and 2.6 grams. Between 2 and 11 spring beauty corms were required for a composite sample to meet the target or minimum mass. Corms for the composite samples were collected within a short distance of each other when possible.

Each corm making up the composite samples was weighed individually and recorded on the data sheets. The proportion of the sample mass represented by each corm was calculated. A co-located soil sample was collected next to each individual corm or closely grouped corms. A representative proportion of soil near each corm or group was then used to make a composite soil sample. A single GPS location was taken from the center of the sampling area, unless individual plants or groups were more than 3 meters apart, in which case GPS locations were taken for each plant or group.

Green Willow

Green willow (*Salix exigua*) grows in riparian areas, gravel bars, and lake and pond margins. It was not identified on any of the original SAs during the August 2017 field reconnaissance, because these areas lacked appropriate habitat. Two additional SAs (SA15 and SA16) adjacent to the Columbia River were added for the spring 2018 sampling event to capture riparian habitats.

SA15 is located on a large gravel bar at Deadman's Eddy, northeast of Northport. This area was surveyed for willows during the spring 2018 sampling event, but none were observed. The predominant woody plants observed in the riparian areas were cottonwood saplings, which can look similar to willows when dormant.

SA16 is located on the Columbia River south of Kettle Falls and adjacent to Barnaby Island. Abundant green willows were observed in this area (Photo 12), sufficient for collection of all six samples. Samples were collected from robust individual shrubs of the appropriate length and diameter (Photo 13). Distinct samples were taken from widely separated plants across the SA. A summary of sampling results for green willow is provided in Table 10. The protocols for sampling green willow for the Study are provided in SOP-4 of Attachment A2 of the FSP (Appendix A of the QAPP [Ramboll 2018]).

The target plant tissue for green willow was the inner bark of branches less than 0.5 inch in diameter. Branches were collected intact for later extraction of the inner bark at the laboratory. Each sample consisted of branches from a single plant. The target sample was based on branch length (189 centimeters) rather than mass. Sample collection did not result in destruction of any plants. Branches were abundant enough to take both a replicate sample and a potential EPA split sample. A co-located soil sample and GPS location were collected next to each sampled plant.

Sampling Area	Sampling Date	Sample Number	Sample Length (centimeters)	Notes
		SP01	190	Sufficient mass for both TAL metals and mercury analyses.
		SP02	190	Replicate sample of SA16-SP01-P01 . Sufficient mass for both TAL metals and mercury analysis.
		SP03	405	Sufficient mass for potential EPA split sample for both TAL metals and mercury analysis.
SA16	May 1	SP04	205	Sufficient mass for both TAL metals and mercury analysis.
		SP05	215	Sufficient mass for both TAL metals and mercury analysis.
		SP06	217	Sufficient mass for both TAL metals and mercury analysis.
		SP07	203	Sufficient mass for both TAL metals and mercury analysis.

Table 10: Green Willow Sampling Summary



Photo 12: Green willows in riparian area at SA16



Photo 13: Green willow stems collected at SA16

2.3.2 June Sampling

Samples were collected from June 18 to June 20, 2018. Samples were packaged on June 21 and transported to the lab on June 22. A total of 23 individual or composite plant tissue and co-located soil samples, including 3 field replicate samples, were collected from 4 SAs. Eight samples and 1 field replicate sample were collected from high lead SAs, and 12 samples and 2 field replicate samples were collected from lower lead SAs (Table 3).

Sarvisberry (*Amelanchier alnifolia*) and wild strawberry (*Fragaria* spp.) were initially targeted for June collection. Sarvisberry was prevalent across several SAs, but the fruit was green and, in consultation with a CCT representative, was deemed too immature for collection. The sampling team, in consultation with technical oversight personnel, decided to postpone collection of sarvisberry until the August sampling event.

Wild strawberry plants had been identified and mapped across several SAs during both the 2017 field reconnaissance and the spring 2018 sampling event; however, very few of these plants were in flower. During the June sampling event, very few fruits were found, and those fruits were insufficient to meet target sample size.

Indian carrot (*Perideridia gairdneri*) was originally targeted for collection during the spring sampling event. However, no plants were observed on any of the SAs. This was also the case during the June sampling event. As the plant blooms from July to September, sampling was postponed until the August sampling event when it might be more identifiable.

Ponderosa pine (*Pinus ponderosa*) nuts were targeted for sampling during the August event. To facilitate sampling in August, additional pine trees with either low-hanging pine cones, or abundant cones higher up, were identified and located with GPS. Some pine cones were collected from the forest floor to try to estimate the number of nuts per cone. Most of the nuts appeared to have been eaten by insects. New cones still on the trees were unripe and closed, so nuts could not be extracted.

One potential sampling area for green willow was observed by a member of the survey team along with EPA and CCT representatives. The site includes an island in the Columbia River that appeared to have cottonwoods and willows (likely green willow). A boat would be required to access the site. No samples were collected from this site in June, but this area was evaluated as a potential sampling area for the August event as discussed in Section 2.3.3.

Species-by-species collection results are summarized in the following subsections.

Wild Rose

Wild rose stems and leaves were originally targeted for the spring 2018 sampling event. Due to insufficient vegetative growth at that time, the sampling was postponed until June. Wild rose includes both Woods' rose (*Rosa woodsii*) and Nootka rose (*R. nutkana*). It was difficult to identify plants to species without fruits, which were not often present. Baldhip rose (*R. gymnocarpa*) was not observed. Wild rose was abundant on two high lead SAs and several lower lead SAs. It was collected on two high lead SAs and two lower lead SAs.

The target plant tissue for wild rose was tender stems with leaves. Samples were collected from individual shrubs of the appropriate length (Photo 14). Distinct samples were taken from widely separated plants across the SA. Plants with flowers were avoided to ensure that rose hips would be available for collection in August. A summary of sampling results for wild rose is provided in Table 11. The protocols for sampling wild rose for the Study are provided in SOP-4 of Attachment A2 of the FSP (Appendix A of the QAPP [Ramboll 2018]).

The target sample was based on stem length (48.3 centimeters of stem with leaves) rather than mass. Sample collection did not result in destruction of any plants. Stems were abundant enough to take both replicate samples and potential EPA split samples. One replicate and one split sample were collected on high lead SAs. Two replicates and two split samples were collected on lower lead SAs. A co-located soil sample and GPS location were collected next to each sampled plant.

Sampling Area	Sampling Date	Sample Number	Sample Length (centimeters)	Notes			
		JU01	275	Sufficient mass for potential EPA split sample and both TAL metals and mercury analyses.			
		JU02	98	Sufficient mass for potential EPA split sample for both TAL metals and mercury analysis.			
SA01	June 19	JU03	77	Replicate sample of SA01-JU02-P01 . Sufficient mass for both TAL metals and mercury analysis.			
		JU04	100	Sufficient mass for TAL metals and mercury analysis.			
		JU01	70	Sufficient mass for TAL metals and mercury analysis.			
SA03	June 18	June 18	JU02	81	Sufficient mass for TAL metals and mercury analysis.		
		JU03	57	Sufficient mass for TAL metals and mercury analysis.			
	June 19	JU01	150	Sufficient mass for potential EPA split sample for both TAL metals and mercury analysis.			
					JU02	70	Sufficient mass for both TAL metals and mercury analysis.
SA04		JU03	82	Replicate sample of SA04-JU02-P01 . Sufficient mass for both TAL metals and mercury analysis.			
		JU04	91	Sufficient mass for both TAL metals and mercury analysis.			
		JU01	218	Sufficient mass for potential EPA split sample for both TAL metals and mercury analysis.			
		JU02	115	Sufficient mass for both TAL metals and mercury analysis.			
SA06	June 20	JU03	149	Replicate sample of SA06-JU02-P01 . Sufficient mass for both TAL metals and mercury analysis.			
		JU04	116	Sufficient mass for both TAL metals and mercury analysis.			

Table 11: Wild Rose Sampling Summary



Photo 14: Wild rose stems with leaves collected at SA03

Huckleberry

Huckleberry was originally targeted for the August 2018 sampling event. During a plant survey of SA04, fruits of dwarf huckleberry (*Vaccinium cespitosum*) were observed to be ripe and in sufficient quantity to meet target sample mass. The sampling team, in consultation with technical oversight personnel, decided to collect samples in June rather than waiting until August, when fruits may be past their prime or consumed by wildlife. Dwarf huckleberry was the only huckleberry species observed, and it was only observed in one sampling area (SA04).

Berries were collected from patches (Photo 15). One soil sample and GPS location were collected from the center of the patch. Discrete samples were taken from widely separated patches across the SA. Heavily berried plants were selected where possible. A summary of sampling results for huckleberry is provided in Table 12. The protocols for sampling huckleberry for the Study are provided in SOP-4 of Attachment A2 of the FSP (Appendix A of the QAPP [Ramboll 2018]).

The target and minimum sample masses were 31 grams and 16 grams, respectively. An initial sample of 10 berries was weighed to estimate the number of berries required to meet each mass. The minimum sample mass required approximately 114 berries. It was decided that the huckleberry patches would not likely sustain enough berries to meet the target sample mass, so the minimum sample mass was collected (Photo 16).

Sampling Area	Sampling Date	Sample Number	Sample Mass (grams)	Notes	
		JU05	17.0	Sufficient mass for TAL metals analysis.	
	June 19	JU06	18.0	Sufficient mass for TAL metals analysis.	
SA04		JU07	18.0	Sufficient mass for TAL metals analysis.	
5A04		JU08	16.0	Sufficient mass for TAL metals analysis.	
	June 20	JU09	18.0	Sufficient mass for TAL metals analysis.	
		JU10	19.0	Sufficient mass for TAL metals analysis.	

Table 12: Huckleberry Sampling Summary



Photo 15: Dwarf huckleberry patch sampled at SA04



Photo 16: Huckleberries sampled at SA04

Lomatium

Lomatium roots were sampled during the spring 2018 event. See Section 2.3.1 for sampling details and photographs. Two additional samples were collected in June from SA03 to meet the study objectives of collecting six individual samples from high lead SAs. Each sample was a composite of four nearby individuals. A summary of sampling results is provided in Table 13.

Sampling Area	Sampling Date	Sample Number	Sample Mass (grams)	Number of Roots in Composite	Notes
SA03		JU04	8.6	4	Sufficient mass for TAL metals analysis.
SA05	June 18	JU05	7.8	4	Sufficient mass for TAL metals analysis.

Table 13: Lomatium Sampling Summary

2.3.3 August Sampling

Samples were collected from August 21 to August 28, 2018. Samples were packaged on August 29 and transported to the lab on August 30. A total of 82 individual or composite plant tissue and co-located soil samples, including 10 field replicate samples, were collected from 10 SAs. Twenty-four samples and 3 field replicate samples were collected from high lead SAs, and 48 samples and 7 field replicate samples were collected from lower lead SAs (Table 3).

Wild strawberry was originally targeted for collection during the June sampling event. However, very few fruits were found, and those fruits were insufficient to meet the target sample size. No fruits were found during the August sampling event.

Indian carrot was originally targeted for collection during the spring sampling event. However, no plants were observed in any of the SAs during the spring sampling event or during the June sampling event. The plant blooms from July to September; however, no plants were observed in any of the SAs during the August sampling event.

Species-by-species collection results are summarized in the following subsections.

Chokecherry

Chokecherry (*Prunus virginiana*) was observed on all high lead SAs and several lower lead SAs. It was collected on two high lead and two lower lead SAs. This plant spreads by suckering and can form dense colonies of multi-branched shrubs or small trees. Branches visibly connected above ground to a central stem or radiating outward from below ground around the central stem were assumed to be genetically identical for sampling. Samples were taken from plants with visibly distinct central stems (Photo 17). A summary of sampling results for chokecherry is provided in Table 14. The protocols for sampling chokecherry for the Study are provided in SOP-4 of Attachment A2 of the FSP (Appendix A of the QAPP [Ramboll 2018]).

The target plant tissue for chokeberry was the fruit. The target sample mass was 60 grams. Fruit was abundant enough to collect two replicate samples and one potential EPA split sample. One replicate was

collected on high lead SAs. One replicate and one split sample were collected on lower lead SAs. A single co-located soil sample and GPS location were taken below the crown of each sampled plant.

Sampling Area	Sampling Date	Sample Number	Sample Mass (grams)	Notes	
		AU01	76.5	Sufficient mass for TAL metals analysis.	
		AU02	82.0	Sufficient mass for TAL metals analysis.	
SA01	August 22	AU03	112.0	Replicate sample of SA01-AU02-P01 . Sufficient mass for TAL metals analysis.	
		AU04	79.0	Sufficient mass for TAL metals analysis.	
		AU05	177.0	Sufficient mass for TAL metals analysis.	
SA03	August 21	AU06	188.0	Sufficient mass for TAL metals analysis.	
		AU07	86.0	Sufficient mass for TAL metals analysis.	
	August 24		AU01	105.0	Sufficient mass for TAL metals analysis.
		AU02	105.0	Replicate sample of SA07-AU01-P01 . Sufficient mass for TAL metals analysis.	
SA07		AU03	98.0	Sufficient mass for TAL metals analysis.	
		AU08	85.0	Sufficient mass for TAL metals analysis.	
		AU10	100.0	Sufficient mass for TAL metals analysis.	
		AU11	212.0	Sufficient mass for potential EPA split sample for TAL metals.	
SA09	August 25	AU04	89.0	Sufficient mass for TAL metals analysis.	

Table 14: Chokecherry Sampling Summary



Photo 17: Chokecherries sampled at SA03

Hazelnut

Hazelnut (*Corylus cornuta* var. *californica*) was observed on two high lead SAs and several lower lead SAs (Photo 18). It was collected on two high lead and three lower lead SAs. A summary of sampling results for hazelnut is provided in Table 15. The protocols for sampling hazelnut for the Study are provided in SOP-4 of Attachment A2 of the FSP (Appendix A of the QAPP [Ramboll 2018]).

The protocol for sampling hazelnut in SOP-4 called for spreading a cloth on the ground under the plant and gently shaking the branches to collect ripe nuts. However, during the first day of sampling it was determined that picking the nuts off the tree was more successful. Additionally, the protocol called for putting the hazelnuts into a cup or bowl of deionized water and discarding those that float, with the assumption that nuts that float are empty or have insect damage not visible on the outside of the shell. The field team tried the float test on the first sample of hazelnuts collected and found that almost every hazelnut floated. Several hazelnuts that floated were cracked open to determine the condition of the nut, and it was found that these were not necessarily empty or damaged, and that the float test was not predictive of sample integrity. Therefore, the float test was not used. Additional nuts above the target amount were collected to account for the potential that empty or damaged nuts were collected along with whole nuts.

The target sample was six nuts. Hazelnuts were abundant enough to collect more than the target quantity and to collect replicate samples and potential EPA split samples. One replicate sample and one split sample were collected at high lead SAs and one replicate sample and one split sample were collected at lower lead SAs. A single co-located soil sample and GPS location were taken below the crown of each sampled plant.

Sampling Area	Sampling Date	Sample Number	Sample Units (nuts)	Notes			
		AU01	21	Sufficient mass for TAL metals analysis.			
SA02	August 21	AU02	31	Sufficient mass for TAL metals analysis.			
		AU03	21	Sufficient mass for TAL metals analysis.			
		AU01	20	Sufficient mass for TAL metals analysis.			
		AU02	12	Sufficient mass for TAL metals analysis.			
SA03	August 21	AU03	20	Replicate sample of SA03-AU02-P01 Sufficient mass for TAL metals analysis.			
		AU04	57	Sufficient mass for potential EPA split sample for TAL metals.			
	August 23	AU01	22	Sufficient mass for TAL metals analysis.			
SA04		AU02	22	Replicate sample of SA04-AU01-P01 . Sufficient mass for TAL metals analysis.			
		AU03	24	Sufficient mass for TAL metals analysis.			
SA06	August 23	August 23			AU01	62	Sufficient mass for potential EPA split sample for TAL metals.
			AU02	27	Sufficient mass for TAL metals analysis.		
		AU03	20	Sufficient mass for TAL metals analysis.			
SA09	August 25	AU01	28	Sufficient mass for TAL metals analysis.			

Table 15: Hazelnut Sampling Summary



Photo 18: Hazelnuts sampled at SA02

Ponderosa Pine

Ponderosa pine was observed on all high lead SAs and several lower lead SAs. The target plant tissue for Ponderosa pine were pine nuts harvested from cones. Pine cones were collected on three high lead SAs and two lower lead SAs. A summary of sampling results for ponderosa pine is provided in Table 16. The protocol for sampling ponderosa pine tissue for the Study are provided in SOP-4 of Attachment A2 of the FSP (Appendix A of the QAPP [Ramboll 2018]).

Sampling Area	Sampling Date	Sample Number	Sample Units (cones)	Notes	
		AU10	12	Cones collected with extendable lopper. Sufficient mass for TAL metals analysis.	
SA01	August 22	AU11	11	Cones collected by hand from ground. Sufficient mass for TAL metals analysis.	
	August 22	AU12	10	Majority of cones collected with extendable lopper; some cones collected by hand from ground. Sufficient mass for TAL metals analysis.	
		AU04	15	Cones collected by hand from ground. Sufficient mass for TAL metals analysis.	
SA02	August 21	AU05	11	Replicate sample of SA02-AU04-P01 . Cones collected by hand from ground. Sufficient mass for TAL metals analysis.	
		AU06	10	Cones collected by hand from ground. Sufficient mass for TAL metals analysis.	
SA03	August 21	AU09	11	Cones collected by hand from ground. Sufficient mass for TAL metals analysis.	
	August 23	AU04	17	Cones collected by hand from ground. Sufficient mass for TAL metals analysis.	
SA04		August 23	AU05	26	Sufficient mass for potential EPA split sample . Cones collected by hand from ground. Sufficient mass for TAL metals analysis.
		AU06	16	Cones collected by hand from ground. Sufficient mass for TAL metals analysis.	
	August 24	AU09	13	Cones collected with extendable lopper. Sufficient mass for TAL metals analysis.	
SA07		AU12	14	Cones collected with extendable lopper. Sufficient mass for TAL metals analysis.	
		AU13	12	Cones collected with extendable lopper. Sufficient mass for TAL metals analysis.	

Table 16: Ponderosa Pine Cone Sampling Summary

The target plant tissue for lab testing was the nut, but the target for field collection was the pine cone. The initial target and minimum samples for ponderosa pine were 20 cones and 10 cones, respectively; however, a field test was conducted on August 20 to estimate how many nuts might be present in cones found on the ground. From that test, it was determined that 6 to 10 cones would make an adequate sample. Pine cones were collected both directly from trees and from the ground. Cones collected from the tree were picked using an extendable lopper (Photo 19). A short section of branch that had a cone on it was cut from the tree, the branch was retrieved from the ground, and the cone was then cut from the branch (Photo 20). One replicate sample and one potential EPA split sample were collected for ponderosa pine nut analyses. A single co-located soil sample and GPS location were taken below the crown of each sampled tree.



Photo 19: Ponderosa pine cones collected from tree using extendable lopper at SA04



Photo 20: Ponderosa pine cones collected at SA04

Sarvisberry

Sarvisberry was observed on all high lead SAs and all lower lead SAs. The target plant tissue for sarvisberry was the fruit. During the August 2017 field reconnaissance phase of this Study (AECOM 2017), the majority of fruit observed still on the plants was dried out. So, for the field sampling phase of

this Study, sarvisberry was originally targeted for collection during the June sampling event. However, in June the fruit was green and deemed too immature for collection. Collection was postponed until the August sampling event, and a target mass for dry fruit was established based on dry fruit samples collected during the August 2017 field reconnaissance. The target sample mass was 31.0 grams for plump fruit and 3.1 grams for dry fruit. Fruit collected during the August sampling event was dried out, so the target sample mass for dry fruit was used.

Sarvisberry was collected from two high lead and three lower lead SAs (Photo 21). Fruit was abundant enough to collect two potential EPA split samples and one replicate sample. One split sample was collected on a high lead SA. One replicate and one split sample were collected on lower lead SAs. A single co-located soil sample and GPS location were taken below the crown of each sampled plant. A summary of sampling results for sarvisberry is provided in Table 17. The protocols for sampling sarvisberry for the Study are provided in SOP-4 of Attachment A2 of the FSP (Appendix A of the QAPP [Ramboll 2018]).

Sampling Area	Sampling Date	Sample Number	Sample Mass (grams)	Notes
		AU05	8.9	Sufficient mass for TAL metals analysis.
		AU06	10	Sufficient mass for TAL metals analysis.
SA01	August 22	AU07	6.2	Sufficient mass for TAL metals analysis.
		AU08	7.5	Sufficient mass for TAL metals analysis.
		AU09	6	Sufficient mass for TAL metals analysis.
SA03	August 21	_		Sufficient mass for potential EPA split sample. Sufficient mass for TAL metals analysis.
	August 24	AU04	21.5	Sufficient mass for potential EPA split sample. Sufficient mass for TAL metals analysis.
SA07		AU05	22	Sufficient mass for TAL metals analysis.
		AU06	17	Sufficient mass for TAL metals analysis.
		AU07	17	Replicate sample of SA07-AU06-P01 . Sufficient mass for TAL metals analysis.
SA08	August 27	AU01	25	Sufficient mass for TAL metals analysis.
SAUO		AU02	13	Sufficient mass for TAL metals analysis.
SA14	August 27	AU16	8.15	Sufficient mass for TAL metals analysis.

Table 17: Sarvisberry Sampling Summary



Photo 21: Sarvisberries sampled at SA07

Tule

Tule (*Schoenoplectus acutus*) was observed growing in only one sampling area (SA14; Photo 22). Tule grows in large patches propagated by rhizomes, making it difficult to identify genetically distinct individuals. One large patch of tule was identified in SA14. Discrete samples were collected from individual tule as widely spaced as possible within the patch. A summary of sampling results for tule is provided in Table 18. The protocols for sampling tule for the Study are provided in SOP-4 of Attachment A2 of the FSP (Appendix A of the QAPP [Ramboll 2018]).

The target sample for tule was based on culm length (90 centimeters) rather than mass. Culms were cut as close to the base of the plant as possible, and the reproductive part of the plant was removed and discarded near the mature plants. After being measured, culms were cut to fit into sample bags. Sample collection did not result in the destruction of any plants. Culms were abundant enough to collect both a replicate sample and a potential EPA split sample. A co-located soil sample and GPS location were collected next to each sampled plant.

Sampling Area	Sampling Date	Sample Number	Sample Length (centimeters)	Notes
		AU08	269	Sufficient mass for both TAL metals and mercury analyses.
		AU09	290	Sufficient mass for both TAL metals and mercury analysis.
	August 27	AU10	260	Replicate sample of SA14-AU09-P01. Sufficient mass for both TAL metals and mercury analysis.
SA14		AU11	233	Sufficient mass for both TAL metals and mercury analysis.
		AU12	412	Sufficient mass for potential EPA split sample for both TAL metals and mercury analysis.
		AU13	272	Sufficient mass for both TAL metals and mercury analysis.
		AU14	277	Sufficient mass for both TAL metals and mercury analysis.

Table 18: Tule Sampling Summary



Photo 22: Tule sampled at SA14

Wild Mint

Wild mint (*Mentha arvensis*) was observed growing in only one sampling area (SA14). Wild mint grows in large patches propagated by rhizomes, making it difficult to identify genetically distinct individuals. One large patch of wild mint was identified in SA14 (Photo 23). Discrete samples were collected from individual clumps of mint (considered to be genetically the same individual) as widely spaced as possible within the patch. A summary of sampling results for mint is provided in Table 19. The protocols for sampling wild mint for the Study are provided in SOP-4 of Attachment A2 of the FSP (Appendix A of the QAPP [Ramboll 2018]).

The target plant tissue for wild mint was leaves. The target sample mass for analysis was 4.0 grams, which required collecting leaves from multiple closely spaced plants. Sample collection did not result in destruction of any plants. Leaves were abundant enough to take both a replicate sample and a potential EPA split sample. A single co-located soil sample and GPS location were collected adjacent to each discrete plant sample.

Sampling Area	Sampling Date	Sample Number	Sample Mass (grams)	Notes
		AU01	11	Sufficient mass for both TAL metals and mercury analysis.
		AU02	10.5	Sufficient mass for both TAL metals and mercury analysis.
		AU03	22	Sufficient mass for potential EPA split sample for both TAL metals and mercury analysis.
SA14	August 27	AU04	12	Sufficient mass for both TAL metals and mercury analysis.
		AU05	11	Sufficient mass for both TAL metals and mercury analysis.
		AU06	11	Replicate sample for SA14-AU05-P01. Sufficient mass for both TAL metals and mercury analysis.
		AU07	12	Sufficient mass for both TAL metals and mercury analysis.

Table 19: Wild Mint Sampling Summary



Photo 23: Wild mint sampled at SA14

Wild Rose

Wild rose was observed on two high lead SAs and several lower lead SAs (Photo 24). The target plant tissue for wild rose during the August sampling event was the hips. Wild rose with hips were not found in large enough numbers to collect on any of the high lead SAs. Wild rose hips were collected on three lower lead SAs (SA06, SA09, and SA14) but were sufficiently abundant to collect a replicate sample, but there was not enough mass for a potential EPA split sample. One replicate sample was collected on SA09. A summary of sampling results for wild rose is provided in Table 20. The protocols for sampling wild rose for the Study are provided in SOP-4 of Attachment A2 of the FSP (Appendix A of the QAPP [Ramboll 2018]).

Sampling Area	Sampling Date	Sample Number	Sample Mass (grams)	Number of Hips in Composite	Notes
		AU04	5.4	2	Sufficient mass for TAL metals analysis.
	August 23	AU05	7.0		Not a composite. Sufficient mass for TAL metals analysis.
SA06		AU06	15		Not a composite. Sufficient mass for TAL metals analysis.
		AU07	9.5		Not a composite. Sufficient mass for TAL metals analysis.
SA09	August 25	AU02	17		Not a composite. Sufficient mass for TAL metals analysis.
5A09		AU03	16		Replicate sample of SA09-AU02-P01. Not a composite. Sufficient mass for TAL metals analysis.
SA14	August 27	AU15	7.2		Not a composite. Sufficient mass for TAL metals analysis.

Table 20: Wild Rose Sampling Summary



Photo 24: Wild rose sampled at SA06

The target and minimum sample masses were 8.7 grams and 4.4 grams, respectively. Hips were not sufficiently abundant on individual plants to meet the target mass for all samples. The target mass was collected for three discrete samples and one discrete replicate. The minimum sample mass was collected for two discrete samples and one composite sample.

Green Willow

Green willow was sampled at one sampling area (SA16) during the spring 2018 event. See Section 2.3.1 for sampling details and photographs. SA15 was originally surveyed for willows during the spring 2018 sampling event, but none were identified. The sampling area was revisited during the August 2018 sampling event. Green willow was identified growing at SA15 and was determined to be sufficiently abundant for the collection of all six samples (Photo 25). Six additional samples, one replicate sample, and one potential EPA split sample were collected in August from SA15. A single co-located soil sample and GPS location were taken directly next to the plant sample. Soil was tan to black, very fine to medium sand and gravel.

A summary of sampling results for green willow is provided in Table 21.

Sampling Area	Sampling Date	Sample Number	Sample Length (centimeters)	Notes	
		AU01	411	Sufficient mass for potential EPA split sample for both TAL metals and mercury analysis.	
		AU02	190	Sufficient mass for both TAL metals and mercury analysis.	
	August 28	AU03	202	Sufficient mass for both TAL metals and mercury analysis.	
SA15		AU04	233	Replicate sample of SA15-AU03-P01 . Sufficient mass for both TAL metals and mercury.	
		AU05	AU05	218	Sufficient mass for both TAL metals and mercury analysis.
		AU06	203	Sufficient mass for both TAL metals and mercury analysis.	
		AU07	208	Sufficient mass for both TAL metals and mercury analysis.	

Table 21: Green Willow Sampling Summary



Photo 25: Green willow in riparian area at SA15

2.4 Recording Plant Tissue Collection Locations

All sampling area and TA boundaries were loaded onto handheld differential GPS (DGPS) units that were carried by the survey and sampling teams. The units were used to ensure that survey and sampling activities occurred within the designated SAs and TAs. They were also used to record sample collection locations. The protocols for recording plant tissue and soil collection locations for the Study are provided in SOP-2 of Attachment A2 of the FSP (Appendix A of the QAPP [Ramboll 2018]).

Two DGPS systems were used. The sampling team used a Trimble R1 Global Navigation Satellite System receiver and a tablet running ESRI ArcPad 10.2 collection software. The survey team used a Trimble GeoExplorer XH 6000 running Trimble TerraSync 5.3 collection software. Both used satellitebased augmentation by accessing the Wide Area Augmentation System to get a real-time correction signal in the field, which improved accuracies to less than 1 meter. As specified in the QAPP, the standard projection method that was used during field activities was the horizontal datum of World Geodetic System of 1984. GPS features collected were exported to a folder on OneDrive that was synced each night. The geographic information system (GIS)/GPS manager then imported the data to a local server.

2.5 Sample Holding and Transport

Tissue and soil samples were stored on wet ice immediately after being weighed, measured, and packaged in the field. At the end of each day, samples were transferred to a chest freezer located in a locked storage area in Kettle Falls. A maximum/minimum thermometer was kept inside the freezer and checked daily to ensure the freezers were functioning properly.

In the spring and August, samples were packaged for transport in coolers with dry ice. In June, the samples were transported in a portable freezer. All samples were driven to the analytical laboratory (ALS) in Kelso, Washington, and transferred using defined chain-of-custody procedures. Samples were stored at -20 degrees Celsius during transport.

2.6 Project Documentation

Field sampling methods and associated field data collection were completed in accordance with the QAPP and are not repeated in this report. Field documentation and records are provided in the appendices. Following is a brief description of what is contained in each appendix.

- Appendix A Daily Tailgate Task Hazard Assessment Forms
- Appendix B Project Permits
- Appendix C Protocol Modification Forms
- Appendix D Chain-of-Custody Forms
- Appendix E ALS Confirmation of Sample Receipt Forms
- Appendix F Plant Tissue and Soil/Sediment Data Forms
- Appendix G Daily Logbook Entries
- Appendix H Sample Information Sheets (electronic copy only)
- Appendix I Field Sampling Data

2.6.1 Appendix A – Daily Tailgate Task Hazard Assessment Forms

Appendix A contains the AECOM Task Hazard Assessment form, which was completed and signed daily by all crews and visitors.

2.6.2 Appendix B – Project Permits

The following permits and/or approvals for the Study can be found in Appendix A:

- CCT Research Permit No. 2018-07 for UCR Plant Tissue Study
- BIA Colville Indian Agency Limited Use Agreement for access to tribal trust lands in the UCR area
- Washington State Department of Natural Resources permission to sample at SA15, Deadman's Eddy (email from Arne Johnson on April 23, 2018).

2.6.3 Appendix C – Protocol Modification Forms

Detailed descriptions of all modifications to the QAPP and the circumstances that necessitated such changes were recorded in the logbooks and protocol modification forms. These changes were reviewed for compliance with data quality objectives. Modifications to the QAPP, documented as protocol modifications, were processed for the Study (Table 22).

2.6.4 Appendix D – Chain-of-Custody Forms

Final chain-of-custody forms, including several with revisions, are included in Appendix D.

2.6.5 Appendix E – ALS Confirmation of Sample Receipt Forms

Final sample receipt forms from ALS laboratory are included in Appendix E.

2.6.6 Appendix F – Plant Tissue and Soil/Sediment Data Forms

Sample data forms are included in Appendix F. There is one data form for each of the plant tissue samples (including replicates). Two abandoned samples (SA01-SP03-P01 and SA08-SP08-P01) are also included.

2.6.7 Appendix G – Daily Logbook Entries

Appendix G contains a full copy of the spring, June, and August 2018 logbook entries, from April 25 to May 4, June 18 to 21, and August 20 to 28, respectively.

2.6.8 Appendix H – Sample Information Sheets (electronic copy only)

Appendix H is a compact disc containing photos and summary data for each sample collected during the spring, June 2018, and August 2018 events.

2.6.9 Appendix I – Field Sampling Data

Appendix I contains a list of all field samples collected in 2018 during the spring, June, and August sampling events.

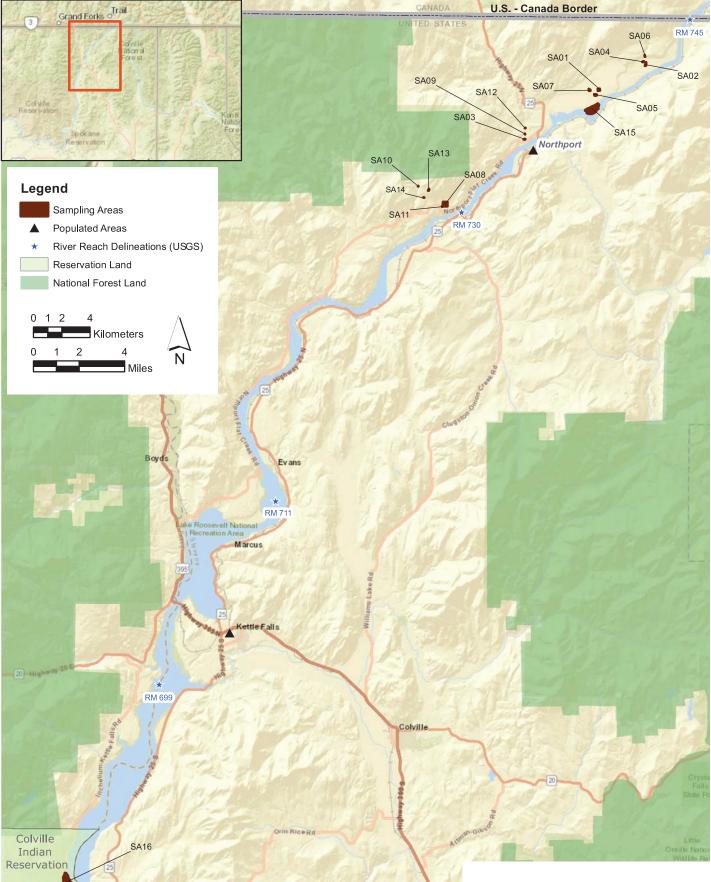
No.	Sample	QAPP Procedure	Applicable Sample Identification Nos.	Description of Modification	Reason for Modification	Comments
1	Multiple	SOP-6	Multiple, in Spring 2018	Photo board labelling	Inadvertent mislabeling of sample identification numbers in photo board in project photos	Discrepancies identified during field data QA.
2	Multiple	SOP-7	All June 2018 Samples	Sample transportation to ALS Kelso done with a portable freezer plugged into vehicle power instead of a cooler with dry ice	No dry ice available in Colville at time of shipment	Samples remained frozen throughout drive from Colville, WA, to ALS in Kelso, WA. Samples logged in as frozen by ALS.
3	Multiple	SOP-4	All August 2018 Hazelnut Samples	Discard float test; discard blanket/ shaking method of collection	Float test was determined not to be predictive of sample integrity; hand picking was determined to be more effective than shaking the shrub to collect nuts	Float test tested in field; shaking method was not.

Table 22: Summary of Modifications

3.0 References

- AECOM. 2017. Field Reconnaissance Summary Report. Upper Columbia River, Plant Tissue Study. Prepared for Teck American Incorporated. December 2017.
- CH2M HILL. 2016. Final UCR Residential Soil Study Field Sampling and Data Summary Report. February.
- Lodestone. 2018. Personal communication (e-mail from Whitney Fraser, Lodestone Environmental Consulting, to Monica Tonel, EPA, regarding the use of red-osier dogwood by CCT. April 8.
- Ramboll. 2018. FINAL Quality Assurance Project Plan for the Plant Tissue Study. Upper Columbia River, Plant Tissue Study. Prepared for Teck American Incorporated.
- Ramboll Environ. 2017. FINAL Residential Soil Study Data Summary Report. Prepared for Teck American Incorporated in association and consultation with Exponent, Parametrix, Inc., and Windward LLC. October.
- TCAI (Teck Cominco American Incorporated). 2009. Upper Columbia River Draft General Site Health and Safety Plan for the Remedial Investigation and Feasibility Study. Prepared by Integral Consulting, Inc., Mercer Island, WA and Parametrix, Bellevue, WA. December 27.
- USEPA (U.S. Environmental Protection Agency). 2017. Letter from Laura C. Buelow, EPA Project Coordinator, to Kris McCaig, TAI Project Coordinator, detailing resolution of informal disputes regarding terrestrial plant sampling and Level of Effort (LOE) for estimation of Upland Soils (background study). EPA Region 10 Hanford/INL Project Office. Richland, WA. June 14, 2017.
- Windward et al. 2015. Upper Columbia River, Final Soil Study Data Summary Report. Prepared by Windward Environmental LLC in association and consultation with Exponent, Parametrix, Inc., and Ramboll Environ. October.

Figures

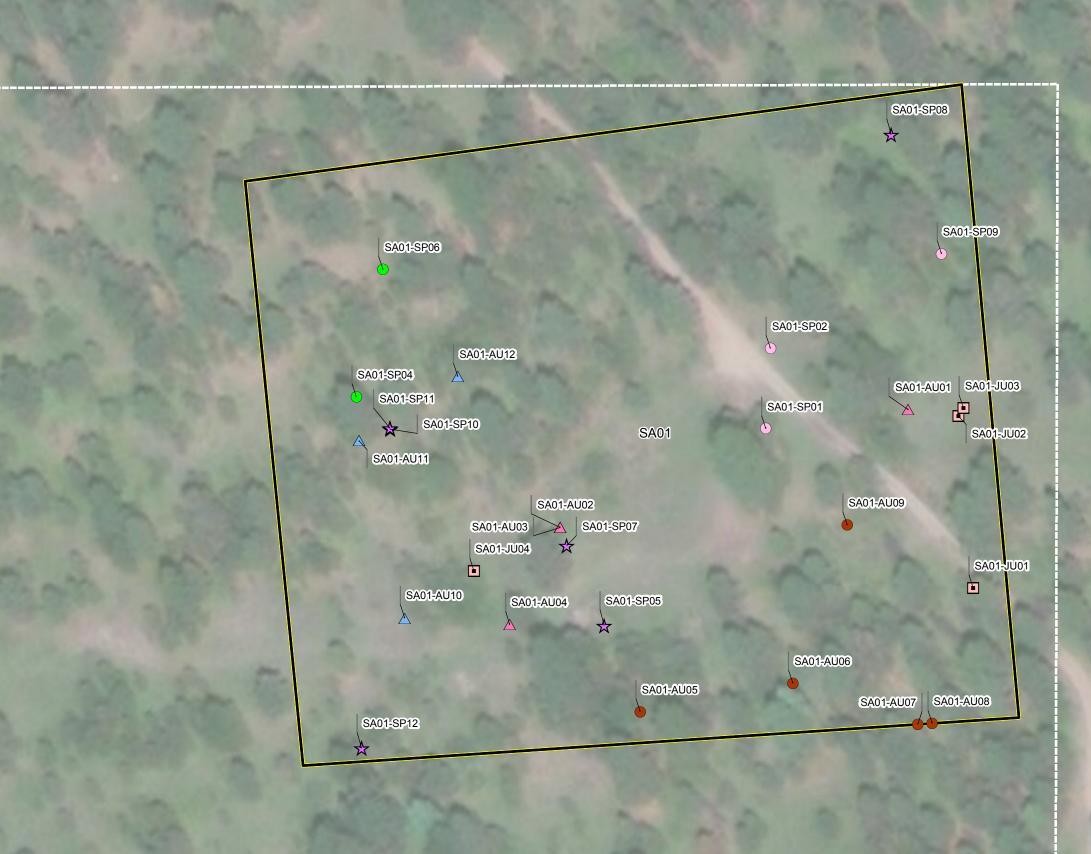


Source: Source: Ramboll 2018, Field Sampling Plan for the Plant Tissue Study.

Figure 1 Sampling Areas

ΑΞϹΟΜ

Upper Columbia River, WA

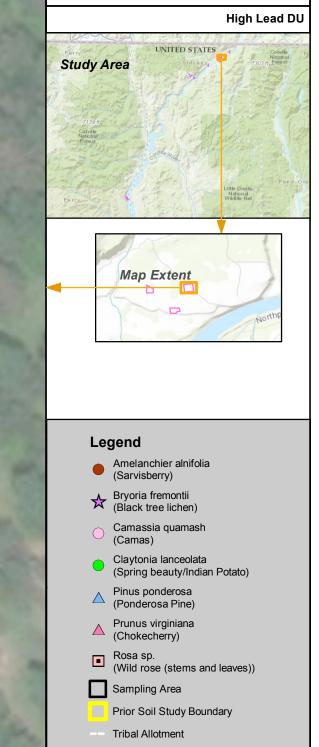


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SA Acreage:

Figure 2. SA01 Results

Location Code:2014R-258-xxx Sample Area: SA01 Tribal Allotment: 151-H-193 Upper Columbia River, WA







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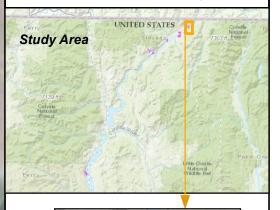
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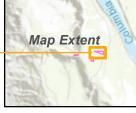
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Figure 3. SA02 Results

Location Code:2014R-401-xxx Sample Area: SA02 Tribal Allotment: 151-H-196 Upper Columbia River, WA

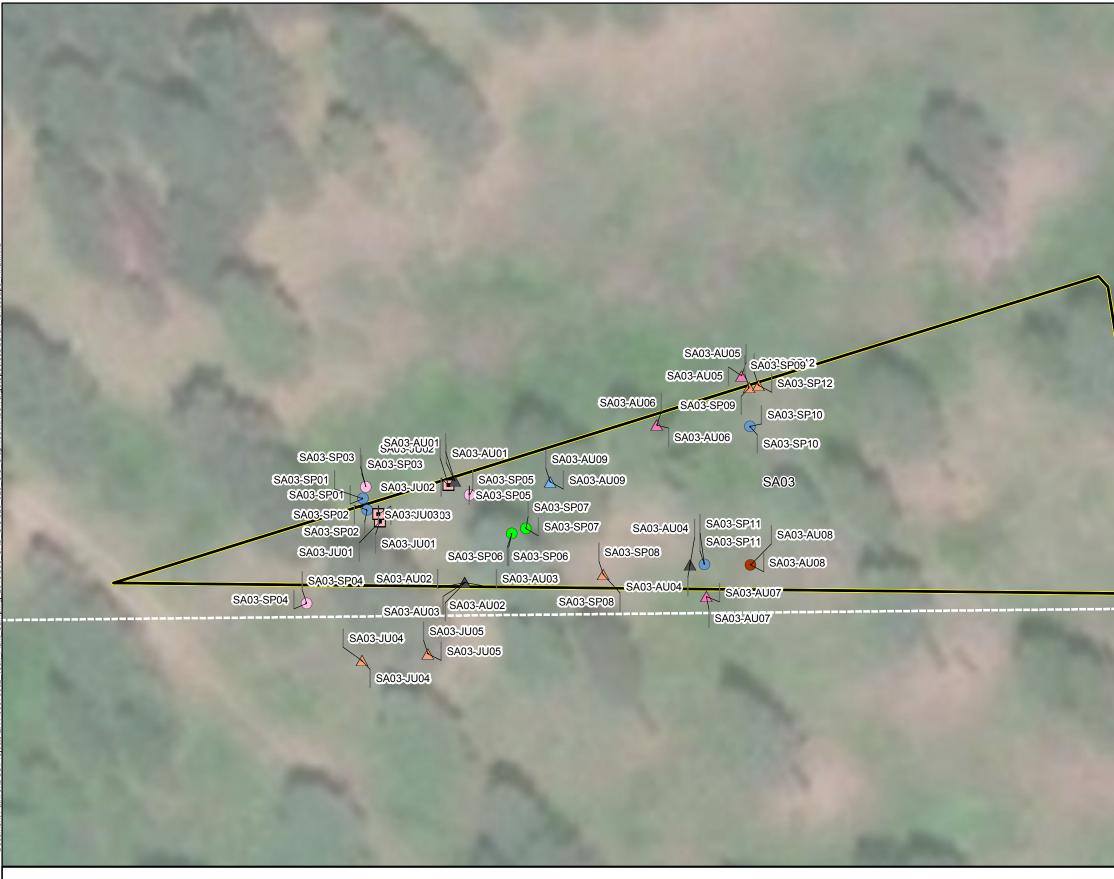
High Lead DU







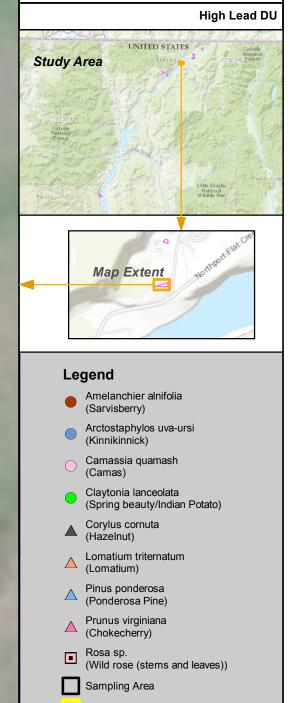




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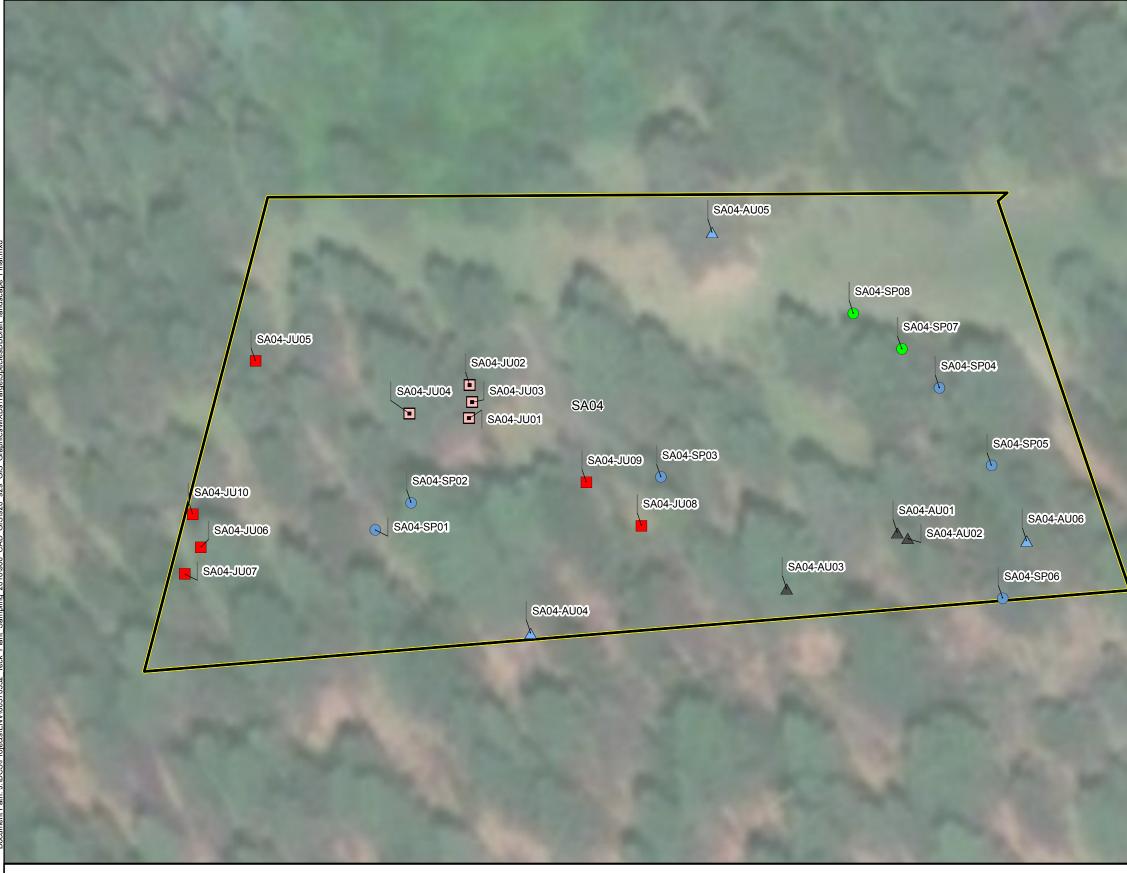
Figure 4. SA03 Results

Location Code:2014R-441-xxx Sample Area: SA03 Tribal Allotment: 151-H-197 Upper Columbia River, WA



- Prior Soil Study Boundary
- Tribal Allotment





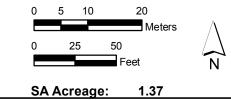
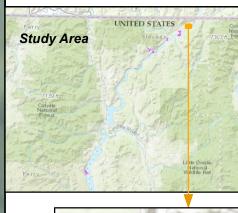
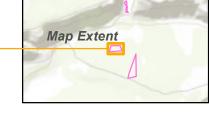


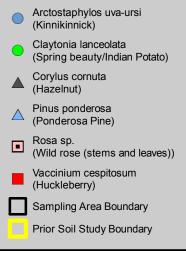
Figure 5. SA04 Results

Location Code:2014R-402-xxx Sample Area: SA04 Tribal Allotment: 151-H-196 Upper Columbia River, WA

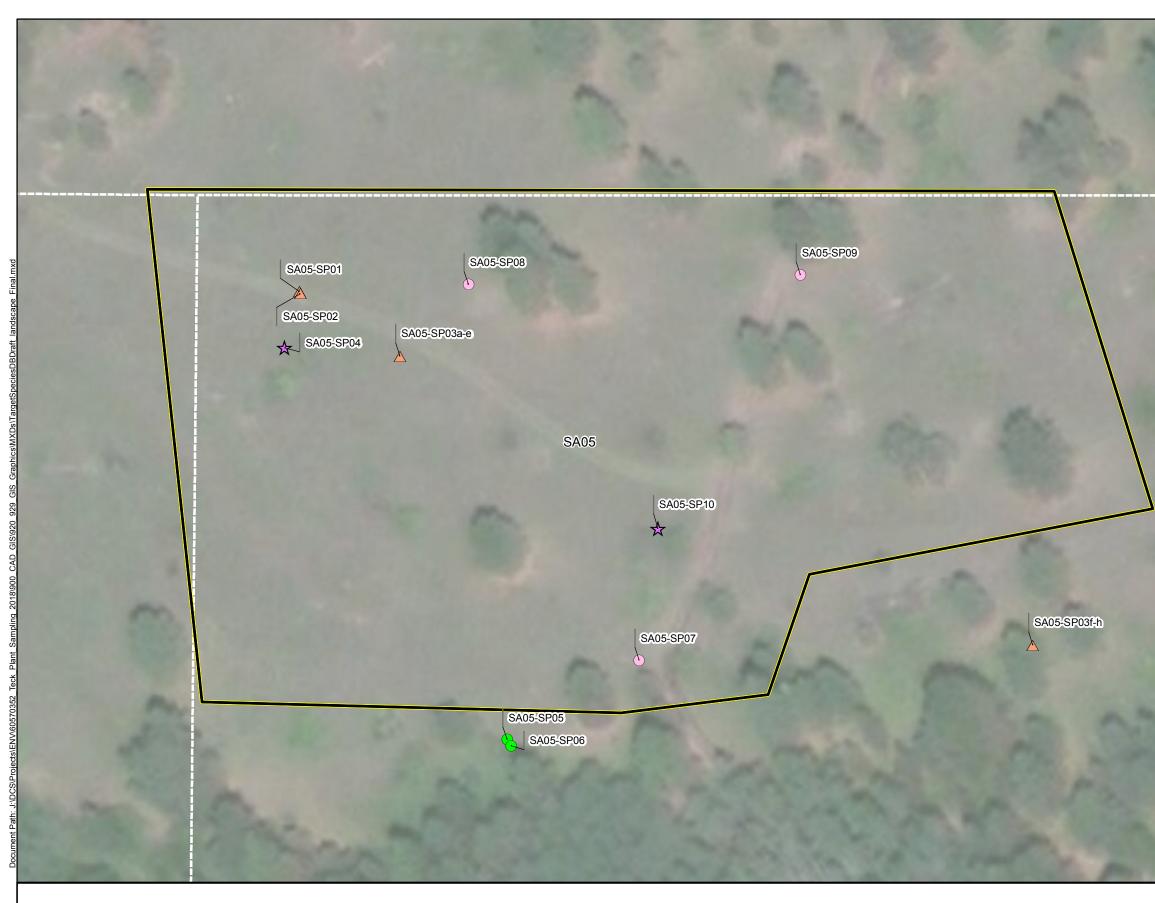
Lower Lead DU - Priority Group 2











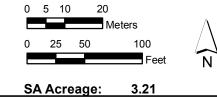
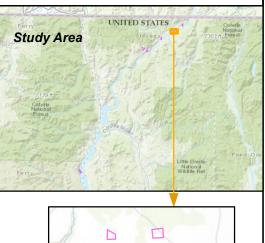


Figure 6. SA05 Results

Location Code:2014R-410-xxx Sample Area: SA05 Tribal Allotment: 151-H-195 Upper Columbia River, WA

Lower Lead DU - Priority Group 2











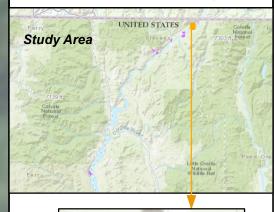
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Figure 7. SA06 Results

Location Code:2014R-403-xxx Sample Area: SA06 Tribal Allotment: 195-H-196 Upper Columbia River, WA

Lower Lead DU - Priority Group 2











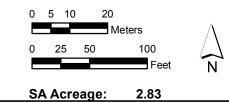
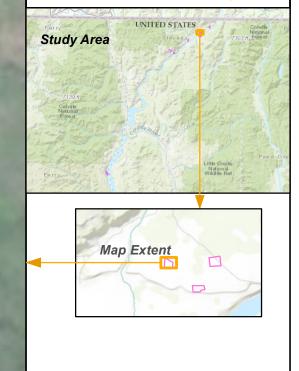


Figure 8. SA07 Results

Location Code:2014R-259-xxx Sample Area: SA07 Tribal Allotment: 151-H-193 Upper Columbia River, WA

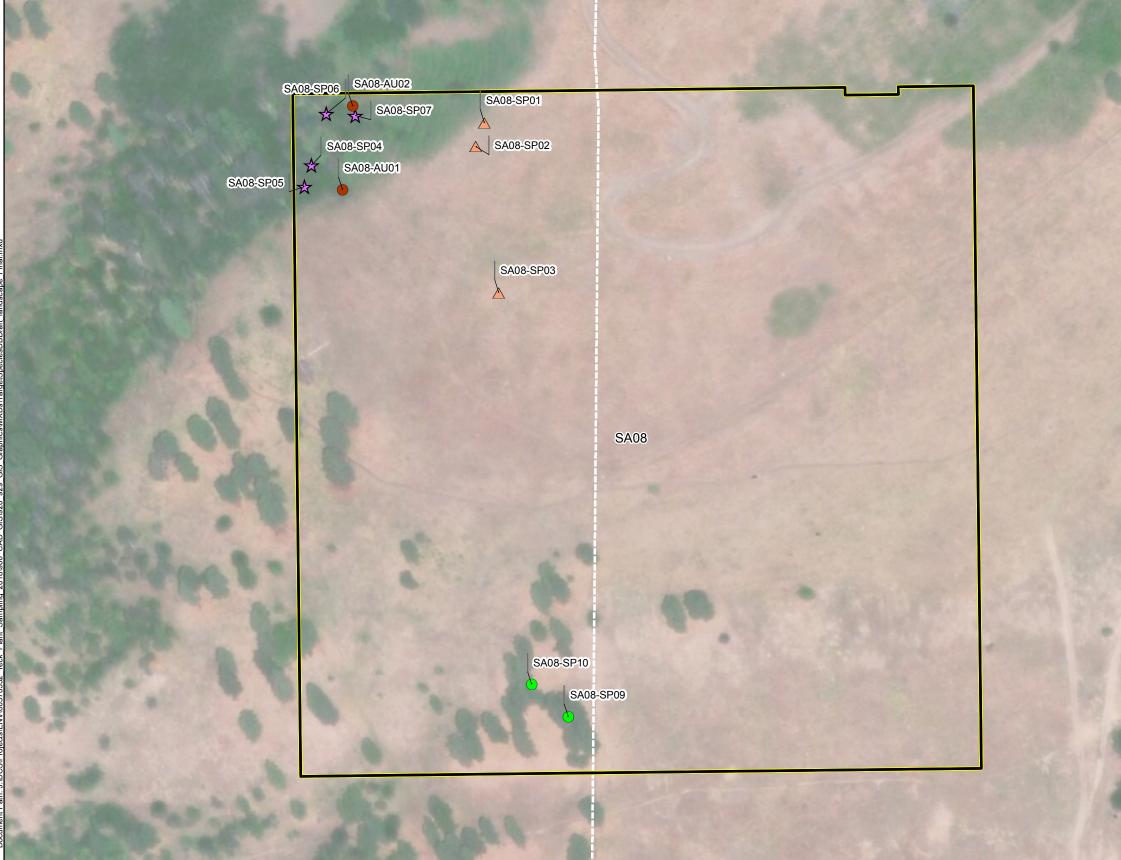
Lower Lead DU - Priority Group 2











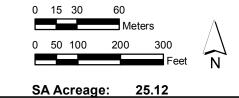


Figure 9. SA08 Results Location Code:2014U-ADA-023 Sample Area: SA08 Tribal Allotment: 804 Upper Columbia River, WA Lower Lead DU - Priority Group 2 UNITED STATES Study Area Little Oreille National Wildlife Ref. Map Extent Legend Amelanchier alnifolia (Sarvisberry) Bryoria fremontii (Black tree lichen) Claytonia lanceolata (Spring beauty/Indian Potato) \bigcirc Lomatium triternatum (Lomatium) Sampling Area Prior Soil Study Boundary Tribal Allotment





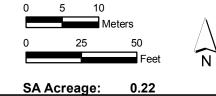
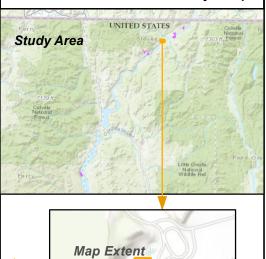


Figure 10. SA09 Results

Location Code:2014R-442-xxx Sample Area: SA09 Tribal Allotment: 151-H-197 Upper Columbia River, WA

Lower Lead DU - Priority Group 2





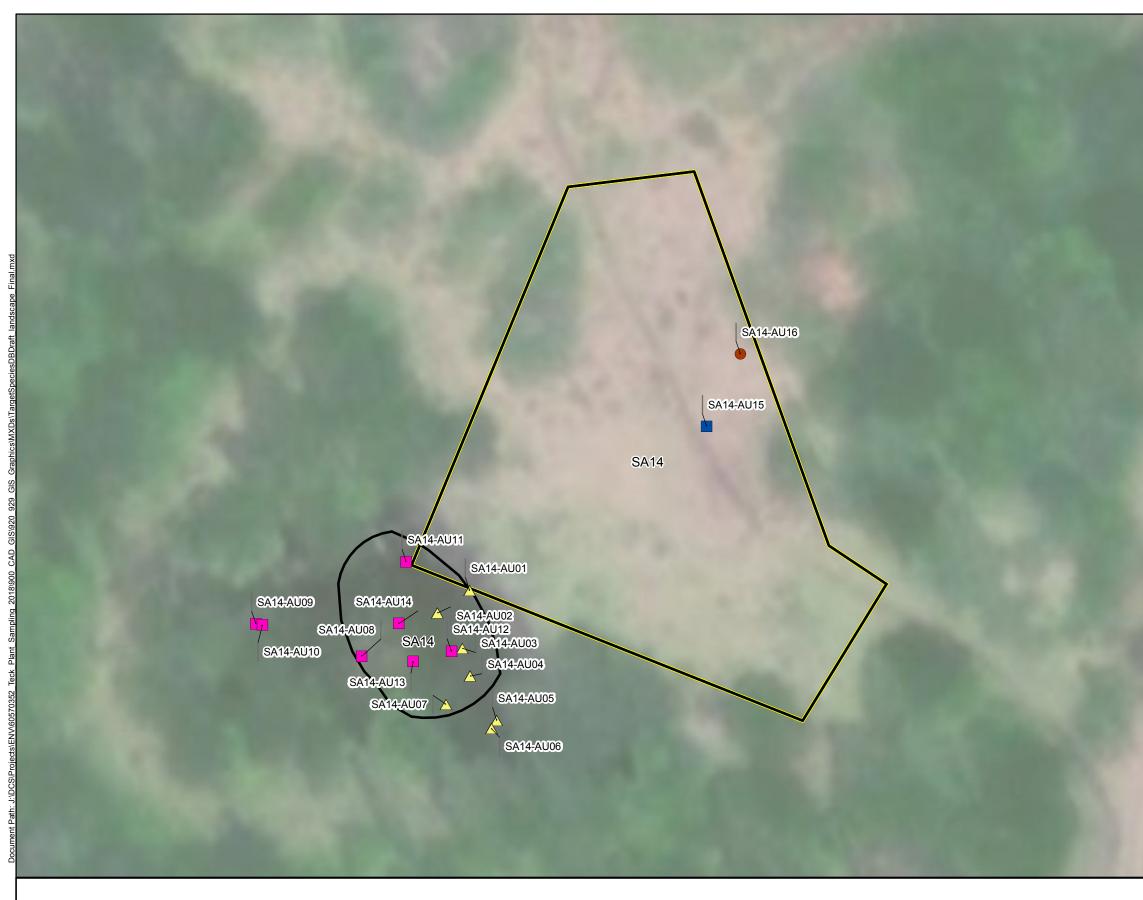


Rosa sp. (Wild rose (hips)) Sampling Area

Prior Soil Study Boundary

Tribal Allotment





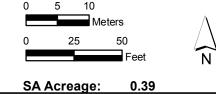
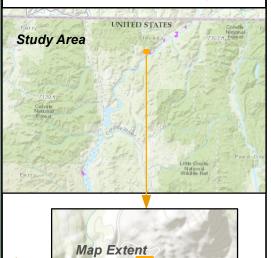


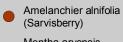
Figure 11. SA14 Results

Location Code:2016R-805-xO2 Sample Area: SA14 Tribal Allotment: 805 Upper Columbia River, WA

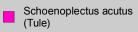
Lower Lead DU - Priority Group 1







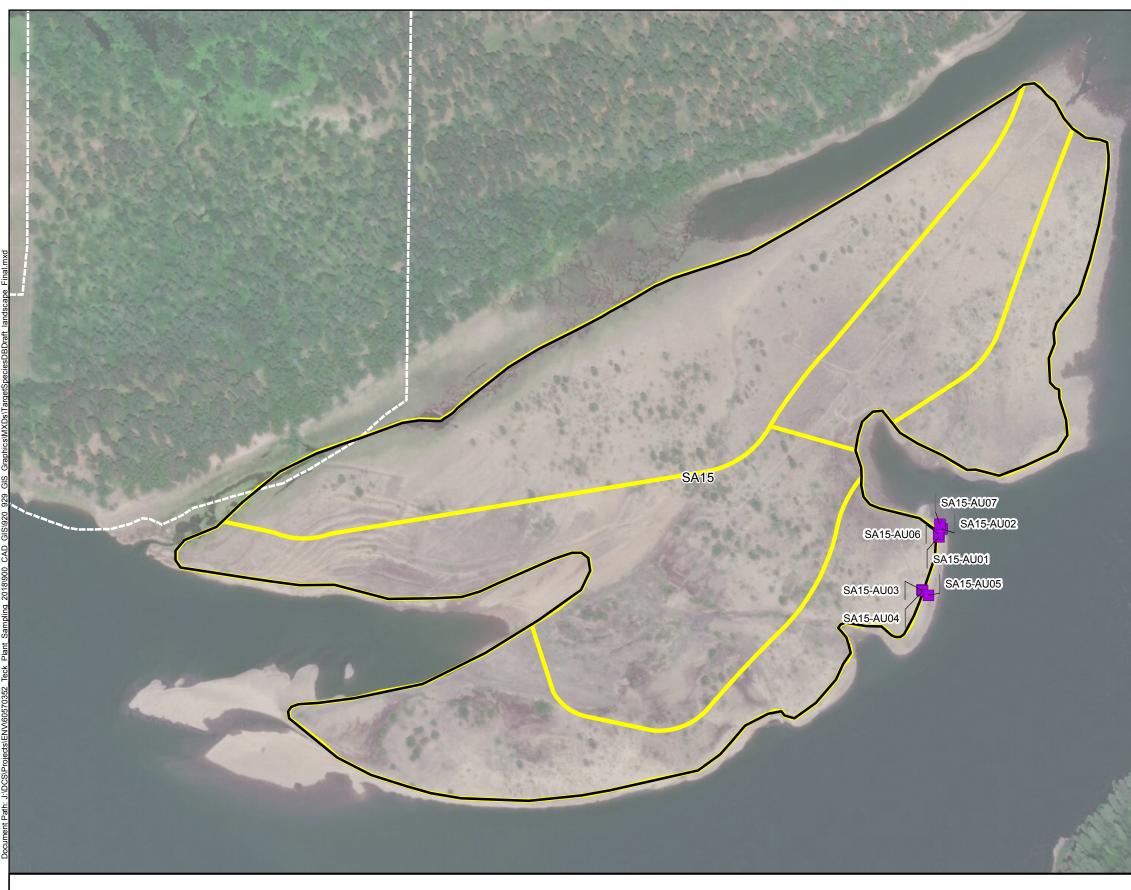
- △ Mentha arvensis (Wild Mint)
- Rosa sp. (Wild rose (hips))



Sampling Area Boundary

Prior Soil Study Boundary





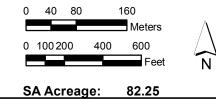


Figure 12. SA15 Results Location Code:Deadman's Eddy Sample Area: SA15 WA Dept. of Natural Resources Upper Columbia River, WA Lower Lead DU - Priority Group 2 UNITED STA Colville National Forest Study Area Little Oreille National Wildlife Ref Map Extent Legend Salix exigua (Green willow) Sampling Area Prior Soil Study Boundary Tribal Allotment





0	40	80		160
				Meters
0	100 20	00	400	600
				Feet

 $\langle \rangle$

SA Acreage: 91.38

Figure 13. SA16 Results Location Code:Barnaby Island Campground Sample Area: SA16 National Park Service Upper Columbia River, WA Lower Lead DU - Priority Group 2 UNITED STATES Study Area Little Oreille National Wildlife Ref. Map Extent Legend Salix exigua (Green willow) Sampling Area Prior Soil Study Boundary ΑΞϹΟΜ

Appendix A

AECOM

Americas Doily Toilgoto Mos

Daily lailgate Meeting	S3AM-209-FM
instructions: Conduct meeting prior to sending crews to individual tasks. R attendance of all AECOM employees and subcontractors. Invite personnel f	rom Phone Number: 510.681.6401
simultaneous operations for coordination purposes. Review scope of work a briefly discuss required and applicable topics. This meeting is a daily refree not a full orientation. Task-specific discussions associated with Task Haza	esher, AECOM SH&E Rep. Name: Fred Merrill
Assessment (THA) follow this meeting at the task location immediately befo individual task is started.	re Meeting Leader:
Date: 4 2(70) X Project Name/Location: Upper Columbia	a River Plant Tissue Study Project Number: 60570350
Today's Scope of Work:	
Projeck Kick of meeting in North driving, plant " Soil sampling	at SA02
Muster Point Location: First Aid Kit Location:	Fire Extinguisher Location: Spill Kit Location:
Field Vehicle Field Vehicle/Backpack	Field Vehicle Field Vehicle
1. Required Topics	2. Discuss if Applicable to Today's Work ✓ ■ Check ✓ as reviewed or mark ■ as not applicable
 Required training (incl. task specific) completed and current SH&E Plan onsite - understood, reviewed, signed by all (incl. scope, hazards, controls, procedures, requirements, etc.) Pre-Job Hazard Assessments (JHA/JSAs) available and understood Task Hazard Assessments (THAs) are to be completed for each task immediately prior to conducting STOP WORK Right & Responsibility- all task changes/changed conditions re-assess with THA Requirement to report to supervisor any injury, illness, damage, near miss, unsafe act / condition Emergency Response Plan – including muster point, first aid kit, fire extinguisher, clinic/hospital location Personal Protective Equipment (PPE) - Required items per hazard assessments in good condition / in use by all Equipment/machinery inspected (documented as required) and in good condition - operators properly trained/certified Work area set up and demarcation/ barricades in place to protect workers, site staff, and the public Required checklists/records available, understood (describe): Lessons Learned / SH&E improvements (describe): 	 Biological/ Chemical / Electrical Hazards Girgonomics - Lifting, Body Position Lock Out/ Tag Out Short Service Employees - visual identifier and mentor/ oversight assignment Simultaneous/ Neighbouring Operations Slip/ Trip/ Fall Hazards Specialized PPE Needs Traffic Control Waste Management/ Decontamination Weather Hazards / Heat Stress / Cold Stress Subcontractor Requirements (e.g., JHAs, THAs, procedures, reporting, etc.) Work Permits / Plans required (e.g., Fall Protection, Confined Space, Hot Work, Critical Lifts, etc.); in place, understood (identify/attach): Other Topics (describe/attach): Client specific requirements (describe):
3. Daily Check Out by Site Supervisor	
Describe incidents, near misses, observations or Stop Work interventions from today:	Describe Lessons Learned/ Improvement Areas from today:
The site is being left in a safe condition and work crew o	checked out as fit unless otherwise specified as above.
Site Supervisor Name Janpy Proto Skanature Michelle Hogner Sulpty	Date 4/25/2018 Time (at end of day / shift) 6:30 pm
Worker Acknowledgement / Sign In Sign Out sheets applicabl Daily Tailgate Meeting (S3AM-209-PM5)	le to this meeting are on reverse and, if applicable, attached.

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All employees:

- STOP WORK if concerned / uncertain about safety / hazard or additional precaution is not recorded on the THA.
- Be alert and communicate any changes in personnel or conditions at the worksite to the supervisor.

Reassess task, hazards, & mitigations on an ongoing basis; amend the THA if needed.

SITE WORKERS (including AECOM Contractors and Subcontractors): Your signature below means that you understand: * The requirement to participate in creating, reviewing, & updating hazard assessments (THA) applicable to your task(s).

* The hazards & control measures associated with each task you are about to perform.

* The permit to work requirements applicable to the work you are about to perform (if it includes permitted activities).

* That no tasks or work is to be performed without a hazard assessment.

* Your authority & obligation to "Stop Work" intervene, speak up/ listen up.

Your initials (right columns) certify that you arrived & departed fit for duty, & have reported all incidents/near misses; meaning:

- * You are physically and mentally fit for duty and have inspected your required PPE to ensure satisfactory condition.
- * You are not under the influence of any type of medication, drugs, or alcohol that could affect your ability to work safely.
- * You are aware of your responsibility to immediately report any illness, injury (regardless of where or when it occurred), or impairment/fatigue issue to the AECOM Supervisor.

* You signed out as fit / uninjured unless you have otherwise informed the AECOM Supervisor.

Print Name & Company	Signature	Initials & Sign In Time	Initials & Sign Out Time
See Project Kickolp Meeting sheet for Staff + S	ignotures	In & Fit 10ª11 - 6pm	Out & Fit
	0	In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit

(Attach additional Site Worker sign-in/out sheets if needed) Identify number of attached sheets:

Name	Company Name	Arrival Time	Departure Time	Signature
1.0				
		1		
				(

Daily Tailgate Meeting (S3AM-209-FM5) Revision 7 December 27, 2017 PRINTED COPIES ARE UNCONTROLLED. CONTROLLED COPY IS AVAILABLE ON COMPANY INTRANET.

AECOM

Americas				
Daily Tailgate Mee	eting		S3AM-209-FM5	
instructions: Conduct meeting prior attendance of all AECOM employees	r to sending crews to individual tasks. F s and subcontractors. Invite personnel	from Phone Number: 510.681.6	and the second se	
briefly discuss required and applicab	ation purposes. Review scope of work ole topics. This meeting is a daily refr discussions associated with Task Haz	esher, AECOM SH&E Rep. Na		
Assessment (THA) follow this meetin	ng at the task location immediately before		Pretore/Michelle Jegner	
Individual task is started.	ect Name/Location: Upper Columbi			
Today's Scope of Work:	ect warner Eocation. opper columb			
driving to No.	soil Sampling	words, to Sample A.	rea 2 and 3,	
penni			and the second	
Muster Point Location: Field Vehicle	First Aid Kit Location	Fire Extinguisher Location: Field Vehicle	Spill Kit Location: Field Vehicle	
1. Required Topics		2. Discuss if Applicable to To		
Fitness for Duty requirement	te all sign in / sign out		d or mark is as not applicable	
	specific) completed and current	Biological/ Chemical / E		
\equiv /	cood, reviewed, signed by all (incl.	Ergonomics - Lifting, Bo		
	rocedures, requirements, etc.)	Lock Out/ Tag Out		
Pre-Job Hazard Assessmer		Short Service Employee	es - visual identifier and mentor/	
for, each task immediately p		oversight assignment Simultaneous/ Neighbouring Operations		
STOP WORK Right & Resp changes/changed condition		Sip/ Trip/ Fall Hazards		
Requirement to report to su damage, near miss, unsafe		Traffic Control	econtamination	
Emergency Response Plan first aid kit, fire extinguisher,		Weather Hazards / Hea	t Stress / Cold Stress nents (e.g., JHAs, THAs,	
Personal Protective Equipm hazard assessments in goo	nent (PPE) - Required items per d condition / in use by all	procedures, reporting, e	etc.)	
Equipment/machinery inspe and in good condition - open	ected (documented as required) rators properly trained/certified		equired (e.g., Fall Protection, ork, Critical Lifts, etc.); in place,	
Work area set up and dema protect workers, site staff, a		understood (identify/atta	ach):	
Required checklists/records	available, understood (describe):	Other Topics (describe/	attach):	
Lessons Learned / SH&E in	nprovements (describe):	Client specific requirem	ents (describe):	
3. Daily Check Out by Site Su	Ipervisor			
Describe incidents, near misses	Non-second second s	Describe Lessons Learned/ Impr	rovement Areas from today:	
	a safe condition and work crew		wise specified as above.	
Site Supervisor Name Jun Michelle Stegner (6)	y Addensignature	Date Time (a	4/26/2018 at end of day/shift) 6-30pm	
Worker Acknowledgement / Daily Tailgate Meeting (S3AM-2	Sign by Sign Out sheets applicab 209-FM5)	ble to this meeting are on revers	e and, if applicable, attached.	

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All employees:

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• Reassess task, hazards, & mitigations on an ongoing basis; amend the THA if needed.

SITE WORKERS (including AECOM Contractors and Subcontractors): Your signature below means that you understand: * The requirement to participate in creating, reviewing, & updating hazard assessments (THA) applicable to your task(s).

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* You signed out as fit / uninjured unless you have otherwise informed the AECOM Supervisor.

Print Name & Company	Signature	Initials & Sign In Time	Initials & Sign Out Time
See THA for Staff & Signatures		In & Fit	Out & Fit
0		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
=		In & Fit	Out & Fit

(Attach additional Site Worker sign-in/out sheets if needed) Identify number of attached sheets:

Name	Company Name	Arrival Time	Departure Time	Signature
				alar i saori
				11 14 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	······································		5	

Daily Tailgate Meeting (S3AM-209-FM5) Revision 7 December 27, 2017 PRINTED COPIES ARE UNCONTROLLED. CONTROLLED COPY IS AVAILABLE ON COMPANY INTRANET. Americas

Task Hazard Assessment

S3AM-209-FM6 4 2018 Project Name / Location: Upper Columbia River Plant Tissue Study, Northport, WA Date: Permit / Job Number: Project Number: 60570352 Description of Task: Plant Tissue Sampling Do you have a pre-job hazard assessment (JHA) specific to this task in your hands? • Yes - review the steps, hazards, and precautions. Attach and reference JHA in the form below. Add any additional steps, hazards, and precautions to this form otherwise unidentified on JHA. O No - list all steps, hazards, and precautions associated with the task in the form below. **Basic Task Steps** Risk **Control Measures / Precautions** Risk **Revised?** Hazards (explain in order how the task will be carried out) (identify all hazards & potential hazards of each step) (describe how that hazard will be controlled) (before) (after) (yes - record time) 5 above he 10 1. 20 0 12 000 2.12 Kell~ 0.7 8:20 5 00 6.28 2 0 Eg alternour hicles Maner MORICA Jene! 2. 012.2501 MARCA 6:2 8.3 Miles. ~511. W 8:3 DID, 3 500 6.3 С 5:3 2:8 Gira pel in De 23 **Highest Risk Index** The Task Hazard Assessment is to be completed aftife worksite by the individual(s) who is intended to conduct the task immediately prior to initiating the associated task. Number and attach additional pages if necessary 01) Originator nei Worker/Visitor acknowledgement and review of this content on back of this Supervisor document. Originator to also sign Worker acknowledgement section. Print Name Signature

Risk Matrix on Reverse

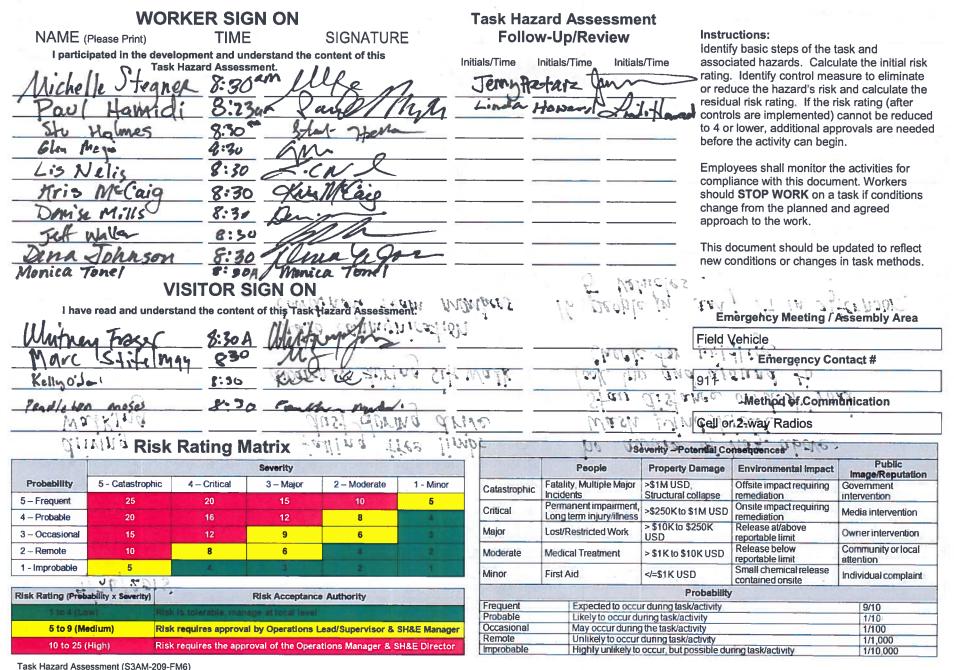
Task Hazard Assessment (S3AM-209-FM6) Revision 6 June 26, 2017 PRINTED COPIES ARE UNCONTROLLED. CONTROLLED COPY IS AVAILABLE ON COMPANY INTRANET.



THIS FORM IS TO BE KEPT ON JOB SITE.

AECOM

of 2



Task Hazard Assessment (S3AM-209-FM Revision 6 26, 2017

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ANET.

AECOM

ttendance of all AECOM employ	rior to sending crews to individual tasks. I ees and subcontractors. Invite personnel	from Phone Number: 510.681	
riefly discuss required and applic	dination purposes. Review scope of work cable topics. This meeting is a daily refr ific discussions associated with Task Haz	esher, AECOM SH&E Rep. N	ame: Fred Merrill
	eting at the task location immediately before	bre Maating Loadon /	enny Pretare Mich
Date: 4 27 2018 Pr	oject Name/Location: Upper Columb	ia River Plant Tissue Study Project	
Today's Scope of Work:	Sample Area 3 -	driving to and h Soil and	Jampling plants
Muster Point Location:	First Aid Kit Location:	Fire Extinguisher Location:	Spill Kit Location:
Field Vehicle	Field Vehicle/Backpack	Field Vehicle	Field Vehicle
1. Required Topics		2. Discuss if Applicable to T	
 SH&E Plan onsite - unde scope, hazards, controls, Pre-Job Hazard Assessmunderstood Task Hazard Assessmen for each task immediately STOP WORK Right & Rechanges/changed conditi Requirement to report to damage, near miss, unsatisfiest aid kit, fire extinguish Personal Protective Equiphazard assessments in grand in good condition - op Work area set up and der protect workers, site staff Required checklists/record 	sponsibility- all task ons re-assess with THA supervisor any injury, illness, ife act / condition an – including muster point, er, clinic/hospital location oment (PPE) - Required items per ood condition / in use by all pected (documented as required) perators properly trained/certified marcation/ barricades in place to	oversight assignment Simultaneous/ Neighbu Slip/ Trip/ Fall Hazards Specialized PPE Need Waste Management/ D Weather Hazards / He Subcontractor Require procedures, reporting, Work Permits / Plans r Confined Space, Hot V understood (identify/at	Body Position Dees - visual identifier and mentor/ ouring Operations Bis Decontamination at Stress / Cold Stress ments (e.g., JHAs, THAs, etc.) equired (e.g., Fall Protection, Vork, Critical Lifts, etc.); in place, tach): Plattach):
nterventions from today: The site is being left i	es, observations or Stop Work		'muchout day and
Site Supervisor Name Jan	y Pectale Signature	Date	4/27/2018 (at end of day / shift) 6:30pm

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All employees:

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- * You are not under the influence of any type of medication, drugs, or alcohol that could affect your ability to work safely.
- * You are aware of your responsibility to immediately report any illness, injury (regardless of where or when it occurred), or impairment/fatigue issue to the AECOM Supervisor.

* You signed out as fit / uninjured unless you have otherwise informed the AECOM Supervisor.

Print Name & Company	Signature	Initials & Sign In Time	Initials & Sign Out Time
See daily THA for Stay Usignatures		In & Fit yam - 6 pm	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
	2	In & Fit	Out & Fit
		In & Fit	Out & Fit

(Attach additional Site Worker sign-in/out sheets if needed) Identify number of attached sheets:

Name	Company Name	Arrival Time	Departure Time	Signature
				e
11		- 2 m		
			10.15.56	

Daily Tailgate Meeting (S3AM-209-FM5) Revision 7 December 27, 2017 PRINTED COPIES ARE UNCONTROLLED. CONTROLLED COPY IS AVAILABLE ON COMPANY INTRANET. Americas

Task Hazard Assessment

AECOM

	209-FM6
Description of Task: Plant Tissue Sampling Do you have a pre-job hazard assessment (JHA) specific to this task in your hands? O Yes - review the steps, hazards, and precautions. Attach and reference JHA in the form below. Add any additional steps, hazards, and precautions to this form otherwise unidentifie O No - list all steps, hazards, and precautions associated with the task in the form below. Basic Task Steps Hazards (explain in order how the task will be carried out) (identify all hazards & potential hazards of each step) driving to/fum ////////////////////////////////////	
Do you have a pre-job hazard assessment (JHA) <u>specific to this task in your hands?</u> O Yes - review the steps, hazards, and precautions. Attach and reference JHA in the form below. Add any additional steps, hazards, and precautions to this form otherwise unidentifie O No - list all steps, hazards, and precautions associated with the task in the form below. Basic Task Steps (explain in order how the task will be carried out) driving to fime Sampling anas Welche Uuck 5 Walk and Marked I Walking and Meechs, bles, plys, other 5	
© Yes - review the steps, hazards, and precautions. Attach and reference JHA in the form below. Add any additional steps, hazards, and precautions to this form otherwise unidentifie O No - list all steps, hazards, and precautions associated with the task in the form below. Basic Task Steps Hazards Hazards (identify all hazards & potential hazards of each step) (before) (describe how that hazard will be controlled) (after) (a	14 mar - 1
(explain in order how the task will be carried out) (identify all hazards & potential hazards of each step) (before) (describe how that hazard will be controlled) (after) (driving to/from	on JHA.
Sampling areas vehicle check 5 walk around, check 1 walking area insects, bees, plys, other 5	Revised? es - record time
walking and insects, bees, plys, other 5 tires, pluids	
walking and insects, bees, plys, other 5	
sampling soil burgs 1 Use burg sprang 1 and plants avoid hives	
and plants 0 avoid hives	
	J. L. S.W.
	alubye -
Paul Anniel - Baar Claude Price La Carlo	
Highest Risk Index	
The Task Hazard Assessment is to be completed at the worksite by the individual(s) who is intended to conduct the task immediately prior to initiating the associated task. Number and attach additional pages if necessary.	nin Ni ma
Worker/Visitor acknowledgement and review of this content on back of this document. Originator to also sign Worker acknowledgement section.	AND PARTY
Risk Matrix on Reverse Signature	

Task Hazard Assessment (S3AM-209-FM6) Revision 6 June 26, 2017 PRINTED COPIES ARE UNCONTROLLED. CONTROLLED COPY IS AVAILABLE ON COMPANY INTRANET.

AECOM

WORKE			ter aller		
WORKE	K SIGN	UN	lask Ha	azard Asse	ssment
NAME (Please Print)	TIME	SIGNATURE	Foll	ow-Up/Rev	view
1, 1/1/1	rd Assessme	nt.	Initials/Time	Initials/Time	Initials/Time
Michelle Stegne	R Siam	left			
I ide Downed	8~	Rink Annard			
_ Jeff Walkar,	San	KARA 1			
Paul Hamidi	Bam	Jan Maila			
Whitney Fraser	Som	anihver franc			
Mure Stifelman	8	M& TO			
Monica Tonel	8 am	MonicaTonel			
Sty Holmes	9 am	Stud Halun			15 KG - 15
Alen Mijri	On.	GM			
1		k ,			0.00

The second

Instructions:

Identify basic steps of the task and associated hazards. Calculate the initial risk rating. Identify control measure to eliminate or reduce the hazard's risk and calculate the residual risk rating. If the risk rating (after controls are implemented) cannot be reduced to 4 or lower, additional approvals are needed before the activity can begin.

Employees shall monitor the activities for compliance with this document. Workers should STOP WORK on a task if conditions change from the planned and agreed approach to the work.

This document should be updated to reflect new conditions or changes in task methods.

	Emergency	Meeting / Assembly Area
n vite	Field Vehicle	/ Nouthpord Boat L
	Eme	rgency Contact #

911

Method of Communication

4004 Boat Lau

Cell or 2-way Radios

	S	everity - Potential Co	nsequences	La Contraction of the later	
	People	Property Damage	Environmental Impact	Public Image/Reputation	
Catastrophic	Fatality, Multiple Major Incidents	>\$1M USD, Structural collapse	Offsite impact requiring remediation	Government	
Critical	Permanent impairment, Long term injury/illness	>\$250K to \$1M USD	Onsite impact requiring remediation	Media intervention	
Major	Lost/Restricted Work	> \$10K to \$250K USD	Release at/above reportable limit	Ownerintervention	
Moderate	Medical Treatment	> \$1K to \$10K USD	Release below reportable limit	Community or local attention	
Minor	First Aid	=\$1K USD</td <td>Small chemical release contained onsite</td> <td>Individual complaint</td>	Small chemical release contained onsite	Individual complaint	
		Probability			
Frequent	Expected to occu	ir during task/activity		9/10	
Probable	Likely to occur du	uring task/activity	1/10		
Occasional	al May occur during the task/activity		the task/activity		
Remote	Unlikely to occur	during task/activity	during task/activity		
Improbable	Highly unlikely to	occur, but possible du	ring task/activity	1/10.000	

Risk Rating Matrix

			Severity		
Probability	5 - Catastrophic	4 - Critical	3 - Major	2 - Moderate	1 - Minor
5 – Frequent	25	20	15	10	5
4 - Probable	20	16	12	8	4
3 - Occasional	15	12	9	6	
2 - Remote	10	8	6	4	2
1 - Improbable	5	4	1	2	1

VISITOR SIGN ON I have read and understand the content of this Task Hazard Assessment.

> 8mm 8:07

8.07

8:07

Risk Rating (Probability x Severity)	Risk Acceptance Authority
1 to 4 (Low)	Risk is tolerable, manage at local lavel
5 to 9 (Medium)	Risk requires approval by Operations Lead/Supervisor & SH&E Manager
10 to 25 (High)	Risk requires the approval of the Operations Manager & SH&E Director

Task Hazard Assessment (S3AM-209-FM6)

Revision 6 26, 2017

Kelly O Nat

Nelis

Denise Mills

11.60

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ANET.

AECOM

Americas						
Daily Tailgate Me	eting				S3AM-209-FM5	
Instructions: Conduct meeting prior to sending crews to individual tasks. attendance of all AECOM employees and subcontractors. Invite personnel simultaneous operations for coordination purposes. Review scope of work briefly discuss required and applicable topics. This meeting is a daily refined to a full orientation. Task-specific discussions associated with Task Hat			AECOM Superv Phone Number:		me: Jennifer Pretare	T
			AECOM SH&E F Phone Number:			
ssessment (THA) follow this meet dividual task is started.	ing at the task location immediately before	re	Meeting Leader	: kni	ny Protare Michille ST	tegn
	ject Name/Location: Upper Columbia	a River F	lant Tissue Study	17	Number: 60570350	
						ľ
	and soil sampling					
Muster Point Location:	First Aid Kit Location:		tinguisher Loca	ation:	Spill Kit Location:	
ield Vehicle	Field Vehicle/Backpack	The second second	Vehicle	18 8 9 8	Field Vehicle	
1. Required Topics		2. Dia	cuss if Applicab			
Fitness for Duty requireme		МЪ			l or mark 🔳 as not applicable	
_/ .	k specific) completed and current	Y.			lectrical Hazards	
	stood, reviewed, signed by all (incl. procedures, requirements, etc.)	HE	Ergonomics - Li Lock Out/ Tag (dy Position	
Pre-Job Hazard Assessme					es - visual identifier and mentor/	
understood	and the second second		oversight assign			
Task Hazard Assessments for each task immediately					uring Operations	
STOP WORK Right & Res		<u>Y</u>	Slip/ Trip/ Fall H			
changes/changed condition			Specialized PPI	E Needs		5
Acquirement to report to su damage, near miss, unsafe			Traffic Control Waste Manager	mont/ De	contamination	
Emergency Response Plan		MÉ	1		t Stress / Cold Stress	
first aid kit, fire extinguishe	r, clinic/hospital location				nents (e.g., JHAs, THAs,	
Personal Protective Equipr hazard assessments in goo	ment (PPE) - Required items per		procedures, rep			
- /	ected (documented as required)				quired (e.g., Fall Protection,	
and in good condition - ope	erators properly trained/certified		understood (ide		ork, Critical Lifts, etc.); in place,	
Work area set up and dem protect workers, site staff, a	arcation/ barricades in place to and the public		understood (ide	and y and	iony.	
	s available, understood (describe):		Other Topics (d	escribe/a	attach):	
_/	1.					
Lessons Learned / SH&E in	mprovements (describe):		Client specific re	equireme	ents (describe):	
	a Filler a					
. Daily Check Out by Site S	upervisor		And Andrews	1.4		-
Describe incidents, near misse		Describ		ed/ Impr	ovemenț Areas from today:	13
nterventions from today:		ļ	leep Vehich	e Kei	is up vehicle	
The site is being left in	a safe condition and work crew o	checke	d out as fit unles	s other	vise specified as above.	
Site Supervisor Name Junn Michelle Jegne	Heter Signature			Date Time (a	4 20 20 18 it end of day / shift) 6:30 pm	-
	Sign In Sign Out sheets applicabl	le to th	s meeting are or	n revers	e and, if applicable, attached.	

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All employees:

- STOP WORK if concerned / uncertain about safety / hazard or additional precaution is not recorded on the THA.
- Be alert and communicate any changes in personnel or conditions at the worksite to the supervisor.

Reassess task, hazards, & mitigations on an ongoing basis; amend the THA if needed.

SITE WORKERS (including AECOM Contractors and Subcontractors): Your signature below means that you understand: * The requirement to participate in creating, reviewing, & updating hazard assessments (THA) applicable to your task(s).

* The hazards & control measures associated with each task you are about to perform.

* The permit to work requirements applicable to the work you are about to perform (if it includes permitted activities).

* That no tasks or work is to be performed without a hazard assessment.

* Your authority & obligation to "Stop Work" intervene, speak up/ listen up.

Your initials (right columns) certify that you arrived & departed fit for duty, & have reported all incidents/near misses; meaning:

- * You are physically and mentally fit for duty and have inspected your required PPE to ensure satisfactory condition.
- * You are not under the influence of any type of medication, drugs, or alcohol that could affect your ability to work safely.
- * You are aware of your responsibility to immediately report any illness, injury (regardless of where or when it occurred), or impairment/fatigue issue to the AECOM Supervisor.

* You signed out as fit / uninjured unless you have otherwise informed the AECOM Supervisor.

Print Name & Company	Signature	Initials & Sign In Time	Initials & Sign Out Time
See THA for Stay		In & Fit Sam - 6 pm	Out & Fit
Signatures		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
	5	In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
3		In & Fit	Out & Fit

(Attach additional Site Worker sign-in/out sheets if needed) Identify number of attached sheets:

SITE VISITOR / SITE REPRESENTATIVE						
Name	Company Name	Arrival Time	Departure Time	Signature		
	5					
					_	
	1 I					
					_	

Daily Tailgate Meeting (S3AM-209-FM5) Revision 7 December 27, 2017 PRINTED COPIES ARE UNCONTROLLED. CONTROLLED COPY IS AVAILABLE ON COMPANY INTRANET.



Americas

Task Hazard Assessment

Task Hazard Assessment	-			S3A	M-209-FM6
Date: 4202018 Permit / Job Number:	Project Name / Location: Upper Columbia I	-		-	
Description of Task: Plant Tissue Sampling		Projec	t Number: 60570352		
Do you have a pre-job hazard assessment O Yes – review the steps, hazards, and p	t (JHA) <u>specific to this task</u> in your hands? recautions. Attach and reference JHA in the form below. utions associated with the task in the form below.	Add any ac	ditional steps, hazards, and precautions to this form otherwis	e unidenti	fied on JHA.
Basic Task Steps (explain in order how the task will be carried out)	Hazards (identify all hazards & potential hazards of each step)	Risk (before)	Control Measures / Precautions (describe how that hazard will be controlled)	Risk (after)	Revised? (yes - record time
driving to	mud, slippens	T	slow on Unpared	1	
From Sample	unpaved surfaces		roads	1	
area			angine de gine		
			36	li	
Sampling -	observed ticks yester	aus	do tick Chark multiple	11	
walking in forest	Walking on Meven	L	day	1	
	Surraces	5	let people Know if	11	
Visit or	2 0		you are behind them	1	
TRADE OF PARTY & C	A CONTRACTOR OF THE REAL		when working on Slop	es	
Bellin 1 States 1	A A A A A A A A A A A A A A A A A A A		to be aware of		
LINE SPRAMMENT 2			rockfall		
rail Hamital Ba	and a literature				÷
de la mais	and the second of the		take care up slipping/ma	ddy	ALC: N
Allerer a lot an (Drown) S is			aleas	\square	
-EUC			Highest Risk Index		Star Bernard
The Task Hazard Assessment is to be completed at the w individual(s) who is intended to conduct the task immediat associated task. Number and attach additional pages if ne		helle J			
Worker/Visitor acknowledgement and review of this conte document. Originator to also sign Worker acknowledgement	Int on back of this Supervisor	Print Name	Signature Signature		10139-009

Risk Matrix on Reverse

Task Hazard Assessment (S3AM-209-FM6) Revision 6 June 26, 2017 PRINTED COPIES ARE UNCONTROLLED. CONTROLLED COPY IS AVAILABLE ON COMPANY INTRANET.

THIS FORM IS TO BE KEPT ON JOB SITE.

1

AECOM

AECOM

WORKE	R SIG			zard Asses	
NAME (Please Print)	TIME	SIGNATURE	Follo	ow-Up/Rev	iew
I participated in the developme			Initials/Time	Initials/Time	Initials/Time
Michelle Stegner	rd Assessm	11/1		a Constantion	
Glen Mejin	8.07	and			
Jef walke	8:00	MAR			
WWWWWW Linda Howard	8,00	Brile Haval	<u></u>		special read
Sto Holmes,	8.00	Star Josh A			
Paul Hamidi	3:00	Kavil Amily			
Marc Stifeman	800	MX			
Monica Tonel	800	Munica Tonel			1.6
Jennifer Preten	8.00	Jan			
VISI		GNION			

Instructions:

Identify basic steps of the task and associated hazards. Calculate the initial risk rating. Identify control measure to eliminate or reduce the hazard's risk and calculate the residual risk rating. If the risk rating (after controls are implemented) cannot be reduced to 4 or lower, additional approvals are needed before the activity can begin.

Employees shall monitor the activities for compliance with this document. Workers should STOP WORK on a task if conditions change from the planned and agreed approach to the work.

This document should be updated to reflect new conditions or changes in task methods.

UR SIGN UN

I have read and understand the content of this Task Hazard Assessment.

Kelly	O'Nort	
Lis	Nelis	

5:00	Luger
8:00	Lickl

Emergency Meeting / Assembly Area

Field Vehicle

Emergency Contact #

911

Method of Communication

Cell or 2-way Radios

	Si	everity - Potential Co	nsequences		A REAL	
	People	Property Damage	Environmental Impact	Ima	Public ge/Reputation	
Catastrophic	Fatality, Multiple Major Incidents	>\$1M USD, Structural collapse	Offsite impact requiring remediation	Gove	mment ention	
Critical	Permanent impairment, Long term injury/illness	>\$250K to \$1M USD	Onsite impact requiring remediation	Media	intervention	
Major	Lost/Restricted Work	> \$10K to \$250K USD	Release at/above reportable limit	Owne	Ownerintervention	
Moderate	Medical Treatment	> \$1K to \$10K USD	Release below reportable limit	Community or local attention		
Minor	First Aid	=\$1K USD</td <td>Small chemical release contained onsite</td> <td colspan="2">Individual complaint</td>	Small chemical release contained onsite	Individual complaint		
		Probability	,			
Frequent	Expected to occu	Ir during task/activity		1	9/10	
Probable	Likely to occur du	luring task/activity			1/10	
Occasional	Occasional May occur during the task/activity				1/100	
Remote	Unlikely to occur	during task/activity	di 1997 da 1997		1/1,000	
Improbable	Highly unlikely to	occur, but possible du	ring task/activity		1/10:000	

Risk Rating Matrix

A CONTRACT	Severity							
Probability	5 - Catastrophic	4 - Critical	3 – Major	2 - Moderate	1 - Minor			
5 – Frequent	25	20	15	10	5			
4 – Probable	20	16	12	8	4			
3 - Occasional	15	12	9	6				
2 – Remote	10	8	6	4	2			
1 - Improbable	5	4	3	2	1			

Risk Rating (Probability x Severity)	Risk Acceptance Authority
1 to 4 (Low)	Risk is tolerable, manage at local level
5 to 9 (Medium)	Risk requires approval by Operations Lead/Supervisor & SH&E Manager
10 to 25 (High)	Risk requires the approval of the Operations Manager & SH&E Director

Task Hazard Assessment (S3AM-209-FM6)

Revision 6 / 26, 2017

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ANET.



DOALS OOD FLAG

Americas

Task Hazard Assessment

Permit / Job Number:		Project Number: 60570352				
Description of Task: Plant Tissue Sampling						
O Yes – review the steps, hazards, and pr	t (JHA) <u>specific to this task</u> in your hands? recautions. Attach and reference JHA in the form below. utions associated with the task in the form below.	Add any addit	tional steps, hazards, and precautions to this form otherwise	unidentif	ied on JHA.	
Basic Task Steps (explain in order how the task will be carried out)	Hazards	Risk (before)	Control Measures / Precautions (describe how that hazard will be controlled)	Risk (after)	Revised	
driving	deer, turkey	6	passenjer aware of	3		
Sampling	tripping hazardo		watch lach step	3		
	Nood, prinches logs,	6	talking on phone			
Band Charles Rus			using gps	- 19		
Intruster Ional Ban	Conderine (wid)		ARE CONTRACTOR OF A			
Bine Welch	AN CONTRACTOR		and the second			
Den Halling I.			Highest Risk Index	Kolence	The Party of the	
The Task Hazard Assessment is to be completed at the w individual(s) who is intended to conduct the task immediat associated task. Number and attach additional pages if ne Worker/Visitor acknowledgement and review of this conter	ely prior to initiating the Originator Michaelle	2 Stegy Print Name	Left Signature			
document. Originator to also sign Worker acknowledgement		Print Name	Signature			

Revision 6 June 26, 2017 Control Control Control Copy is available on company intranet.

AECOM

WORKI	ER SIGN C	N	Task Ha	azard Asse	ssment
NAME (Please Print)	TIME	SIGNATURE	Foll	ow-Up/Rev	view
I participated in the developm Task Haz	ent and understa ard Assessment.	nd the content of this	Initials/Time	Initials/Time	Initials/Time
Michelle Stegner	8:00 am	and a	S. 199		
Linda Howard	8a X	mla M Amar			
Sty Holnes	8 am	Stat Halung			
Paul Hamidi	- Bar	Saul Hampt			
Glen Meji	4 an	Wan			
Jeff Walker	Par	allin			
Monica Tonel	8 am	monica Tonel			
Marc Stifelman	8 "	ME			
JENNY Pretare	8:00 -	fun			
VISI	TOR SIGN	ION			

I have read and understand the content of this Task Hazard Assessment.

Kelly ONal	Son June
Jond than Espinoza	Sam Int 4:
Julie Weicheld	Sam Jus Thull
Lis Nelis	Sam Alcul

Risk Rating Matrix

Probability	Severity							
	5 - Catastrophic	4 - Critical	3 - Major	2 - Moderate	1 - Minor			
5 – Frequent	25	20	15	10	5			
4 - Probable	20	16	12	8	4			
3 - Occasional	15	12	9	6				
2 - Remote	10	8	6	4	2			
1 - Improbable	5	4	3	2	T			

Risk Rating (Probability x Severity)	Risk Acceptance Authority
	Risk is toterable, manage at local level
5 to 9 (Medium)	Risk requires approval by Operations Lead/Supervisor & SH&E Manager
10 to 25 (High)	Risk requires the approval of the Operations Manager & SH&E Director

Task Hazard Assessment (S3AM-209-FM6)

26, 2017 Revision 6 PRINTED

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Emergency Meeting / Assembly Area

This document should be updated to reflect new conditions or changes in task methods.

Field Vehicle

Instructions:

Identify basic steps of the task and

before the activity can begin.

approach to the work.

associated hazards. Calculate the initial risk

rating. Identify control measure to eliminate or reduce the hazard's risk and calculate the residual risk rating. If the risk rating (after controls are implemented) cannot be reduced to 4 or lower, additional approvals are needed

Employees shall monitor the activities for compliance with this document. Workers should STOP WORK on a task if conditions change from the planned and agreed

Emergency Contact #

911

Method of Communication

Cell or 2-way Radios

	Si	everity - Potential Co	nsequences		
	People	Property Damage	Environmental impact	Public Image/Reputation	
Catastrophic	Fatality, Multiple Major Incidents	>\$1M USD, Structural collapse	Offsite impact requiring remediation	Government	
Critical	Permanent impairment, Long term injury/illness	>5250K10 \$1M USD	Onsite impact requiring remediation	Media intervention	
Major	Lost/Restricted Work	> \$10K to \$250K USD	Release at/above reportable limit	Owner intervention	
Moderate	Medical Treatment	> \$1K to \$10K USD	Release below reportable limit	Community or local attention	
Minor	First Aid	<=\$1KUSD	Small chemical release contained onsite		
		Probability		And and the local states	
Frequent	Expected to occu	r during task/activity	the second s	9/10	
Probable	Likely to occur du	uring task/activity		1/10	
Occasional May occur during the task/activity			1/100		
Remote	Unlikely to occur	during task/activity		1/1,000	
Improbable	Highly unlikely to	occur, but possible du	ring task/activity	1/10.000	

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S3AM-209-FM6

Americas

Task Hazard Assessment

Permit / Job Number: / /		Projec	t Number: 60570352		Project Number: 60570352				
Description of Task: Plant Tissue Sampling				1.0					
O Yes – review the steps, hazards, and pr	(JHA) <u>specific to this task</u> in your hands? ecautions. Attach and reference JHA in the form below. Itions associated with the task in the form below.	Add any ad	ditional steps, hazards, and precautions to this form otherwis	e unidentii	ied on JHA.				
Basic Task Steps (explain in order how the task will be carried out)	Hazards (identify all hazards & potential hazards of each step)	Risk (before)	Control Measures / Precautions (describe how that hazard will be controlled)	Risk (after)	Revised				
driving	Sun, rain, weather	L	clean windshield of	3					
walking	bees.		aust, airt	2	4.70				
1. 1.	use caution	6	let others know if you	5					
Sattapling.	while dissing uf	6	wear cloves glasses	3					
ABUDS	Sharp tools		0 ,)						
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ann mann an Sa			The second		Support of				
Pout Hamid Bu	San M. C.		Second and State of Second and State of Second and Seco						
St. Holar- Year			Highest Risk Index	c l	Des .				
The Task Hazard Assessment is to be completed at the w individual(s) who is intended to conduct the task immediat associated task. Number and attach additional pages if ne	ely prior to initiating the Originator	, che							
Worker/Visitor acknowledgement and review of this conte document. Originator to also sign Worker acknowledgeme		Print Name	Sighatur Sighatur						

 Task Hazard Assessment (S3AM-209-FM6)

 Revision 6 June 26, 2017

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AECOM

WORK	WORKER SIGN ON				
NAME (Please Print)	TIME	SIGNATURE	Foll	ow-Up/Rev	view
/ I participated in the developm				Initials/Time	Initials/Time
VIS	TOR SIGN	ON			

Instructions:

Identify basic steps of the task and associated hazards. Calculate the initial risk rating. Identify control measure to eliminate or reduce the hazard's risk and calculate the residual risk rating. If the risk rating (after controls are implemented) cannot be reduced to 4 or lower, additional approvals are needed before the activity can begin.

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This document should be updated to reflect new conditions or changes in task methods.

I have read and understand the content of this Task Hazard Assessment.

Denise Mills	Egm ,	h.~	
Monica Tonel	8 am	Monica Tonel	
Jonathan Expinoza		It li	
Julie werchend	Bam	que plate -	

Risk Rating Matrix

	Severity								
Probability	5 - Catastrophic	4 - Critical	3 – Major	2 - Moderate	1 - Minor				
5 - Frequent	25	20	15	10	5				
4 - Probable	20	16	12	8	4				
3 - Occasional	15	12	9	6	3				
2 - Remote	10	8	6	15195 Marier B	2				
1 - Improbable	5	4	3	2	1				

Risk Rating (Probability x Severity)	Risk Acceptance Authority					
1 to 4 (Low)	Risk is tolerable, manage at local level					
5 to 9 (Medium)	Risk requires approval by Operations Lead/Supervisor & SH&E Manager					
10 to 25 (High)	Risk requires the approval of the Operations Manager & SH&E Director					

Task Hazard Assessment (S3AM-209-FM6) Revision 6 26, 2017

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Emergency Meeting / Assembly Area

Field Vehicle

Emergency Contact #

911

Method of Communication

Cell or 2-way Radios

	3	everity - Potential Co	nsequences		
	People	ople Property Damage Environmental Impact		Public Image/Reputation	
Catastrophic	Fatality, Multiple Major Incidents	>\$1M USD, Structural collapse	Offsite impact requiring remediation	Government	
Critical	Permanent impairment Long term injury/illness	>\$250K10 \$1M USD	Onsite impact requiring remediation	Media intervention	
Major	Lost/Restricted Work	> \$10K to \$250K USD	Release at/above reportable limit	Owner intervention	
Moderate	Medical Treatment	> \$1K to \$10K USD	Release below reportable limit	Community or local attention	
Minor	First Aid	=\$1K USD</td <td>Small chemical release contained onsite</td> <td>Individual complaint</td>	Small chemical release contained onsite	Individual complaint	
		Probability			
Frequent	Expected to occu	r during task/activity		9/10	
Probable	Likely to occur d	uring task/activity		1/10	
Occasional	May occur during			1/100	
Remote		during task/activity		1/1,000	
Improbable	Highly unlikely to	occur, but possible du	1/10.000		

Task Hazard Assessment

Permit / Job Number:		Proje	ct Number: 60570352		
Description of Task: Plant Tissue Sampling					A Part -
 Yes – review the steps, hazards, and p 	t (JHA) <u>specific to this task</u> in your hands? recautions. Attach and reference JHA in the form below utions associated with the task in the form below.	. Add any a	idditional steps, hazards, and precautions to this form ot	nerwise unidenti	fied on JHA.
Basic Task Steps	Hazards (identify all hazards & potential hazards of each step)	Risk (before)	Control Measures / Precautions (describe how that hazard will be controlled)		Revised*
(to inchellion)	nother with Stroll on	6	passinger lookont	3	10-10-10 10-1
Camp gioura					
- Mufle abor	MIST Souper purch print	6	watch for piach points	3	es years
Town Lister To	Sorta an ort				
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Harden Tener Anes	MR ANT		Highest Risk I		
The Task Hazard Assessment is to be completed at the w individual(s) who is intended to conduct the task immediat associated task. Number and attach additional pages if ne Worker/Visitor acknowledgement and review of this conte document. Originator to also sign Worker acknowledgeme Risk Matrix on Reverse	ely prior to initiating the Originator	Print Nan	Hognen Is	Ignature	

 Task Hazard Assessment (S3AM-209-FM6)

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S3AM-209-FM6

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AECOM

	WOF	RKER SIG	IN ON			Task Haz	ard Assessm	ent
NAME	(Please Print)	TIME		SIGNATUR	E	Follow	w-Up/Review	In
l partic	ipated in the deve	lopment and un Hazard Assess		content of this	In	itials/Time	Initials/Time Initia	ld Is/Time as
Mic	helle Stean	1el 8:50	n bl	1 dad	1			ra or
1 au	1 lamid	8:5	r Va	in Alhi	h			re cc
Str. H		8:150	- Atus	+ Ach				to be
Marc			M	8				
	a Tonel	8:15 A/	n Mon	ica Tonel				Er cc
Julie		<u>8:15 A</u>	10	ughter	<u> </u>			sh
Jonat	han Estino		n di	t Gi				ch
Jenny	Pretare	8:15	- Pup					Th
- Linita	Howard		- da	la tom	and _			ne
	v	ISITOR S	IGN ON					
l hav	e read and unders	tand the conten	t of this Task	Hazard Assessm	ent.			
Jeff	Walter	8:15	he has	1/1e	_			Fie
Glen	Mejia	1:15	-	m-				
		10.		0				91
							The second	Ce
	Risk	Rating M	atrix					Beverity - Potentia
			Severity				People	Property Dama
Probability	5 - Catastrophic	4 - Critical	3 - Major	2 - Moderate	1 - Minor	Catastrophic	Fatality, Multiple Major	>\$1M USD, Structural collap
5 - Frequent	25	20	15	10	5	The second second	Permanent impairment	

Instructions:

Identify basic steps of the task and associated hazards. Calculate the initial risk rating. Identify control measure to eliminate or reduce the hazard's risk and calculate the residual risk rating. If the risk rating (after controls are implemented) cannot be reduced to 4 or lower, additional approvals are needed before the activity can begin.

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This document should be updated to reflect new conditions or changes in task methods.

Emergency	Meeting /	Assembly Area
ield Vehicle		

Emergency Contact #

911

Method of Communication

ell or 2-way Radios

	34	everity - Potential Co	nsequences		
	People	Property Damage Environmental Impac		Public Image/Reputation	
Catastrophic	Fatality, Multiple Major Incidents	>\$1M USD, Structural collapse	Offsite impact requiring remediation	Government	
Critical	Permanent impairment, Long term injury/illness	>\$250Kto \$1M USD	Onsite impact requiring remediation	Media intervention	
Major	Lost/Restricted Work	>\$10K to \$250K USD	Release at/above reportable limit	Ownerintervention	
Moderate	Medical Treatment	> \$1K to \$10K USD	Release below reportable limit	Community or local attention	
Minor	First Aid	=\$1KUSD</td <td>Small chemical release contained onsite</td> <td>Individual complaint</td>	Small chemical release contained onsite	Individual complaint	
		Probability			
Frequent	Expected to occu	r during task/activity	9/10		
Probable	Likely to occur du	uring task/activity		1/10	
Occasional	May occur during	the task/activity	the task/activity		
Remote		during task/activity occur, but possible du	1/1,000		
Improbable	1/10.000				

	Severity								
Probability	5 - Catastrophic	4 - Critical	3 - Major	2 - Moderate	1 - Minor				
5 - Frequent	25	20	15	10	5				
4 - Probable	20	16	12	8	10114				
3 - Occasional	15	12	9	6	3				
2 - Remote	10	8	6		2				
1 - Improbable	5	4	3	2	4				

Risk Rating (Probability x Severity)	Risk Acceptance Authority
1 (o 4 (Low)	Risk is tolerable, manage at local level
5 to 9 (Medium)	Risk requires approval by Operations Lead/Supervisor & SH&E Manager
10 to 25 (High)	Risk requires the approval of the Operations Manager & SH&E Director

Task Hazard Assessment (S3AM-209-FM6)

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NAME (Please Print)

TASK HAZARD ASSESSMENT

VISITOR SIGN ON

NAME (Please Print)

SIGNATURE TIME

Learning the development and understand the content of this Task Hazard Assessment.

WORKER SIGN ON

SIGNATURE

Risk Rating Matrix

Signed the Satety	~										
adenaile degenert form.	Probability	Lizzberry L		" Seve	erity		and the Party				
30 1.		5-Catastrophic	4-Critical	3-Ma	ajor 2-Mode	ate	1-Minor				
	5-Frequent	25	20	1	5 10		5				
	4-Probable	20	16	12	2 8		4	· · · · · · · · · · · · · · · · · · ·			
		15	12	9	6		3				
	2-Remote	10	8	6	4		2				
	- 1-Improbable	5	4	3			1				
		•	14			_					
	Risk F			Risk Acc	ceptance Aut	horit	ty				
	1 to 4	(Low)	Risk is tole	erable, m	anage at local	level					
	<mark>5 to 9 (N</mark>	(Medium) Risk requires approval by Operations Lead/ Supervisor & Safety Manager						-			
	10 to 25	o 25 (High) Risk requires the approval of the Operations Manager & Safety Director									
			Severity - Pote	ntiel Conneg				Task Hazard Asse	ssment Follow-Up/Rev	view.	
F		People			Environmental Imp	ct .	Public	First Break		Init	fial
	Catastrophic	Fatality, Multiple	Major >\$1M		Offsite impact requini	ng Gov	vernment				la
	Critical	Permanent impa	ment, >\$2501	K to \$1M	Onsite impact requin remediation		ervention dia intervention			\rightarrow	
	Major	Long term injury Lost/Restricted V	Vork > \$10k	(to \$250K	Release at/above	Ow	ner intervention			$ \rightarrow $	
	Moderate	Medical Treatme	USD nt > \$1K1	to \$10K USD	reportable limit Release below		mmunity or local				
	Minor	First Aid	=\$1K</td <td>USD</td> <td>reportable limit Small chemical releat contained onsite</td> <td></td> <td>ention ividual complaint</td> <td>Lunch Break</td> <td></td> <td>Init</td> <td>ial</td>	USD	reportable limit Small chemical releat contained onsite		ention ividual complaint	Lunch Break		Init	ial
			L	******	CONTRACTORISHE				12		
Emergency Meeting / Assembly Area				bebility	Constant 1				15		-
	Frequent Probable		ccur during task/a r during task/activ				9/10				
North Dort Boat Laurich	Occasional		ing the task/activi				1/100				
	Remote	Unlikely to oc	cur during task/act	livity		**********	1/1,000		L		
Emergency Contact #	Improbable	Highly unlike	y to occur, but pos	sible during ta	isk/activity		1/10,000	Second Break		Init	ial
91	Area	is safe and h	ousekeepin	g comple	eted at the end	of ta:	sk/shift.				
Emergency Radio Channel	Supervis	Or (print nam	ie)								
······································	Signatur									$\neg \uparrow$	
All Correll I stalled											
1 to Mt. Carmel hospital, (Julle									Page	2 of



TASK HAZARD ASSESSMENT

Customer Teck American			Permit No.				
Location Northport, WA		Job No. 60570352					
Description of Task Plant + Soil Sampling			June 18, 2018		ř.		
Basic Task Steps (explain how the task will be carried out)	Hazards (identify all hazards and potential hazards)	Risk (initial)	Precautions (describe how that hazard will be controlled)	Risk (final)	Initials		
Driving	Other vehicles		No cell phone use				
5	Distractions						
Walking through SA	Slips, trips, falls						
	Wildlife - bear, rattlesnaker						
Plant sampling	Insects - FICKS, bees						
J	Sunt heat				ļ		
Soil Sampling	overhead work - muscle strain	١					
5	- falling pine coned						
					-		
		+					
- (in					
		1 . a . m*s					
		2	1				
					a(2.5)		
			Highest Risk Ind	ex			
Review and attach to Tailgate Meeting as required. Numb additional pages if necessary.	ent on back of this Supervisor Jenny P	reta	e fin				
Worker/Visitor acknowledgement and review of this contend document.	ent on back of this Supervisor Terrup P	Print Name	C Signature				
Risk Matrix on Reverse	V						

THIS FORM IS TO BE KEPT ON JOB SITE.

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June 18, 2018

Imagine it.

Delivered.

AECOM

Upper Coumbia River Plant Tissue Study B. Personnel Acknowledgement 13.

By signing below, the undersigned acknowledges that he/she has reviewed the AECOM Health and Safety Plan for the feitemame] site. The undersigned also acknowledges that he/she has been instructed in the contents of this document and understands the information pertaining to the specified work, and will comply with the provisions contained therein. The employee understands that they are NOT to perform any work that they have not been adequately trained for and that they are to stop work if it is unsafe to proceed. Finally, the employee understands to notify the Site Supervisor and the Incident Hotline at 800-348-5046 for any incident, including ANY injury even if no first aid or medical treatment is required.

Print Name	Signature	Organization	Date
JEnny Pretare	Jem	AELOM	6-18-18
Kris M-Caig	Husthaig	Teck American	6-18-18
Linka Noward	Sunda monal	AECOM	6-18-18
DAVE LEWIS	Davertens	AECOM	6-18-18
Jeff Walker	fille	AECOM	6-18-18
De Wichman .	periton	ac	6-18-18
MONICA TONEL	Monica Tonel	USEPA RID	6/18/2018
Kelly O'Nen	Keydre	Jacobs	6/18/2018
Whitney Freser	Mitney hag	Codestone Env. Consulhi,	6/18/2018
Ellie Traudt	Elizabeth flat	Jacobs	0118/18
Marc Stifelman	Nor	epa	6/14/18
Michelle Steaner	- A	AECOM	6/18/18
GIAN META	A	ARCOM	6/18/18
Lis Nelis	ZENI	Ramboll	6/18/18



Severity

3-Major

15

12

9

6

3

2-Moderate

10

8

6

4

2

1-Minor

5

4

3

2

1

WORKER SIGN ON

NAME (Please Print)

SIGNATURE

VISITOR SIGN ON

SIGNATURE NAME (Please Print) TIME

I participated in the development and understand the content of this Task Hazard Assessment. **Risk Rating Matrix** toaner Probability 5-Catastrophic **4-Critical** 5-Frequent 25 20 Monica Tone WITTME **4-Probable** 20 16 Kelly O'New **3-Occasional** 15 12 rraudt 2-Remote 10 8 Marc 2 piman 5 4 1-Improbable have 11011 **Risk Rating Risk Acceptance Authority** (Probability x Severity) 0 1 to 4 (Low) Risk is tolerable, manage at local level 104 How Risk requires approval by Operations Lead/ Linda 5 to 9 (Medium) Supervisor & Safety Manager RN **Risk requires the approval of the Operations** 10 to 25 (High) Manager & Safety Director Severity -- Potential Consequences

	People	Property Damage	Environmental Impact	Public Image/Reputation
Catastrophic	Fatality, Multiple Major Incidents	>\$1M USD, Structural collapse	Offsite impact requiring remediation	Government intervention
Critical	Permanent impairment, Long term injury/illness	>\$250K to \$1M USD	Onsite impact requiring remediation	Media intervention
Major	Lost/Restricted Work	> \$10K to \$250K USD	Release at/above reportable limit	Owner intervention
Moderate	Medical Treatment	> \$1K to \$10K USD	Release below reportable limit	Community or local attention
Minor	First Aid	<=\$1K USD	Small chemical release contained onsite	Individual complaint

Task Hazard Assessment Follow-Up/Review.

First Break	Ini	tial
Lunch Break	 Ini	tial

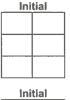
Emergency Meeting / Assembly Area Northport Boat Lounch Emergency Contact #

	Probability					
Frequent	Expected to occur during task/activity	9/10				
Probable	Likely to occur during task/activity	1/10				
Occasional	May occur during the task/activity	1/100				
Remote	Unlikely to occur during task/activity	1/1,000				
Improbable	Highly unlikely to occur, but possible during task/activity	1/10,000				

Area is safe and housekeeping completed at the end of task/shift.

Jenniter Pretare

Second Break



911

Emergency Radio Channel

Supervisor rint name Signature

Page 2 of 2



Sustomer Teck UCR Plan	+ Tissue Study	Permit	No.		
ocation Northport, WA		Job No)		2
escription of Task		Date	6/19/20182		é =
Basic Task Steps (explain how the task will be carried out)	Hazards (identify all hazards and potential hazards)	Risk (initial)	Precautions (describe how that hazard will be controlled)	Risk (final)	Initials
No changes from yes	slow traffic, passing				
driving	Slow traffic, passing		avoid passing when necessar)	
			avoid passing when necessar better to go Slower with rost of traffic than take risk.	-	
Walking	Steep Slippen slopes		make sure to secure		
0			footing and identify Safest path forward before Walking		
			bejore Walking		
Sampling	hand tools, clippers		Keep fingers out of		
		4	way		
			~		
					ng: 5);
			Highest Risk Index		6

Review and attach to Tailgate Meeting as required. Number and attach additional pages if necessary.

Risk Matrix on Reverse

Originator

Worker/Visitor acknowledgement and review of this content on back of this document.

Supervisor Jennifer Pretare. Print Name

Signature em Signature

THIS FORM IS TO BE KEPT ON JOB SITE.



WORKER SIGN ON

NAME (Please Print)

SIGNATURE

VISITOR SIGN ON

NAME (Please Print)

SIGNATURE TIME

I participated in the development and understand the content of this Task Hazard Assessment.		R	lisk R	ating N	Natrix					
Monica Tonel) mt mcl 6/20/18	-		SE ONE	" Seve	rity]			
Marc Stife Man Nor	Probability	5-Catastrophic	4-Critica			te 1-Minor				
Ellie Traudt Shubert	5-Frequent	25	20	15	5 10	5				
	- 4-Probable	20	16	12	2 8	4		<u></u>		
GLEN MEJIA	- 3-Occasional	15	12	9	6	3				
DIVELEWIS DE	2-Remote	10	8	6	4	2				
KellydNac Kugel	- 1-Improbable	5	4	3	2	1				
What Howard Zinger symmet	Diele f	Detine					1			
Jeff Walker		Rating x Severity)		Risk Acc	eptance Auth	ority				
Whitney Freser Ollinhey Josef	1 to 4	(Low)	Risk is t	tolerable, m	anage at local l	evel				
Jenny Pretare Juit	- 5 to 9 (N	Aedium)		uires appro	val by Operatio / Manager	ons Lead/		<u></u>		
~~	10 to 2	ō (High)		uires the ap r & Safety D	oproval of the C Director	perations				9
	_		Severity P	otential Consequ	Jences		Task Hazard Assess	sment Follow-Up/Re	view.	
		People	Pro	operty Damage	Environmental Impec	Public Image/Reputation	First Break		Initia	al
	Catastrophic	Fatality, Multiple Incidents	Stru	1M USD, uctural collapse	Offsite impact requiring remediation	Government intervention				
	Critical	Permanent impa Long term injury	//illness USI		Onsite impact requiring remediation	Media intervention				
	- Major	Lost/Restricted \	USI	_	Release at/above reportable limit	Owner intervention				
	_ Moderate	Medical Treatme		1K to \$10K USD	Release below reportable limit	Community or local attention				
	- Minor	First Aid	=</td <td>\$1K USD</td> <td>Small chemical release contained onsite</td> <td>Individual complaint</td> <td>Lunch Break</td> <td></td> <td>Initia</td> <td>al</td>	\$1K USD	Small chemical release contained onsite	Individual complaint	Lunch Break		Initia	al
				Probability]			
Emergency Meeting / Assembly Area	Frequent		occur during tas	sk/activity		9/10				
Northport Boat Laurch purk	Probable Occasional	*********	ur during task/a			1/10	-			
Emergency Contact #	Remote		cur during task		al fa ata dh .	1/1 000				
	1			possible during ta		1/10,000	Second Break	.4	Initia	al
	<u>_</u>		-	~	ted at the end o	n task/snint.				
Emergency Radio Channel	Supervis	(prair nar	me) Jen	"Une	tare		and the second se			
V	Signatur	e	\sim							
Mt. Carmer Hospitzle, Con	NIC	()							Page 2	of 2



Customer Teck UCR Plant	Tissue Study	Permit	No.		
Location Northport, W	IA I	Job No).		
Location Northport, W Description of Task Sampling	plants (collection	Date	6/20/2018		• #**
Basic Task Steps (explain how the task will be carried out)	/ Hazards (identify all hazards and potential hazards)	Risk (initial)	Precautions (describe how that hazard will be controlled)	Risk (final)	Initials
Some as cycoterday					
driving	Sun in eyes	4	Clean windshield	1	
			Wear sunglasses		
Walking	dense brush, poison	4	Walk Carefully avoid & point But hozards to others	1	
	IVU		hozardo to others		
			· · · · · · · · · · · · · · · · · · ·	1	
Sampling	Curating Sampling	4	Keep one hand free Walk Slowly & Carefully		
			Carefully		
		(h)			
		8			
			Highest Risk Index		
Review and attach to Tailgate Meeting as required. Number a additional pages if necessary.	ind attach Originator	relle	Stegnor Ma		
Worker/Visitor acknowledgement and review of this content of document.	on back of this Supervisor	Print Name	Signature	-	
Risk Matrix on Reverse	\bigcirc				

THIS FORM IS TO BE KEPT ON JOB SITE.



WORKER SIGN ON

SIGNATURE

VISITOR SIGN ON

SIGNATURE TIME

								SIGNATORE	
I participated in the development and understand the)						1		
content of this Task Hazard Assessment.		R	Risk Ra	atina I	Matrix				
Jeff Walker									
DAVE LEWIS DZ	Probability	A DOLLAR		Seve	erity	1 6 2 L			
Linda Howard AD-	Trobability	5-Catastrophic	4-Critica	lî 3-Ma	ajor 2-Moderat	e 1-Minor			
Mochalle Steaner Miles	5-Frequent	25	20	1	5 10	5			<u> </u>
Circle Margan	4-Probable	20	16	12	2 8	4			
GLAN MATPAR	# 3-Occasional	15	12	9	6	3		<u> </u>	
Gridty Resel, Wydy Keder	2-Remote	10	8	6	4	2			
JOSIE Smith April St	1-Improbable	5	4	3	2	1			
\bigcup	Dist	Dettin a					1		
	- Risk I (Probability	x Severity)		Risk Acc	ceptance Authority	ority			
	1 to 4	(Low)	Risk is to	plerable, m	anage at local le	vel			
			Risk requ	uires appro	oval by Operation	ns Lead/			
5.0×	- 5 to 9 (r	Aedium)			y Manager				
		5 (High)			pproval of the O	perations			
			Manager	& Safety I	Director		Task Hazard Assessn	nent Follow-Up/Revie	
	-	I when we	Contraction of the Contraction	tential Conseq	-	Public			
5	Catastrophic	Fatality, Multiple		perty Damage	Environmental impect	Image/Reputation	First Break	·········	Initial
	- Critical	Incidents	Struc	ctural collapse	Offsite impact requiring remediation	intervention			
		Permanent impa Long term injury	/illness USD)	Onsite impact requiring remediation	Media intervention			
	Major Moderate	Lost/Restricted	USD	0K to \$250K K to \$10K USD	Release at/above reportable limit Release below	Owner intervention			
	Minor	First Aid		1K USD	reportable limit Small chemical release	attention	Lunch Brook		Initial
	_ [1 1101 1 100			contained onsite		Lunch Break	[Initial
			P	robebility]		_
Emergency Meeting / Assembly Area	Frequent		occur during task			9/10			
Warehavie - Kettle Falls	Probable Occasional		ur during task/act			1/10			
· · · · · · · · · · · · · · · · · · ·	Remote	Unlikely to or	cur during task/a	activity		1/1,000]		
Emergency Contact #	Improbable	Highly unlike	ely to occur, but p	ossible during ta	isk/activity	1/10,000	Second Break		Initial
911 Mt. Carmel Hospital	Area				eted at the end o	f task/shift.			
Emergency Radio Channel	Supervis	OF(print na	me) Jeni	ny P	retare				
	Signatur		kn						
			71	-			· .		
			V					1	Page 2 of 2



Customer TECK America	~ Inc	Permi	t No.		
Location Kettle Falls	WA	Job N	D.		
Description of Task Demobiliz	Ation	Date	June 21, 2018		
Basic Task Steps (explain how the task will be carried out)	Hazards (identify all hazards and potential hazards)	Risk (initial)	Precautions (describe how that hazard will be controlled)	Risk (final)	Initials
Driving	Imp- Accidents	(JMP - Metanie Jung as		
Samplinge Dacking	Distraction Dry Ice		Gloves, Not sealed prokage		
	Heavy coolers		Fresh air in car		
Hearn bin backing	muscle same		lift w) a briddy good ergenonigus		
			use butty ste system		
Papernon D_					
Tripto Teck Storge					
		14			
		1.0. 0%			
				_	44.95
			Highest Risk Index		۰ م

Review and attach to Tailgate Meeting as required. Number and attach additional pages if necessary.

Worker/Visitor acknowledgement and review of this content on back of this document.

Risk Matrix on Reverse

Originator		
Supervisor	Tenny Pretare	Signature
	Print Name	Signature

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S3AM-209-FM6

Americas

Task Hazard Assessment

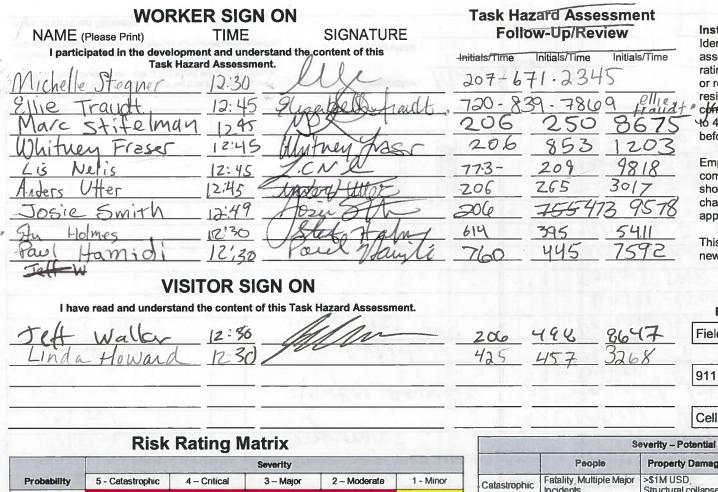
Date: 8 20 2018	Project Name / Location: Upper Columbia F	River Plan	t Tissue Study, Northport, WA		
Permit / Job Number:		Projec	t Number: 60570352	-	
Description of Task: Plant Tissue Sampling			per parte		
• Yes - review the steps, hazards, and p	(JHA) <u>specific to this task in your hands?</u> recautions. Attach and reference JHA in the form below. utions associated with the task in the form below.	Add any ac	dditional steps, hazards, and precautions to this form otherwis	e unidentif	ied on JHA.
Basic Task Steps	Hazards (identify all hazards & potential hazards of each step)	Risk (before)	Control Measures / Precautions (describe how that hazard will be controlled)	Risk (after)	Revised? (yes - record time
driving	ergonomics	5	adjust seat, etc.		1
	J		review Video online		/
	Smoke, animals	5	drive ut lights on		940
			Spotter for wildlife	2)
Sampling /	new fieldstakk	-	buddy system		
monitonne	wild lines 00		extinationer outside veh.	de	
The second second second second	° 0		water down veg		
ARILOB	IGN ON		Contact DNR re. Status		
			Keep Vehicles Lueled U	0	
The spectrum to be the	The Anna States		identily 2 exits in 1	old	1 .
Let drives variable	Smoke	5	Wear N95 Masks @	150	1
	a care a care a care a	and a	Stop work @ hazardon	\$ 30	ot
Cit Deckie I is a	2 7 CN 32 1 1 9 193	Ser a	Communication Plan = day	Tutox	t messo
Will Hussel Frazer III I Bie	5 Hunner Race I FL	19 7	CB radio to monitor 91	Henr	eraunes
March La Mara Irad	CONTRACTOR SO	1	Highest Risk Index	+1/	0
The Task Hazard Assessment is to be completed at the w individual(s) who is intended to conduct the task immediat associated task. Number and attach additional pages if ne Worker/Visitor acknowledgement and review of this conte	ely prior to initiating the Originator Miche	ILe St Print Name	egner lefe	5	_ (
document. Originator to also sign Worker acknowledgeme	nt section.	Print Name	9 Signatur	B	

Risk Matrix on Reverse

Task Hazard Assessment (S3AM-209-FM6) Revision 6 June 26, 2017 PRINTED COPIES ARE UNCONTROLLED. CONTROLLED COPY IS AVAILABLE ON COMPANY INTRANET.

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Instructions:

Identify basic steps of the task and associated hazards. Calculate the initial risk rating. Identify control measure to eliminate or reduce the hazard's risk and calculate the residual risk rating. If the risk rating (after control safe implemented) cannot be reduced to 4 or lower, additional approvals are needed before the activity can begin.

Employees shall monitor the activities for compliance with this document. Workers should **STOP WORK** on a task if conditions change from the planned and agreed approach to the work.

This document should be updated to reflect new conditions or changes in task methods.

Emergency Meeting / Assembly Area

Field Vehicle Emergency Contact #

. .

Method of Communication

Cell or 2-way Radios

	3	everity - Potential Co	nsequences			
	People Property Damage Environmental Impact		Ima	Public Image/Reputatio		
Catastrophic	Fatality, Multiple Major Incidents	>\$1M USD Structural collapse	Offsite impact requiring remediation	Gove	Government	
Critical	Permanent impairment, Long term injury/illness	>\$200K10 \$1M USU	Onsite impact requiring remediation	Media	intervention	
Major	Lost/Restricted Work	> \$10K to \$250K USD	Release at/above reportable limit	Owner intervention		
Moderate	Medical Treatment	> \$1K to \$10K USD	Release below reportable limit	Community or local attention		
Minor	First Aid	=\$1K USD</td <td>Small chemical release contained onsite</td> <td>Indivi</td> <td>dual complaint</td>	Small chemical release contained onsite	Indivi	dual complaint	
	A STATE OF SEA	Probability				
Frequent	Expected to occu	ur during task/activity		1	9/10	
Probable	Likely to occur d	uring task/activity			1/10	
Occasional	May occur durin	g the task/activity		5	1/100	
Remote	Unlikely to occur	during task/activity	during task/activity			
Improbable	Highly unlikely to	occur, but possible du	ring task/activity		1/10,000	

10 to 25 (High) Risk requires the approval of the Operations Manager & SH&E Director

25

20

5

20

16

8

Task Hazard Assessment (S3AM-209-FM6)

Revision 6 / 26, 2017

Risk Rating (Probability x Severity)

5 to 9 (Medium)

5 - Frequent

4 - Probable

2 - Remote

3 - Occasional

1 - Improbable

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Risk Acceptance Authority

Risk requires approval by Operations Lead/Supervisor & SH&E Manager

ANET.

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Cell 7

of 2



S3AM-209-FM6

Americas

Task Hazard Assessment

Permit / Job Number:		Proje	ct Number: 60570352	1.00	
Description of Task: Plant Tissue Sampling	°,				199
• Yes - review the steps, hazards, and pr	: (JHA) <u>specific to this task</u> in your hands? recautions. Attach and reference JHA in the form below utions associated with the task in the form below.	. Add any a	dditional steps, hazards, and precautions to this form otherwise	unidenti	fied on JH/
Basic Task Steps	Hazards (identify all hazards & potential hazards of each step)	Risk (before)	Control Measures / Precautions (describe how that hazard will be controlled)	Risk (after)	Revise
driving	fire vehicles on road	5	Yeild, pull over comple	tely	1
9	file	5	fire extinguisher, water down	10	1
		4	don't ide on vegetation		20
Sampling /.	Smoke	5	no hurry]
observation			no hurry wear masks @ 150	Conner y	
SA03, SA02)			use buddy system stay hydrated		
	is of suit. Tools (human) factories of the		stay hydrated		
A12001	new ow		0 0		
			unit and a second s		unploye
			the particular particular sector		-
			Sector Decide and the sector of the sector o		
			guisting eaguration	11.100	
			ter etc. telefore on aufen alle		
			Highest Risk Index		
The Task Hazard Assessment is to be completed at the w individual(s) who is intended to conduct the task immediat associated task. Number and attach additional pages if ne	orksite by the ely prior to initiating the Originator Miche	lle Ste	per lesse		
Worker/Visitor acknowledgement and review of this conte document. Originator to also sign Worker acknowledgeme	nt on back of this	Print Nag	Signature		
document. Originator to also sign worker acknowledgeme		Print Nam	ne Signature	-	

1 of 2

WORKE	ER SIGN ON	Task Ha	azard Asse	ssment		
NAME (Please Print)	TIME SIGNATURE	Foll	ow-Up/Rev	view		ctions:
I participated in the development	ent and understand the content of this	Initials/Time	Initials/Time	Initials/Time		y basic step iated hazard
Michelle Stegner	7.00 am Mlf	(PROPERTY			or red	Identify course the haza
Cristy Kessel	7:00 ANT (ripsty Vassel					al risk rating
Lis Nelis	7:00 AM ACN					lower, addi
Josic Smith	TODAM Dan USVA	2				
Ellie Traudt	7:00m Speebell stauth	Hs 10				yees shall n iance with th
WADE BRUNHAM	7:00an (45 A.					STOP WO
Paul Hamidi	7:00 Paul the					e from the p ach to the w
Marc Stife Man	700 M8					
Whitney Fraser	100 Mitry for					ocument sho onditions or
	TOR SIGN ON					
I have read and understand	the content of this Task Hazard Assessment.				Em	ergency M
Jeff walker	1:00 With			1.11	Field \	/ehicle
Anders Utter	7.00 Jet Utt	- 2- 2-				Emerg
Linda Howard	7:00 Linteraal			And Address of the owner owner owner owner own	911	
Sty Holmes	0700 Stud, Habry			A LUE S		Method o
	41110			Statistics.	Cell or	2-way Rad
Risk Ra	ting Matrix		1.000	Severity - F	otential Co	nsequences
	Severity		Peopl	e Propert	y Damage	Environment

	Severity							
Probability	5 - Catastrophic	4 - Critical	3 - Major	2 - Moderate	1 - Minor			
5 – Frequent	25	20	15	10	5			
4 - Probable	20	16	12	8	4			
3 - Occasional	15	12	9	6	3			
2 - Remote	10	8	6	4	2			
1 - Improbable	5	Sector and	3	2	1			

Risk Rating (Probability x Severity)	Risk Acceptance Authority
1 to 4 (Low)	Risk is tolerable, manage at local level
5 to 9 (Medium)	Risk requires approval by Operations Lead/Supervisor & SH&E Manager
10 to 25 (High)	Risk requires the approval of the Operations Manager & SH&E Director

Task Hazard Assessment (S3AM-209-FM6)

Revision 6 26, 2017

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os of the task and ds. Calculate the initial risk ontrol measure to eliminate ard's risk and calculate the . If the risk rating (after emented) cannot be reduced litional approvals are needed can begin.

nonitor the activities for his document. Workers ORK on a task if conditions planned and agreed ork.

nould be updated to reflect changes in task methods.

eeting / Assembly Area

ency Contact #

of Communication

dios

	34	everity - Potential Co	nsequences		
	People Property Damage Environmental impact		Public Image/Reputatio		
Catastrophic	Fatality Multiple Major Incidents	>\$1M USD, Structural collapse	Offsite impact requiring remediation	Government	
Critical	Permanent impairment, Long term injury/illness	>\$250K to \$1M USD	Onsite impact requiring remediation	Media intervention	
Major Lost/Restricted Work		> \$10K to \$250K USD	Release at/above reportable limit	Owner intervention	
Moderate	Medical Treatment	> \$1K to \$10K USD	Release below reportable limit	Community or local attention	
Minor First Aid		=\$1KUSD</td <td>Small chemical release contained onsite</td> <td colspan="2">Individual complaint</td>	Small chemical release contained onsite	Individual complaint	
		Probability			
Frequent	Expected to occu	ir during task/activity		9/10	
Probable	Likely to occur du	uring task/activity	1/10		
Occasional	May occur during	the task/activity	1/100		
Remote		during task/activity	1/1,000		
Improbable	Highly unlikely to	occur, but possible du	ring task/activity	1/10,000	



Americas

Task Hazard Assessment

Date: 8 22 2018	Project Name / Location: Upper Columbia F	River Plant	Tissue Study, Northport, WA		
Permit / Job Number:		Project	Number: 60570352		
Description of Task: Plant Tissue Sampling					
• Yes - review the steps, hazards, and p	t (JHA) <u>specific to this task</u> in your hands? recautions. Attach and reference JHA in the form below. utions associated with the task in the form below.	Add any ad	ditional steps, hazards, and precautions to this form otherwise	unidentif	ied on JHA.
Basic Task Steps (explain in order how the task will be carried out)	Hazards (identify all hazards & potential hazards of each step)	Risk (before)	Control Measures / Precautions (describe how that hazard will be controlled)	Risk (after)	Revised? (yes - record time
driving	dust visibility	5	lights on watch vehicle	1	10.4
, i j			ahead		
Sampling	dehadiation	5	Keep water with your	1	pu i i
monitoring	dist		Keep vents closed		
	long work hours		account for travel time.	estant a	
	hatique		Elene Veller in		
Charte total and anest states the state	0 0-		Epicenter Execution		10 y
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			and the second s		150 m-1270-10
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			Highest Risk Index	tir Tacovativi	
The Task Hazard Assessment is to be completed at the w individual(s) who is intended to conduct the task immediat associated task. Number and attach additional pages if ne Worker/Visitor acknowledgement and review of this conte	tely prior to initiating the Originator Mich	elle Sa Print Name	egner Ma		o constant Crista Cat Consta Cat Constant
document. Originator to also sign Worker acknowledgeme		Print Name	Signature		
Risk Matrix on Reverse			a Shanan-Circuit		EPT ON JOB SITE

Task Hazard Assessment (S3AM-209-FM6) Revision 6 June 26, 2017 PRINTED COPIES ARE UNCONTROLLED. CONTROLLED COPY IS AVAILABLE ON COMPANY INTRANET.

AECOM

Identify basic steps of the task and

before the activity can begin.

approach to the work.

associated hazards. Calculate the initial risk rating. Identify control measure to eliminate or reduce the hazard's risk and calculate the residual risk rating. If the risk rating (after controls are implemented) cannot be reduced to 4 or lower, additional approvals are needed

Employees shall monitor the activities for compliance with this document. Workers

should **STOP WORK** on a task if conditions change from the planned and agreed

This document should be updated to reflect new conditions or changes in task methods.

WORK	ER SIGN	ON	Task Ha	azard Asse	ssment
NAME (Please Print)	TIME	SIGNATURE	Foll	ow-Up/Rev	iew
I participated in the develop	nent and unders zard Assessmer		Initials/Time	Initials/Time	Initials/Time
Michelle Stegner	7.00 am	Mus	MARINE	Jacobins.	
Linda Howard	7:002.	Juten Hand			
Josie Smith	0100	pen 48/12.			
Ste Holmes	0700	1 Atap Halm		<u>uiulda.</u>	
Jeff Walla	0700	m			
Cristy Kessel	7:60	Cruth Kessel			
Whitney Fraser	7:00	Ulupun that			
WADE BRUNHAM,	7.00	UIST 1.			
Paul Hamidi	7:00	Poul Inita			
VIS	ITOR SIG	IN ON			
I have read and understand	d the content of	this Task Hazard Assessment.			

Marc Stifelman 7^w M8 Enne Teauax 7°° 900,000th drudt Anders Utter 700 Automn 14437 Lis Nelis 700 2.CM

Emergency Meeting / Assembly Area

Field Vehicle

Instructions:

Emergency Contact #

911

Method of Communication

Cell or 2-way Radios

	3	everity - Potential Co	nsequences		
	People	Property Damage	Environmental Impact	Public Image/Reputation	
Catastrophic	Fatality, Multiple Major Incidents	>\$1M USD, Structural collapse	Offsite impact requiring remediation	Government	
Critical	Permanent impairment, Long term injury/illness	>\$250K to \$1M USD	Onsite impact requiring remediation	Media intervention	
Major Lost/Restricted Work		> \$10K to \$250K USD	Release at/above reportable limit	Ownerintervention	
Moderate Medical Treatment		> \$1K to \$10K USD	Release below reportable limit	Community or local attention	
Minor First Aid		=\$1KUSD</td <td>Small chemical release contained onsite</td> <td>Individual complaint</td>	Small chemical release contained onsite	Individual complaint	
		Probability			
Frequent	Expected to occu	ir during task/activity		9/10	
Probable Likely to occur du		uring task/activity	1/10		
Occasional	May occur during	the task/activity	1/100		
Remote	Unlikely to occur	during task/activity	1/1,000		
Improbable	Highly unlikely to	occur, but possible du	ring task/activity	1/10,000	

Risk Rating Matrix

and the second second	Severity							
Probability	5 - Cetestrophic	4 - Critical	3 - Major	2 - Moderate	1 - Minor			
5 - Frequent	25	20	15	10	5			
4 - Probable	20	16	12	8	4			
3 - Occasional	15	12	9	6	3			
2 - Remote	10	8	6	4	2			
1 - Improbable	5	4	4	2	1			

Risk Rating (Probability x Severity)	Risk Acceptance Authority
1 to 4 (Low)	Risk is tolerable, manage at local level
5 to 9 (Medium)	Risk requires approval by Operations Lead/Supervisor & SH&E Manager
10 to 25 (High)	Risk requires the approval of the Operations Manager & SH&E Director

Task Hazard Assessment (S3AM-209-FM6)

Revision 6 26, 2017

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RANET.



Americas

Task Hazard Assessment

Permit / Job Number:	Project Name / Location: Upper Columbia I		t Number: 60570352	-	
Description of Task: Plant Tissue Sampling		Proje	t number: 00370352	-	
- ies - ieview the steps, hazards, and p	t (JHA) <u>specific to this task</u> in your hands? recautions. Attach and reference JHA in the form below. utions associated with the task in the form below.	Add any a	lditional steps, hazards, and precautions to this form otherwi	se unidenti	fied on JHA.
Basic Task Steps (explain in order how the task will be carried out)	Hazards (identify all hazards & potential hazards of each step)	Risk (before)	Control Measures / Precautions (describe how that hazard will be controlled)	Risk	Revised
driving,	Slow Vehicles	5	taketime Ina kush: contact t	(after)	(yes - record tim
Sampling	air quality	5.	- masks c 150, currently at	112	Clark
homitoring	heat	5	throughout day		CACUL
	dehydiation	5	- 11 We need a break from	mast	1 dere
			to heat, we can sit,	in the	ich
			w/ air cond.		1010
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			putroleura aptat concete		ian 101
			Course and the Report of the		
			Highest Risk Index	Becoming 1	Carpenti, Br
The Task Hazard Assessment is to be completed at the wo ndividual(s) who is intended to conduct the task immediatel associated task. Number and attach additional pages if nece		le Si	Egner M	ning same in K Stort Child	(804) (804)
Vorker/Visitor acknowledgement and review of this content ocument. Originator to also sign Worker acknowledgement	t on back of this Supervisor	Print Name	Signature		
lisk Matrix on Reverse		Print Name	Signature	PER SHIT	

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	R SIGN C			azard Asse	
NAME (Please Print)	TIME	SIGNATURE	Foll	ow-Up/Rev	view
I participated in the developme		nd the content of this	Initials/Time	Initials/Time	Initials/Time
Michelle Stegner	rd Assessment. 7:15	les	1111015/11111C	muals/ mme	muais/ mile
Sty Holmes)	0715	Stat Holup			
Paul Hamidi	0715	Vail Vfril	7/		
Anders VAEr	715 1	soprand Mith			
Jeft Walker	7:15	all the			
Whitney Fraser	7:15	Intron the	Stand In		
Linda Howard	7:15 0	link the Hannah	18		
			1		
		Second	in the second second		

Instructions:

Identify basic steps of the task and associated hazards. Calculate the initial risk rating. Identify control measure to eliminate or reduce the hazard's risk and calculate the residual risk rating. If the risk rating (after controls are implemented) cannot be reduced to 4 or lower, additional approvals are needed before the activity can begin.

Employees shall monitor the activities for compliance with this document. Workers should STOP WORK on a task if conditions change from the planned and agreed approach to the work.

This document should be updated to reflect new conditions or changes in task methods.

VISITOR SIGN ON

I have read and understand the content of this Task Hazard Assessment. 15

Mari Stifelmon Ellie Traudt

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Glizenb 1-8	h Chet
0	0-1-0

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Emergency Meeting / Assembly Area

Field Vehicle

Emergency Contact #

911

Method of Communication

Cell or 2-way Radios

	Si	everity - Potential Co	nsequences			
	People	Property Damage	Environmental Impact	Ima	Public age/Reputation	
Catastrophic	Fatality, Multiple Major Incidents	>\$1M USD Structural collapse	Offsite impact requiring remediation	Gove	rnment vention	
Critical	Permanent impairment, Long term injury/illness	>\$250K to \$1M USD	Onsite impact requiring remediation	Medi	a intervention	
Major	Lost/Restricted Work	> \$10K to \$250K USD	Release at/above reportable limit	Own	erintervention	
Moderate	Medical Treatment	> \$1K to \$10K USD	Release below reportable limit		Community or local attention	
Minor	First Aid	=\$1K USD</td <td>Small chemical release contained onsite</td> <td>Indivi</td> <td colspan="2">Individual complaint</td>	Small chemical release contained onsite	Indivi	Individual complaint	
		Probability				
Frequent	Expected to occu	r during task/activity			9/10	
Probable Likely to occur during task/activity			1/10			
Occasional May occur during the ta			the task/activity		1/100	
Remote Unlikely to occur during task/activity		-	1/1,000			
Improbable	Highly unlikely to	occur, but possible du	ring task/activity		1/10,000	

Risk Rating Matrix

E. M. S. G.	Severity						
Probability	5 - Catastrophic	4 - Critical	3 - Major	2 - Moderate	1 - Minor		
5 – Frequent	25	20	15	10	5		
4 - Probable	20	16	12	8	4		
3 - Occasional	15	12	9	6			
2 - Remote	10	8	6	4	2		
1 - Improbable	5	4	3	2	1		

Risk Rating (Probability x Severity)	Risk Acceptance Authority
1 to 4 (Low)	Risk is tolerable, manage at local level
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10 to 25 (High)	Risk requires the approval of the Operations Manager & SH&E Director

Task Hazard Assessment (S3AM-209-FM6)

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ANET.



S3AM-209-FM6

Americas

Task Hazard Assessment

Permit / Job Number:	Project Number: 60570352					
Description of Task: Plant Tissue Sampling				145	1997	
	(JHA) <u>specific to this task</u> in your hands? ecautions. Attach and reference JHA in the form below. Itions associated with the task in the form below.	Add any ae	dditional steps, hazards, and precautions to this form otherwise	e unidentif	ied on JHA.	
Basic Task Steps (explain in order how the task will be carried out)	Hazards (identify all hazards & potential hazards of each step)	Risk (before)	Control Measures / Precautions (describe how that hazard will be controlled)	Risk (after)	Revised?	
driving	new Stapp. New environ.	5	keep lights on, give		1	
)	D.U.		space in between			
			Vehicles recycle air	a maintaine		
LANE 21 MILLION AND			frature, watch for oth	n		
,			team members.			
Sampling	branches, slepsting	5	give space around while			
honitorica	Visibility of mails		Walking if branches		1	
Jaros	неи ой у		break & Swing back	7		
			Secure lopting observe	10.000	(Research)	
			Step spale before marin	ch		
			101 ward		100	
	air quality	5	@ 151 today-wear. h	hask	is.	
and the second second			take breaks as needed	1	de (n.	
			we will monitor throughout	Ada	1	
			Highest Risk Index	0	10	
The Task Hazard Assessment is to be completed at the w individual(s) who is intended to conduct the task immediat associated task. Number and attach additional pages if ne Worker/Visitor acknowledgement and review of this conte document. Originator to also sign Worker acknowledgeme	ely prior to initiating the Originator Michell	Print Nam	e) Signature	28	~	
Risk Matrix on Reverse	RIGNATI ISE	Print Nam	e Signature			



WORK NAME (Please Print)	ER SIGN ON TIME	SIGNATURE		Task Hazard Asse Follow-Up/Rev		
I participated in the develop			Initials/Time	Initials/Time	Initials/Time	
Michelle Happer	8.15am	Wally begun.	for the factor	2.5		
Anders Vther	_ 8:15 A	TANDOTEN/ CUM				
Sty Holmes	0815	that Halm				
JOSNE = MIM	0815 4	pracet				
Juit Walker	815	and the torna		11.15	125	
Paul Hamidi	8115	Paul Whit	7	LE LA	maria	
				-		

Instructions:

Identify basic steps of the task and associated hazards. Calculate the initial risk rating. Identify control measure to eliminate or reduce the hazard's risk and calculate the residual risk rating. If the risk rating (after controls are implemented) cannot be reduced to 4 or lower, additional approvals are needed before the activity can begin.

Employees shall monitor the activities for compliance with this document. Workers should **STOP WORK** on a task if conditions change from the planned and agreed approach to the work.

This document should be updated to reflect new conditions or changes in task methods.

VISITOR SIGN ON

I have read and understand the content of this Task Hazard Assessment.

Q15

0715

815

EllieTravder Werson mad felman

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T	amoth
	M

Emergency Meeting / Assembly Area

Field Vehicle

Emergency Contact #

911

Method of Communication

Cell or 2-way Radios

	Si	everity - Potential Co	nsequences		
	People	Property Damage	Environmental Impact	Public image/Reputation	
Catastrophic	Fatality, Multiple Major Incidents	>\$1M USD, Structural collapse	Offsite impact requiring remediation	Government	
Critical	Permanent impairment, Long term injury/illness	>\$250K to \$1M USD	Onsite impact requiring remediation	Media intervention	
Major	Lost/Restricted Work	> \$10K to \$250K USD	Release at/above reportable limit	Ownerintervention	
Moderate	Medical Treatment	> \$1K to \$10K USD	Release below reportable limit	Community or local attention	
Minor	First Aid	=\$1KUSD</td <td>Small chemical release contained onsite</td> <td colspan="2">Individual complaint</td>	Small chemical release contained onsite	Individual complaint	
		Probability			
Frequent	Expected to occu	r during task/activity		9/10	
Probable	Likely to occur du	uring task/activity	ing task/activity		
Occasional	May occur during	the task/activity		1/100	
Remote Unlikely to occur due		during task/activity		1/1,000	
Improbable	Highly unlikely to	occur, but possible du	ring task/activity	1/10,000	

Risk Rating Matrix

	Severity						
Probability	5 - Catastrophic	4 - Critical	3 - Major	2 - Moderate	1 - Minor		
5 – Frequent	25	20	15	10	5		
4 - Probable	20	16	12	8	4		
3 - Occasional	15	12	9	6			
2 - Remote	10	8	6		2		
1 - Improbable	5	4	3	20102121210	1 1		

Risk Rating (Probability x Severity)	Risk Acceptance Authority
1 to 4 (Low)	Risk is tolerable, manage at local level
5 to 9 (Medium)	Risk requires approval by Operations Lead/Supervisor & SH&E Manager
10 to 25 (High)	Risk requires the approval of the Operations Manager & SH&E Director

Task Hazard Assessment (S3AM-209-FM6)

Revision 6 26, 2017

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Customer Teck UCR Plant	+ Sampling Project	Permit	No.	
Location Northport,	WA	Job No		
Description of Task	3	Date	8 25/2018	
Basic Task Steps (explain how the task will be carried out)	Hazards (identify all hazards and potential hazard	Risk (initial)	Precautions (describe how that hazard will be controlled)	Risk (final) Initi
Ariving	emergency vehicl or	T	pull over, alert Crew in other Vehicle, seek alt.	, M
Sampling /			route if needed	
monitoing	air quality= 170 t	oday 5	Monitor air quality Wear masks @ 150+	1 M.
			Monitor Staff for dissiness, nauseau, etc	7 10
1 -			Highest Risk Index	
Review and attach to Tailgate Meeting as required. Number additional pages if necessary. Worker/Visitor acknowledgement and review of this conter document.		Print Name	gner Michi etter	2
Risk Matrix on Reverse		Print Name	Signature THIS FORM IS T	O BE KEPT ON JOB S



WORKER SIGN NAME (Please Print) SI	N ON IGNATURE							VISITO NAME (Please Print)	R SIGN ON SIGNATURE	TIME	
I participated in the development and								Anno Weison	ann	7.15	
content of this Task Hazard Ase Michelle Stegner	pessment. Uide Geru		R	lisk Ra	ting N	latrix					
Anders Vitter () Mile	South				Seve	rity					
Jeff Walker	m	Probability	5-Catastrophic	4-Critical	3-Ma		te 1-Minor				
		5-Frequent	25	20	15	i 10	5	<u></u>			
	tax broand of	4-Probable	20	16	12	8	4				
	andine	7 3-Occasional	15	12	9	6	3				
It. Holmes Stu	& Halma	2-Remote	10	8	6	4	2				
		1-Improbable	5	4	3		1				
		Risk F (Probability			Risk Acc	eptance Auth	ority				
		1 to 4 (Low) Risk is tolerable, manage at local level									
		5 to 9 (N	Risk requires approval by Operations Lead/ Supervisor & Safety Manager			ns Lead/					
		10 to 29	ō (High)	Risk requi Manager		oproval of the O _l Director	perations		·		
				Severity - Pote	intial Consequ	Jences		Task Hazard Assessment Follow-Up/Review.			
			People	and a second second	erty Damage	Environmental impact	Public Image/Reputation	First Break		Initial	
		Catastrophic	Fatality, Multiple Incidents	Struct	ural collapse	Offsite impact requiring remediation	Government intervention				
		Critical	Permanent impa Long term injury	fillness USD	K to \$1M	Onsite impact requiring remediation	Media intervention				
		Major	Lost/Restricted V	USD	K to \$250K	Release at/above reportable limit	Owner intervention				
		Moderate	Medical Treatme		to \$10K USD	Release below reportable limit	Community or local attention				
		Minor	First Aid	=\$1</td <td>KUSD</td> <td>Small chemical release contained onsite</td> <td>Individual complaint</td> <td>Lunch Break</td> <td></td> <td>Initial</td> <td></td>	KUSD	Small chemical release contained onsite	Individual complaint	Lunch Break		Initial	
	h. Area			¥.1	obebility	1				+	
Emergency Meeting / Assembl		Frequent Probable		occur during task/			9/10 1/10			1	
Northport Bart aunch Occasional		May occur during the task/activity 1/100			5. C		6 3	j j			
		Remote Improbable	Unlikely to occur during task/activity 1/1,000 Highly unlikely to occur, but possible during task/activity 1/10,000				Second Break	I	Initial	1911 a ²	
911		Агеа	is safe and h	ousekeepir	iq comple	ted at the end o	f task/shift.			111111	
Emergency Radio Channel		Supervis		Ai	challe	Steaner					
Cell or 2 way radio		Signature									
Ch	rahnel 11	5		V	\mathcal{D}^{-}	********			L	Page 2 of 2	



Customer Teck UCR P	lant Sampling	Permit No.				
Location Northport W	A	Job No				
Description of Task		Date	8 27 2018			
Basic Task Steps	Hazards	Risk (initial)	Precautions (describe how that hazard will be controlled)	Risk (final)	Initials	
(explain how the task will be carried out)	(identify all hazards and potential hazards) Weather - Faining - Akids	_ <u></u>	lower speeds around Comens			
	wearran raining - privas		cit of cit i th			
Sumpling/	wet conditions,	5	Side Step rail May be Mippl) J		
Monitorina	lower tearns		bring raingray, watch	1		
	Alips the falls		for shivering, Warmup			
			In truck where stop			
.0			work for lightening			
			V O J			
				1		
			Highest Risk Index			
Review and attach to Tailgate Meeting as required. Numb additional pages if necessary.	er and attach Originator	e Jte	gher			
Worker/Visitor acknowledgement and review of this conte document.	ent on back of this Supervisor	Print Name	Signature			
Risk Matrix on Reverse		rink Name	THIS FORM IS TO	BE KEPT O	N JOB SITE	



WORKER SIGN ON

WORKER SIGN ON							R SIGN ON	
NAME (Please Print) SIGNATURE						NAME (Please Print)	SIGNATURE	TIME
I participated in the development and understand the content of this Task Hazard Assessment.						Anna literson	an m	715
		R	isk Rating I	Matrix				<u>.</u>
Michelle Hegner Mg 1						i		<u>A</u>
Anders Uter under Added	Probability		Seve	erity				
inda Howard Anila Horand		5-Catastrophic	4-Critical 3-Ma	ajor 2-Moderat	e 1-Minor			
Josie Smith Handit	5-Frequent	25	20 1	ō 10	5			
Sty Holmes Attack Holy	4-Probable	20	16 1	2 8	4		, <u> </u>	
Paul family and that	3-Occasional	15	12 9	6	3			
Jeft Waller	2-Remote	10	86	4	2		·	
Sen Waller Man	1-Improbable	5	4 3	2				
	Risk F	lating	Diele Ac	Autor				
x	(Probability	x Severity)	RISK AC	ceptance Authority	ority			
	1 to 4 (Low) Risk is tolerable, manage at local level			vel				
	5 to 9 (Medium) Risk requires approval by Operations Lead/							
	Supervisor & Safety Manager						<u></u>	
	10 to 25	(High)	Risk requires the a Manager & Safety I		perations			
			Severity - Potential Conseq	lences	Task Hazard Asses	sment Follow-Up/Revi	ew.	
×		People	Property Damage	Environmental Impact	Public Image/Reputation	First Break		Initial
	Catastrophic	Fatality, Multiple Incidents	Major >\$1M USD, Structural collapse	Offsite impact requiring remediation	Government			
	Critical	Permanent impa Long term injury		Onsite impact requiring remediation	Media intervention			
	Major	Lost/Restricted V	USD	Release at/above reportable limit	Owner intervention		-	
	Moderate	Medical Treatme		Release below reportable limit	Community or local attention		L	I
	Minor	First Aid	=\$1K USD</td <td>Small chemical release contained onsite</td> <td>Individual complaint</td> <td>Lunch Break</td> <td></td> <td>Initial</td>	Small chemical release contained onsite	Individual complaint	Lunch Break		Initial
Emergency Meeting / Assembly Area			Probability	e.		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		1
	Frequent Probable		ccur during task/activity r during task/activity		9/10 1/10			
Northport Board Launch	Occasional Remote		ring the task/activity cur during task/activity		1/100			د ي ،
Emergency Contact #	Improbable		y to occur, but possible during te	sk/activity	1/10,000	Second Break		Initial
911	Area i	s safe and h	ousekeeping comple	eted at the end of	f task/shift.			
Emergency Radio Channel	Supervis	OF (print nan	ne) Mich	elle Ster	iner			
Cell or 2 way radio	Signature			CIQ)			
Cell or 2. Way radio Channel 11								Page 2 of 2



Customer Teck UCK PI	lant Tissue Sampling	Permit	No.		
Location Northport,		Job No			
Description of Task		Date	8/28/2012		ž
Basic Task Steps (explain how the task will be carried out)	Hazards (identify all hazards and potential hazards)	Risk (initial)	Precautions (describe how that hazard will be controlled)	Risk (final)	Initials
driving .	lust dues	K	use spotter, stay	1	
	Complacency		alett		
Sampling /	0		a de la Addition		
monifiking	boat - water hazard	lp 5	extensive supering		
			Columbia Dayaatin	1	
			Evic Weatherman		
		-			
				1	
		_		-	
		-			-12
			Highest Risk Index	:	
Review and attach to Tailgate Meeting as required. Numbe additional pages if necessary.	er and attach Originator Miche.	1/e Jte	ogner llo signature		
Worker/Visitor acknowledgement and review of this contend document.	nt on back of this Supervisor	Print Name	Signature		
Risk Matrix on Reverse		Frint Name	Signature		

THIS FORM IS TO BE KEPT ON JOB SITE.



Risk Rating Matrix

19-19

WORKER SIGN ON

I participated in the development and understand the

NAME (Please Print)

SIGNATURE

VISITO	R SIGN	ON	
NAME (Please Print)	SIGN	IATURE	TIME
Anna Levson	Un	Mm	8.30

tegner he 1 Severity Howar Probability XII 3-Maior 5-Catastrophic 4-Critical 2-Moderate 1-Minor 5 5-Frequent 25 20 15 10 Istamid **4-Probable** 20 16 12 8 4 Holmes 3-Occasional 12 9 6 3 15 Walker 6 2-Remote 10 8 4 2 OSIC Smith 5 3 1-Improbable 4 2 1 **Risk Rating Risk Acceptance Authority** (Probability x Severity) 1 to 4 (Low) Risk is tolerable, manage at local level **Risk requires approval by Operations Lead/** 5 to 9 (Medium) Supervisor & Safety Manager **Risk requires the approval of the Operations** 10 to 25 (High) Manager & Safety Director Task Hazard Assessment Follow-Up/Review. Severity - Potential Consequences Public People Environmental impact **Property Damage First Break** Initial Image/Reputation >\$1M USD, Catastrophic Fatality, Multiple Major Offsite impact requiring Government Incidents Structural collapse remediation intervention >\$250K to \$1M Critical Permanent impairment, Onsite impact requiring Media intervention Long term injury/illness USD remediation Major Lost/Restricted Work > \$10K to \$250K Release at/above Owner intervention USD reportable limit Moderate Medical Treatment > \$1K to \$10K USD Release below Community or local reportable limit attention Minor First Aid </=\$1K USD Small chemical release Individual complaint Lunch Break Initial contained onsite Probability **Emergency Meeting / Assembly Area** Frequent Expected to occur during task/activity 9/10 Probable Likely to occur during task/activity 1/10 Nin Occasional May occur during the task/activity 1/100 LOOTH 201 Remote Unlikely to occur during task/activity 1/1,000 Emergency Contact # Improbable Highly unlikely to occur, but possible during task/activity 1/10.000 Second Break Initial 911 Area is safe and housekeeping completed at the end of task/shift.

Emergency Radio Channel

11

Supervisor ner 10 (print name) Signature



Appendix B



Confederated Tribes of the Colville Reservation

Research Permit

Approved by Resolution N/A Permit No. 2018-07

This permit authorizes the following study, survey, or research project:

UCR Plant Tissue Study: Kris McCaig, Researcher

This permit is valid from: April 1, 2018 to September 1, 2018

In accordance with Colville Tribal Law, as well as the written research agreement entered into by the holder of this permit, the permittee recognizes and acknowledges that:

- 1) This Research Permit is conditional and may be canceled at any time if the study, survey, or research project is deviating or has deviated from the study design approved in the granting of the Research Permit. or from any provisions of the required underlying agreement upon which issuance of the permit is based.
- 2) All information and data gathered are the property of the Tribes, and the permittee may only publish or disseminate the data gathered, or any conclusions based on that data, under the conditions of the agreement underlying this permit, and with permission of the Tribes. Any unauthorized use of the data by the permittee or any third-party is strictly prohibited. All information and data gathered in the course of this project will be returned to the CCT Archives and Records Center at the conclusion of the project.
- 3) During the course of the study, survey, or research project the Office of the Tribal Chairman and the Archives and Records Center for the Tribes shall receive at least one copy of all interim and/or progress reports, and the final report resulting from the study, survey, or research project.
- 4) As a condition of receiving this Research Permit the research must comply with:
 - a the National Research Service Award Act, Pub. L. No. 93-348, 88 Stat. 342, as amended and as implemented by 45 C.F.R. pt. 46;
 - b. all laws, ordinances, and codes of the Tribes regarding the protection of human subjects involved in the research, development and related activities; and
 - c. any other laws, regulations, policies, or procedures applying to the study, survey, or research project.
- 5) Failing to comply with the conditions of this permit, the underlying agreement, or any other applicable law will subject the permittee to any and all civil or criminal penalties available to the Tribes pursuant to the Tribes' Law and Order Code and any other applicable law, including but not limited to exclusion from Tribal property and criminal trespass.
- 6) As a condition of accepting this permit, the permittee consents to the jurisdiction of Colville Tribal Courts for all civil and criminal matters arising out of this research, and accepts the Colville Tribal Court as the appropriate venue for any such actions.
- 7) The permittee shall carry a copy of this permit at all times while conducting research on the Colville Reservation!

Mike Marchand, Chairman, Colville Tribes or Karen Condon, Designee

4/12/17 Date 4/12/2018

g do Teck American Incorporated

Research Agreement

Research Permit #: 2018-07 Approved by Resolution: N/A

SECTION 1. TITLE

This agreement shall be known as the UCR Plant Tissue Study Research Agreement ("Research Agreement").

SECTION 2. PURPOSE

This is an agreement between the Confederated Tribes of the Colville Reservation ("Colville Tribes") and **Kris McCaig** ("Researcher"), whose names and addresses are listed in Appendix A to this agreement.

The purpose of the Research Agreement is to set forth the manner in which the Researcher may perform the **UCR Plant Tissue Study** research project ("Project"). This Research Agreement governs the collection, sharing, and dissemination of data and conclusions created in the course of the Project. As used throughout this agreement "data" includes any physical or digital writing or recording of any form. Specifically, the purpose of this agreement is to:

- 1. Clarify the rights and responsibilities of the Tribes and the Researcher;
- 2. Ensure that the Researcher: (a) recognizes the rights of the Tribes and the people being studied, including the rights not to be studied, to privacy, to anonymity, to confidentiality, and to fully informed consent; (b) recognizes the primary right of informants and suppliers of data and materials to the knowledge and use of that information and material, including the right of the Tribes to have information and data returned at the conclusion of the Project; (c) respects traditional copyrights; (d) respects local customs and values, and carries out research in a manner consistent with this Agreement; (e) contributes to the interests of the community in whatever ways possible so as to maximize the return to the community for its cooperation in the research work; and (f) recognizes their continuing obligations to the local community after the completion of the fieldwork, including providing support and continuing concern for the well-being of the local community.
- 3. Protect the Colville Tribal community from unauthorized data sharing from this research and ensure that the Researcher recognizes Colville Tribes' ownership and control of data;
- 4. Reduce potential adverse effects of the Project data products on the Colville Tribal community;
- 5. Establish and provide Project data sharing expectations and responsibilities; and
- 6. Ensure that the Researcher can proceed with an effective, culturally-sensitive approach to researching on the Colville Reservation.

SECTION 3. PROJECT OVERVIEW

- **3.1. Project Details Incorporated.** The attached research project proposal (Appendix A) contains a description of: 1) the purpose of the Project, 2) all final and intermediate products produced by or in the course of the Project, 3) the benefit to the Tribes of allowing the Project, 4) and a timeframe for all research and products. The proposal is hereby incorporated into this agreement, and the Researcher affirms that the information contained therein is true and complete.
- 3.2 Updates. The Tribes shall receive updates on the Project
 - □ Monthly
 - □ Quarterly
 - □ Annually
 - Other: In the field and w/ Data Summary Reports
 - □ N/A

3.3. Bond.

- No Bond is required
- □ A Bond in the amount of \$_____ must be posted

3.4. Profit Sharing.

- Not applicable.
- □ Profit Sharing as described in Appendix C.
- **3.5.** Fee. The Researcher agrees to pay a fee in the amount of **\$**_____ prior to issuance of the research permit.
- **3.6. Tribal Representative.** The Tribal Chairman shall select a designee to represent the Tribes in the Project. The designee shall ensure that the Tribes' rights are protected and enforced, and the Tribes fulfills its responsibilities with regards to the contract. The Tribal Representative is identified in Appendix A.

SECTION 4. RIGHTS AND RESPONSIBILITIES OF THE TRIBES.

- **4.1. Final Authority.** The Colville Tribes, as a sovereign, retains ultimate discretionary and final authority and responsibility for the research conducted under this agreement.
- **4.2. Data Ownership.** The Colville Tribes is the owner of the data, data products, and information generated by this study from and about the Colville Tribes and its members. The Colville Tribes will receive all data and information collected and assembled in the

course of the Project at the conclusion of the Project in a form and manner agreed to by the parties. In the event that the parties do not make an agreement about this return of information and data, the return shall occur as soon as reasonably possible. The Tribes shall have the right to inspect and review the information and data at any time upon a request sent to the Researcher.

- **4.3.** Limitation on Dissemination. Except as described in Appendix A, no information or data gathered in the course of this Project, nor any conclusions based on that information or data, shall be released or disseminated in any form without the express prior consent of the Tribes.
- 4.4. Right to Comment. The Tribes has the right to have official comments made by or on behalf of the Tribes included in any final or intermediate published or released products. In addition, any final published work shall include a reference to the Colville Tribal Resolution approving this agreement and the corresponding permit.
- **4.5. Right to Anonymity.** The Tribes reserves the right to have its identity protected by using a generalized term of its choice (e.g. "A tribe in Washington State") to refer to the Tribes in whatever final or intermediate products are produced as a result of this Project.
- **4.6. Research Assistance.** The Tribes will assist the Researcher in identifying and contacting members of the community who may be of assistance in the research, as well as identifying other sources of useful information or data. The Tribes will also assist in developing culturally competent plans of research and data collection.

SECTION 5. RIGHTS AND RESPONSIBILITIES OF RESEARCHER.

- **5.1. Confidentiality.** The Researcher will keep all data and information collected in the course of the Project strictly confidential, except for the purposes described in Appendix A. All agents and employees of the Researcher will similarly maintain strict confidentiality. Without the full informed consent of the individual, no individually identifying information will be released in any form. This includes information which could reasonably be traced to an individual or a small number of individuals. In the event of a breach, the Researcher will act immediately to correct the breach and notify the Tribes of the breach.
- **5.2. Data Protection.** All information and data collected by the Researcher in the course of the Project will be stored securely. In the event of a security breach, the Researcher will act immediately to correct the breach and notify the Tribes of the breach.

- **5.3. Data Return.** All information and data collected by the Researcher during the course of the Project will be returned to the Tribes at the conclusion of the Project. The data will be returned to the Archives and Records Center for the Tribes.
- **5.4. Informed Consent.** Before collecting information or data in any form from any individual, the Researcher will fully disclose the purpose of the Project, the nature of any documents or other products that will be produced as a result of the Project, how the information or data collected from the individual will be used, and whether it will be traceable or attributable to that individual.
- **5.5.** Cultural Sensitivity. The Researcher will work with the Tribes to develop culturally sensitive methods of data collection.
- **5.6.** Native Preference. Any contractors, subcontractors, or employees retained by the Researcher for the purposes of the Project must follow the Tribes' Native Preference policies described in Title 10 of the Colville Tribal Code and any other Colville Tribal regulations. The Researcher will contact the Tribes' Tribal Employment Rights Office before hiring contractors, subcontractors, or employees.
- **5.7.** Compliance With Other Laws. The Researcher must comply with all other laws and regulations, including:
 - the National Research Service Award Act, Pub. L. No. 93-348, 88 Stat. 342, as amended and as implemented by 45 C.F.R. pt. 46;
 - all laws, ordinances, and codes of the Tribes regarding the protection of human subjects involved in the research, development and related activities; and
 - any other laws, regulations, policies, or procedures applying to the study, survey, or research project.
- **5.8. Right to Collect Data.** The Researcher has the right to enter the Colville Reservation to collect information and data in accordance with this Agreement.
- **5.9. Right to Intellectual Property.** The Researcher has the right to the intellectual property rights in the final product, subject to this Agreement, and may choose when and how to publish the products produced as a result of the Project, in accordance with this Agreement. Researcher also has the right to profits as a result of such publication, subject to any profit-sharing provision of this Agreement.
- **5.10. Permit Carrying**. The Researcher shall carry a copy of the research permit that corresponds to this agreement at all times while conducting research on the Colville Reservation.

- **5.11. Right to Assistance.** The Researcher has the right to call upon the Tribes for reasonable assistance in identifying and contacting tribal members who may be able to provide information or data, creating culturally sensitive methods of data collection, and locating other resources that may provide useful information or data.
- **5.12.** Fiduciary Relationship. The Researcher shall act as a fiduciary for the Tribes at all times during the course of the Project.
- **5.13.** Contracting and Subcontracting. If any contractors or subcontractors are hired in the course of the Project by the Researcher or any of the Researcher's employees or contractors, the Researcher will ensure that those contracts contain the same provisions as this Agreement with respect to Sections 4 through 10.

SECTION 6. LIMITED TO THE PURPOSES OF THE PROJECT.

- 6.1. Data Uses Restricted. The information and data collected for the purposes of this Project, as well as any conclusions drawn from the information or data, shall not be used by the Researcher or any other person for any purposes except those specified in this agreement.
- **6.2.** Third-Parties. Any third-party that wishes to access the data or information gathered in the course of the Project must apply for a permit with the Tribes, and will not have access to any information or data until a research agreement has been executed and a permit has been issued.
- **6.3.** Secondary Use. Any use of the information or data other than that specifically listed in Appendix A is not permitted. Any such use will require the explicit permission of the tribe, and an additional agreement specifying the nature of the new use.
- **6.4. Modification.** Any other modifications to this Agreement must be approved by both the Tribes and the Researcher, and memorialized in a written agreement.

SECTION 7. BREACH.

- 7.1. What Constitutes Breach. A Breach is the failure of the Researcher to comply with any of the terms of this agreement, including a breach of confidentiality or the security of information or data.
- **7.2. Remedies.** In the event of a Breach, the Tribes will be entitled to pursue any or all remedies under Tribal or other law, including:

- a. Termination of this Agreement;
- b. Forfeiture of any research bond provided by the Researcher;
- c. Civil or criminal liability under Tribal or other applicable law; and
- d. Exclusion from the Reservation and criminal trespass.

SECTION 8. CONSENT TO TRIBAL JURISDICTION.

- **8.1.** Consent to Tribal Jurisdiction. The Researcher consents to civil and criminal jurisdiction in the Colville Tribal Courts for any matters arising out of or in connection with this Agreement in any way.
- **8.2.** Venue. The Colville Tribal Courts shall be the exclusive forum for any disputes arising out of this agreement or in the course of the Project.
- **8.3.** Governing Law. In all matters or disputes arising out of or in connection with this Agreement in any way, the governing law shall be the law of the Colville Tribes.

SECTION 9. TERMINATION.

- **9.1.** Conclusion of the Project. At the conclusion of the Project, on the date specified in Appendix A, the Researcher will discontinue collecting information and data, and will return all collected information and data to the Tribes.
- **9.2.** Early Termination. The Project may be terminated at any time and without notice in the event of a Breach, or with 30 days' notice by either party to the other. In the event of early termination, all information and data will be returned to the Tribes by the effective termination date. No products may be produced after the termination date without the express permission of the Tribes.
- **9.3.** Survivability. Regardless of how the Project terminates, this Agreement will continue in force, including the limitations on use of the data, consent to tribal jurisdiction, and profit-sharing.

SECTION 10. SEVERABILITY

The provisions of the Agreement are severable. In the event that any portion of this Agreement is found to be unenforceable or invalid, that shall not affect the enforceability or validity of any other portion.

Signed,

Michael E. Marchand, Chairman or Karen Condon, Designee

4/12/18 Date 4/12/2018

als of Teck American Incorporated Kris McCaig, Researcher

APPENDIX B

Tribal Chairman

Michael E. Marchand Confederated Tribes of the Colville Reservation Colville Business Council PO Box 150 Nespelem, WA 99155-0150 (509)634-2200 Michael.marchand.cbc@colvilletribes.com

Tribal Representative

Confederated Tribes of the Colville Reservation Archives & Records Center PO Box 150 Nespelem, WA 99155-0150 (509)634-2148

Researcher

Kris McCaig Teck American Incorporated 501 N. Riverpoint Blvd, Suite 300 Spokane, WA 99202 (509)6234501 kris.mccaig@teck.com

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IN REPLY REFER TO: -Right of WayBUREAU OF INDIAN AFFAIRS Colville Indian Agency Post Office Box 111 Nespelem, Washington 99155-0111 Toll Free 1-888-881-7684



April 20, 2018

Colville Tribes Environmental Trust/Teck American Incorporated PO BOX 150 Nespelem, WA 99155 ATTN: Cindy Marchand

SUBJECT: Upper Columbia River Plant Tissue Study

CINDY MARCHAND:

The Colville Indian Agency, Bureau of Indian Affairs (BIA) Real Estate Services has enclosed the signed Limited Use Agreement for going over and across tribal trust lands in the Upper Columbia River area for the Plant Tissue Study.

If you have any questions regarding this approved Limited Use Agreement please refer them to Christine Buckminster, Property Title Specialist Right-of-Way, at the above address, or call (509) 634-2341.

Sincerely,

Justin Boyo Property Acquisition Manager

ENCLOSURE CC: Superintendent FILE-101-RIE0391818 CHRONO

UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF INDIAN AFFAIRS Colville Indian Agency Post Office Box 111 Nespelem, Washington 99155-0111 Toll Free 1-888-881-7684 LIMITED USE AGREEMENT

Colville Tribes Environmental Trust, PO Box 150, Nespelem, WA 99155, residing in the Nespelem District Area, working in conjunction with Teck American Incorporated requests duration 8 months and 12 days: <u>beginning, April 19, 2018 to</u> <u>December 31st 2018.</u> This Limited Use Agreement will allow Colville Tribes Environmental Trust to obtain sampling of plant tissue and co-located soil/sediment samples collected from three high lead sampling areas and up to 13 additional lower lead sampling areas. The scope of this study to collect data to characterize the levels of lead, arsenic, and other metals in wild plant tissues within the study area that are consumed, mouthed or otherwise utilized from the Site by CCT members. Data collected during this study will be used to help inform the Upper Columbia River (UCR) Remedial Investigation and Feasibility Study (RI/FS) being conducted under the oversight of U.S. Environmental Protection Agency (EPA). See attached description of proposed plant tissue for more details. There will be no harm to the Tribal Tract and Bureau of Indian Affairs Roads will work within designated areas 151-H 165, 151-H176, 151-H179, 151-H195, 151-H196, 151-H197, 2373500, 2376600 por as described:

PARCEL NO 151-H165: LOT 7 (SOUTHEAST-QUARTER SOUTHEAST-QUARTER) OF SECTION 8 AND LOT 7 (EAST-HALF NORTHEAST-QUARTER) OF SECTION 17, TOWNSHIP 39 NORTH, RANGE 39 EAST, WILLAMETTE MERIANDIAN, STEVENS COUNTY, WASHINGTON, CONTAINING 79.80 ACRES, MORE OR LESS

PARCEL NO 151-H176 LOT 11 (SOUTHEAST-QUARTER SOUTHEAST-QUARTER) OF SECTION 7; LOT 9 (SOUTHWEST-QUARTER SOUTHWEST-QUARTER) OF SECTION 8; LOT 9 (NORTHWEST-QUARTER NORTHWEST-QUARTER) OF SECTION 8; LOT 9 (NORTHWEST-QUARTER NORTHWEST-QUARTER) OF SECTION 17 AND LOT 13 (NORTHEST-QUARTER NORTHWEST-QUARTER) OF SECTION 18, TOWNSHIP 39 NORTH, RANGE 39 EAST, WILLAMETTE MERIDIAN, STEVENS COUNTY, WASHINGTON, CONTAINING 80.00 ACRES, MORE OR LESS.

PARCEL NO 151-H179; LOT 9 (NORTHEAST-QUARTER SOUTHEAST-QUARTER) OF SECTION 7 AND LOT 5 (NORTHWEST-QUARTER SOUTHWEST-QUARTER) OF SECTION 8, TOWNSHIP 39 NORTH, RANGE 39 EAST, WILLAMETTE MERIDIAN, STEVENS COUNTY, WASHINGTON, CONTAINING 80.00 ACRES, MORE OR LESS.

PARCEL NO 151-H195: LOT 11 (N SE) OF SECTION 21 AND LOT 7 (SW SW SW) OF SECTION 22, TOWNSHIP 40 NORTH, RANGE 40 EAST, WILLAMETTE MERIDIAN, STEVENS COUNTY, WASHINGTON, CONTAINING 73.40 ACRES, MORE OR LESS.

PARCEL NO 151-H196 LOT 5 (W SE) OF SECTION 11 AND LOT 8 (NW NE) OF SECTION 14, TOWNSHIP 40 NORTH, RANGE 40 EAST, WILLAMETTE MERIDIAN, STEVENS COUNTY, WASHINGTON, CONTAINING 80.00 ACRES, MORE OR LESS.

PARCEL NO 151-H197 LOT 10 (S SW) OF SECTION 25 AND LOT 6 (NW) OF SECTION 36, TOWNSHIP 40 NORTH, RANGE 39 EAST, WILLAMETTE MERIDAN, STEVENS COUNTY, WASHINGTON, CONTAINING 80.00 ACRES, MORE OR LESS.

FEE PROPERTY

PARCEL NO: 2373500 PROPERTY ID: 43516 PARCEL# /GEO ID: 2373500 TAX AREA: 054-211 TAX AREA 211 LAND USE CODE: 91 OPEN SPACE: N DFL: N HISTORIC PROPERTY: N REMODEL PROPERTY: N MULTI_FAMILY DEVELOPMENT: N TOWNSHIP: 39 RANGE: 39 SECTION: 08 PARCEL NO: 2375900 Per US Bureau of Indian Affairs email communication received March 3, 2018: This parcel is fee land that land belongs to non-members. LEGAL DESCRIPTION: GOV. LOT 7, SECTION 16 & 17, TOWNSHIP 39 NORTH, RANGE 39 EAST. TOTAL ACRES: 157.9300 PARCEL NO: 237660 Per US Bureau of Indian Affairs email communication received March 3, 2018: This parcel is fee land that land belongs to non-members. LEGAL DESCRIPTION: GOV. LOT 7, SECTION 16 & 17, TOWNSHIP 39 NORTH, RANGE 39 EAST. TOTAL ACRES: 157.9300 PARCEL NO: 237660 Per US Bureau of Indian Affairs email communication received March 3, 2018: This parcel is fee land that land belongs to non-members. LEGAL DESCRIPTION: GOV. LOT 7, SECTION 16 & 17, TOWNSHIP 39 NORTH, RANGE 39 EAST. TOTAL ACRES: 76.6800

RENT: -Waived-

Administrative Fee: -Waived-

Superintendent granting the within Limited Use Agreement is hereby approved pursuant to 209 DM 8, 230 MD 1, 3 IAM 4, 4A. Colville Tribal Resolution 2009-190/1981-721.

Date Approved: 4-20-18 Approving Official:

Myra Clark, Acting BIA Superintendent Colville Indian Agency

RESOLUTION

WHEREAS, it is the recommendation of the Natural Resources Committee approves the attached temporary access agreement allowing Teck American Incorporated to perform RI/FS work along the Columbia River pursuant to a settlement agreement between Teck Cominco and the U.S. Environmental Protection Agency, and authorizing the Chairman or her designee to sign. No tribal funds required.

THEREFORE, BE IT RESOLVED, that we, the Colville Business Council, meeting in a Special SESSION this 19th, day of March, 2009 acting for and in behalf of the Colville Confederated Tribes, Nespelem Washington, do hereby approve the above recommendation of the Natural Resources Committee.

The foregoing was duly enacted by the Colville Business Council by a vote of 11 FOR 2 AGAINST 0 ABSTAINED, under authority contained in Article V, Section 1(a) of the Constitution of the Confederated Tribes of the Colville Reservation, ratified by the Colville Indians February 26, 1938, and approved by the Commissioner of Indian Affairs on April 19, 1938.

ATTEST:

Jéanne A. Jerred, Cháirperson Colville Business Council

cc: M. Finley, Committee Chair Ciciley M. Yellowwolf, CBC Recording Secretary BIA Superintendent Reservation Attorney Dept. or Program: Melissa Campobasso, ORA



1981-721

RESOLUTION

WHEREAS, a proposed Ordinance to regulate studies, surveys, research and service delivery projects on the Colville Reservation in order to preserve and protect the rights of the Colville Indian Tribes and their tribal members, their privacy and integrity, and their interests in the results and products of the such studies, surveys, research and service delivery projects, has been submitted to HEW Committee for review, and

WHEREAS, it is the recommendation, of the HEW Committee of the Business Council, to approve the attached Ordinance to regulate research on the Colville Indian Reservation.

THEREFORE, BE IT RESOLVED, that we, the Colville Business Council, meeting in SPECIAL Session, this 21st day of SEPTEMBER, 1981, at the Colville Indian Agency, Nespeiem, Washington, acting for and in behalf of the Colville Confederated Tribes, do hereby approve the recommendation of the HEW Committee of the Business Council.

The foregoing was duly enacted by the Colville Busines Council by a vote of 10 FOR 0 AGAINST, under authority contained in Article V, Section 1(a) of the Constitution of the Confederated Tribes of the Colville Reservation, ratified by the Colville Indians on February 26, 1938, and approved by the Commissioner of Indian Affairs on April 19, 1938.

ATTEST:

(A1 Autertin,) Chairman Colville Business Council

CC:TKnapton DWilder AFredin GDavis PChamberlain EFry MRomo GMCClung Colville Tribe, Nespelem, WA

CATEGORICAL EXCLUSION EXCEPTION REVIEW (CEER) CHECKLIST

Project: Colville Indian Agency- Trust to Trust Process for FY 2018	Date: 11/8/17
Exclusion Category and Number: (BIA-516 DM 10.5; DOI-CFR 46-210) Letter and Text of category (BIA - 516 DM 10.5; DOI - 43 CFR46-210) 516 DM 10, 10.5 Categorical Exclusion: I. <u>Land Conveyance and Other Transfers</u> . Approvals or grants of conv transfers of interest in land where no change in land use is planned.	veyances and other

1. This action would have significant impacts on public health or safety. NO X YES 2. This action would have significant impacts on: natural resources & unique NO X geographical features as historic or cultural resources; park, recreation or YES refuge lands; wilderness areas; wild & scenic rivers; national natural landmarks; sole or prime drinking water aquifers; prime farmlands wetlands; floodplains; national monuments; migratory birds; and other ecologically significant areas. 3. This action would have highly controversial environmental effects or NO X unresolved conflicts concerning alternate uses of available resources. YES 4. This action would have highly uncertain environmental effects or involve NO X YES unique or unknown environmental risk. This action will establish a precedent for future actions. 5. NO X YES 6. This action is related to other actions with individually insignificant but NO X YES cumulatively significant environmental effects. This action will have significant impacts on properties listed or eligible for 7. NO X YES listing in the National Register of Historic Places. This action will have significant impacts on a species listed or proposed to be 8. NO ·X YES listed as endangered or threatened, or Critical Habitat of these. This action violates federal, state, local, or tribal law or requirements 9. NO 'X YES imposed for protection of the environment. 10. This action will have a disproportionately high and adverse effect on low NO X YES income or minority populations. 11. This action will limit access to, and ceremonial use of, Indian sacred sites on NO X YES federal lands, by Indian religious practitioners, and/or adversely affect the physical integrity of such sites. 12. This action will contribute to the introduction, continued existence, or spread NO X YES of noxions weeds or non-native invasive species known to occur in the area, or may promote the introduction, growth, or expansion of the range of such species.

A "yes" to any of the above exceptions will require that an environmental assessment be prepared.

Colville Tribe, Nespelem, WA **NEPA** Action: CE___ X EA

Anita McKinney, Assistant IRMP Coordinator Name and Title of person preparing this checklist

Concur:

Regional Archeologist

Date: 11-08.265

Concur:

Other Environmental Professional (Fish or Wildlife Biologist)

Date: 11-8-17

Concur:

Regional/Agency/OFMC NEPA Reviewer

Date: 11-8-17

Approve: Regional Director/Agency Superintendent/

OFMC Official

Date: 11-8-17

NOTES: The purpose of this categorical exclusion is to provide NEPA compliance for BIA Colville Indian Agency trust to trust conveyances for FY2018. It is inclusive of all trust to trust conveyances where there is a change in title only and no ground disturbance. This categorical exclusion is applicable to all tribes within the jurisdiction of the BIA Colville Indian Agency.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY REGION 10 1200 Sixth Avenue Seattle, WA 98101

April 4, 2018

VIA ELECTRONIC MAIL ONLY

Denise Mills Program Manager, Upper Columbia River Teck American Incorporated 501 North Riverpoint Boulevard, Suite 300 Spokane, Washington 99202

Re: Draft Final Quality Assurance Project Plan for the Plant Tissue Study – Upper Columbia River Site RI/FS

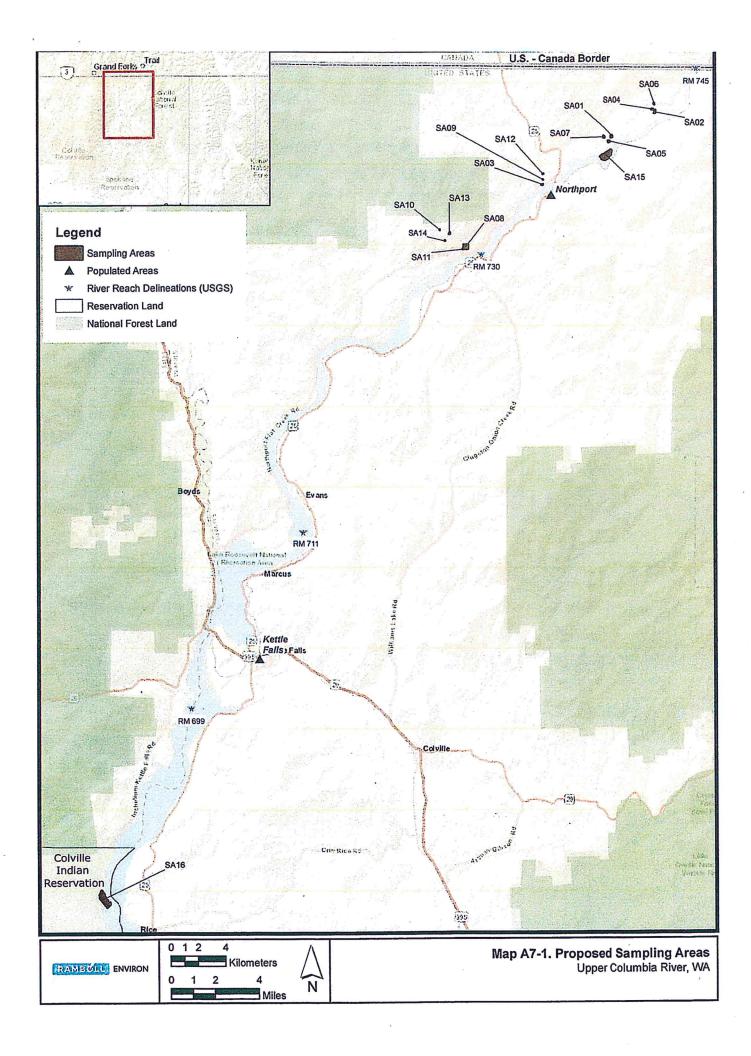
Dear Ms. Mills:

Based on our April 3, 2018 conference call with representatives of EPA, TAI and the Colville Confederated Tribes, please proceed with preparing the final quality assurance project plan (QAPP) for the plant tissue study to reflect the RLSO changes (submitted to EPA for review on March 22,2018) and to also include mercury analyses for kinnikinnick leaves, wild rose leaves and stems, wild mint, willows, and tules, and co-located soil or sediment where these plant samples are collected. As discussed on the April 3 call, please include in the QAPP a decision process for TAI's field team to follow during the presampling survey of each sampling area (SA) to determine whether sufficient plant material is present at that SA with sufficient mass to sample for mercury analysis. EPA understands that where plant material is expected to be insufficient to support analysis of TAL metals (except calcium, magnesium, sodium, and potassium) and mercury. allocation of available material for analysis of TAL metals will be prioritized, and a decision to collect samples only for metals analyses would be documented in the field log book and form for sign-off by TAI, EPA, and CCT field team representatives. In addition, the updated analytical tables (submitted to EPA for review on April 3, 2018) can be incorporated into the final gapp with the following reflected: please switch the RL and MDL in Table A7-5 (the MDL should be smaller than the MRL). Also, please include a copy of ALS Environmental's method SOP for the mercury analysis.

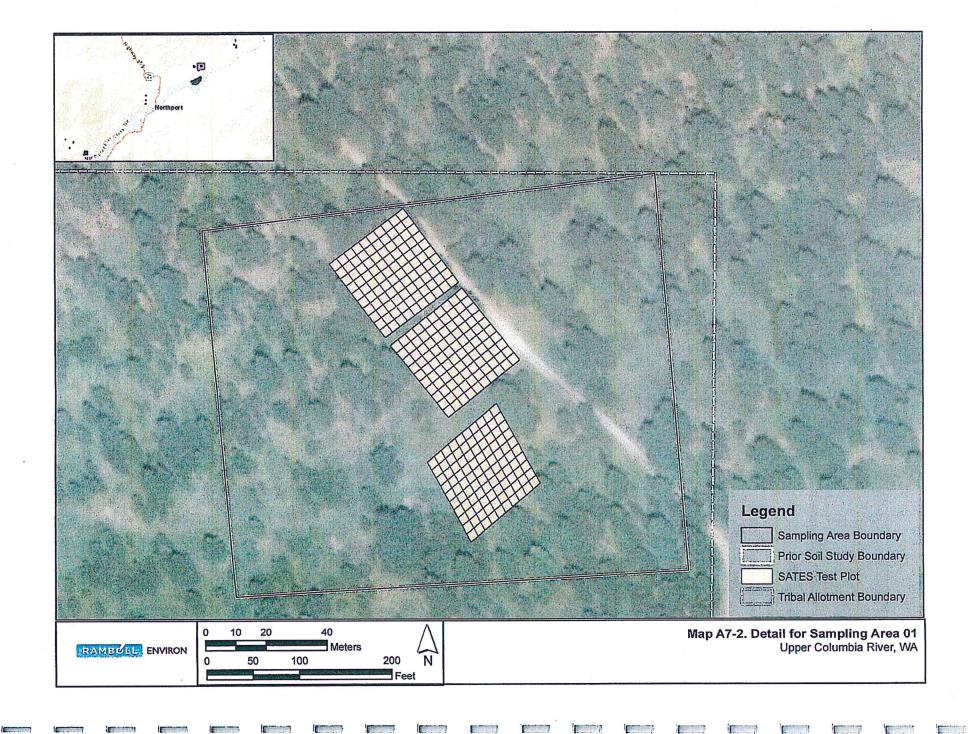
Thank you and should you have any questions, please feel free to contact me at (206) 553-0323.

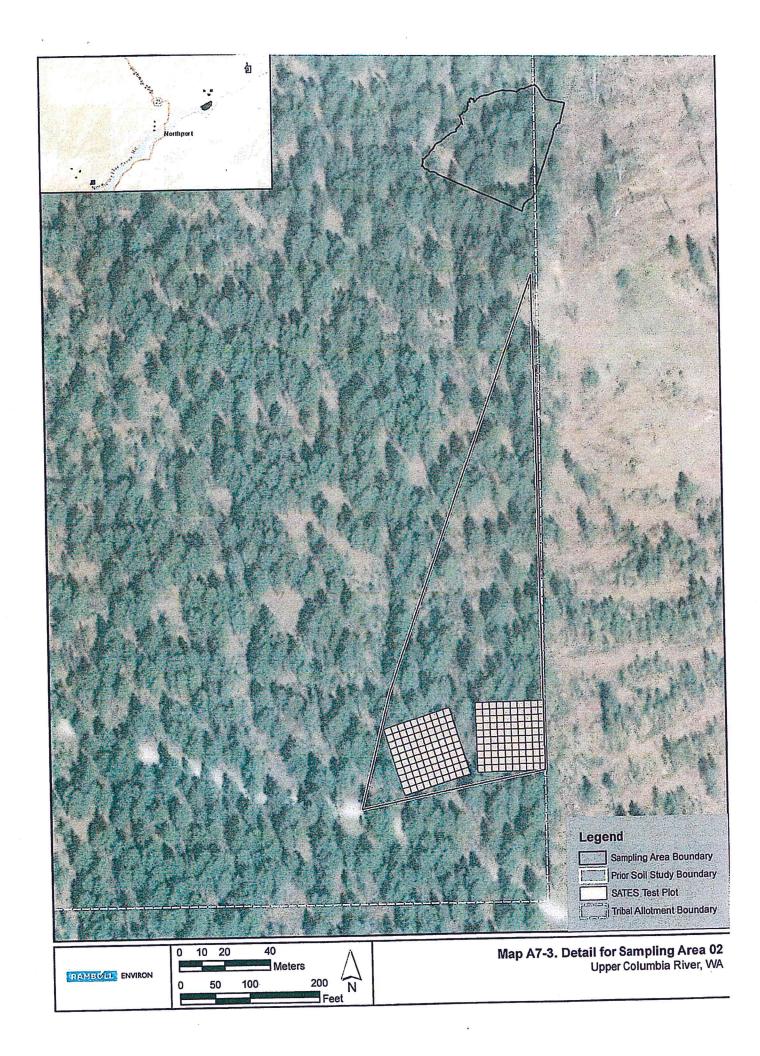
Sincerely. Monoa

Monica Tonel Project Manager





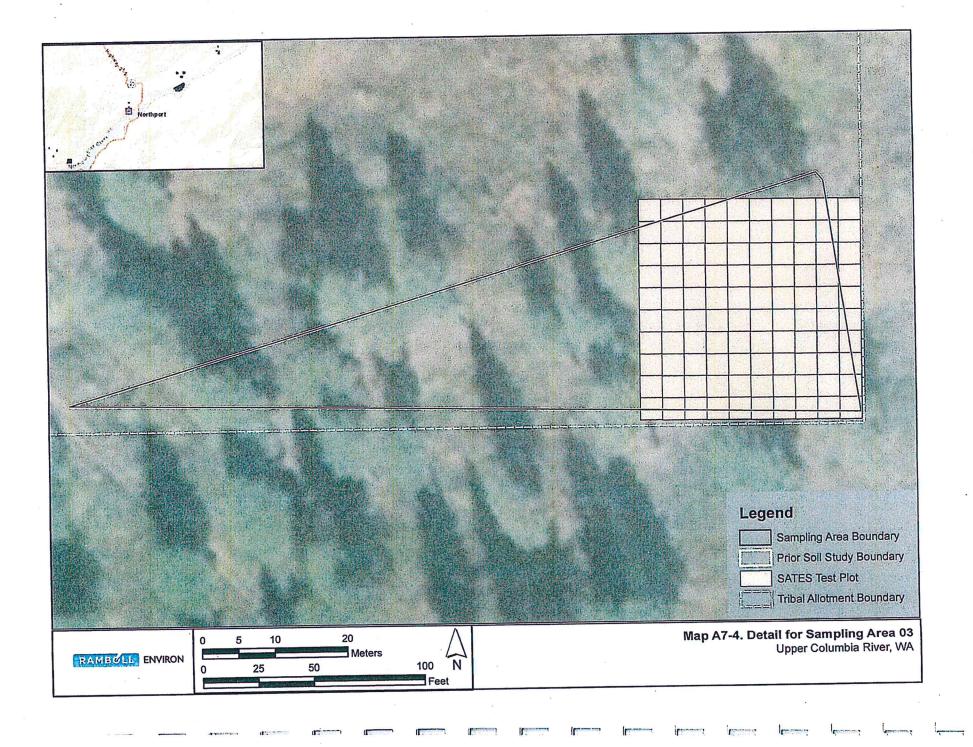


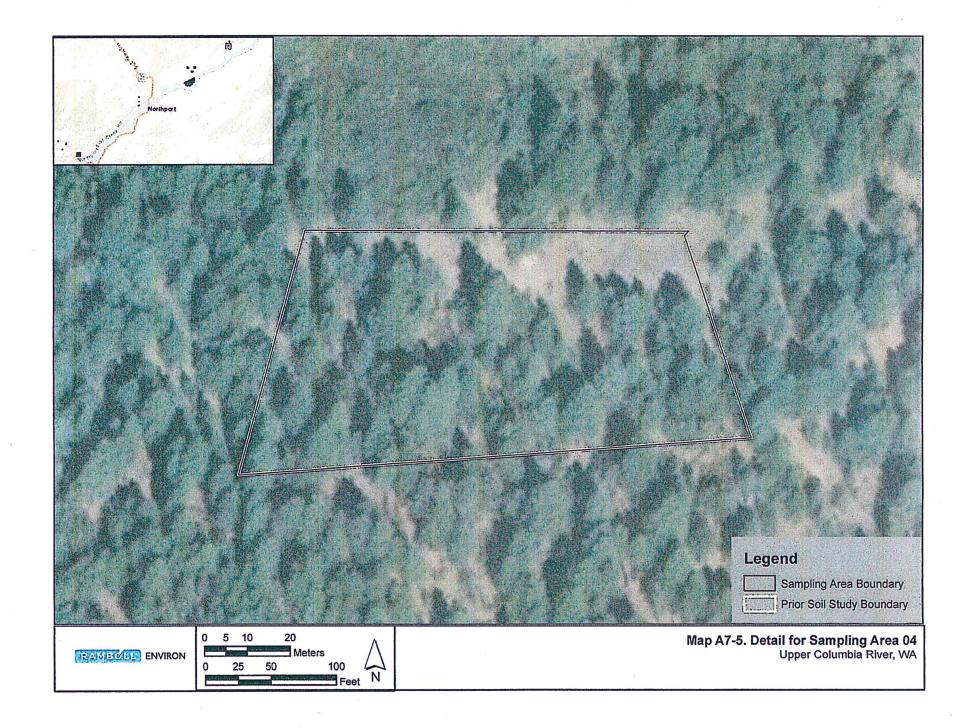


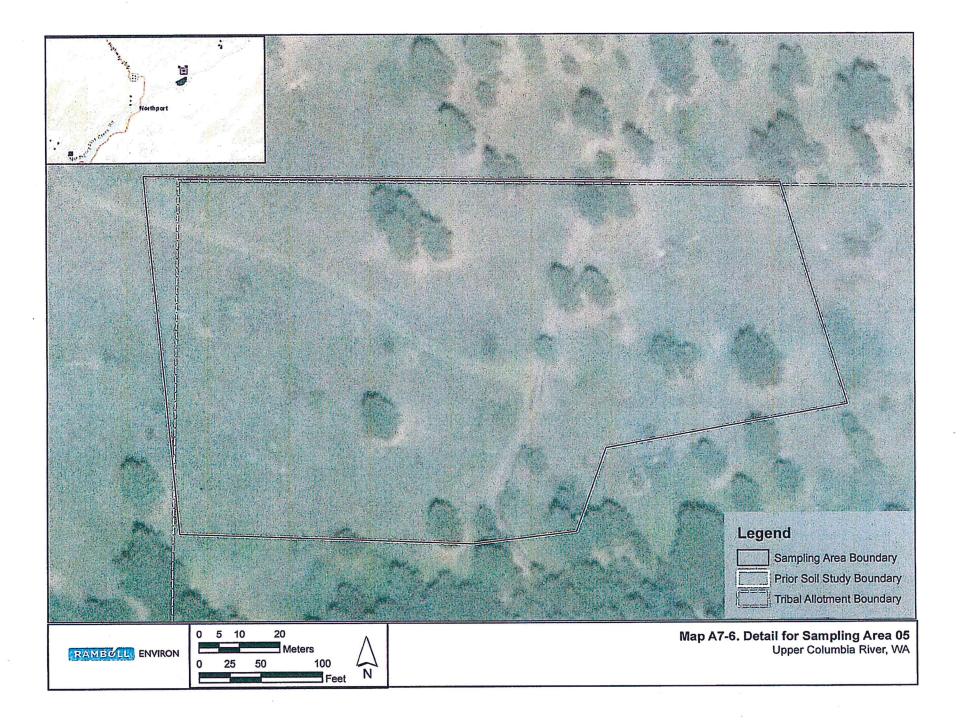
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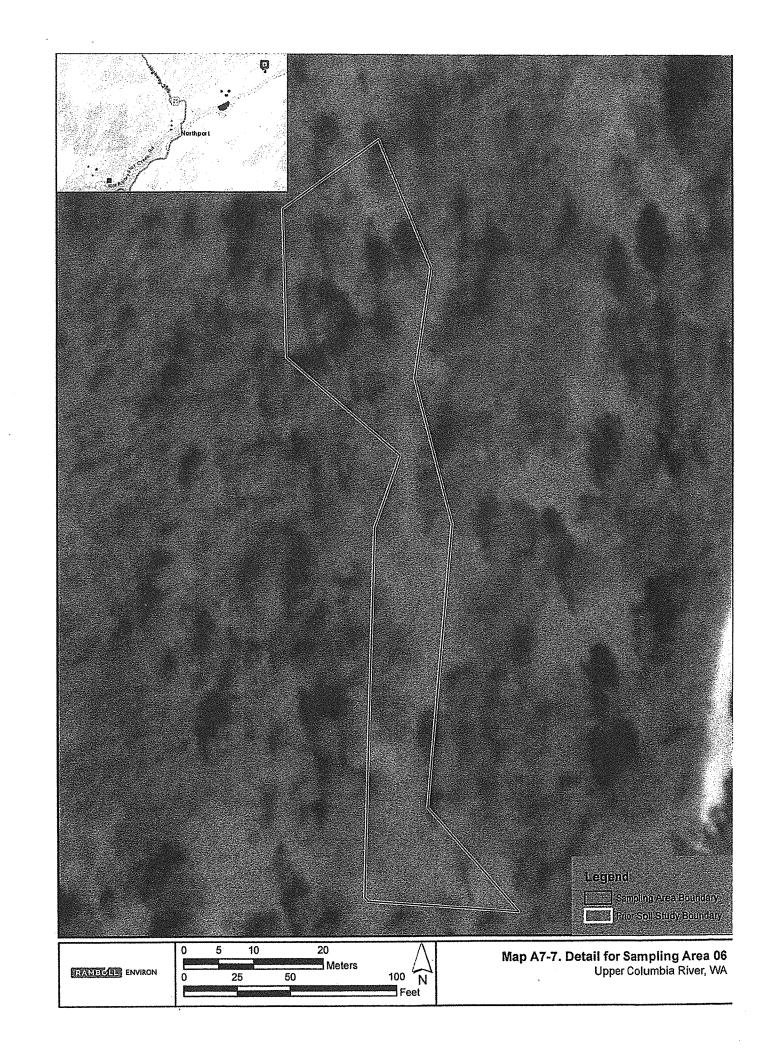
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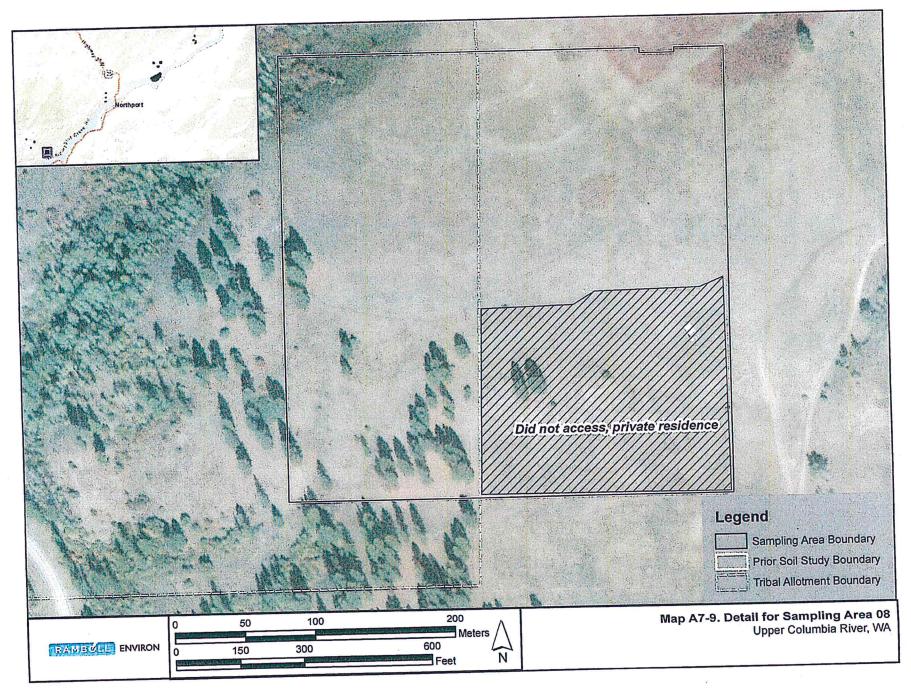


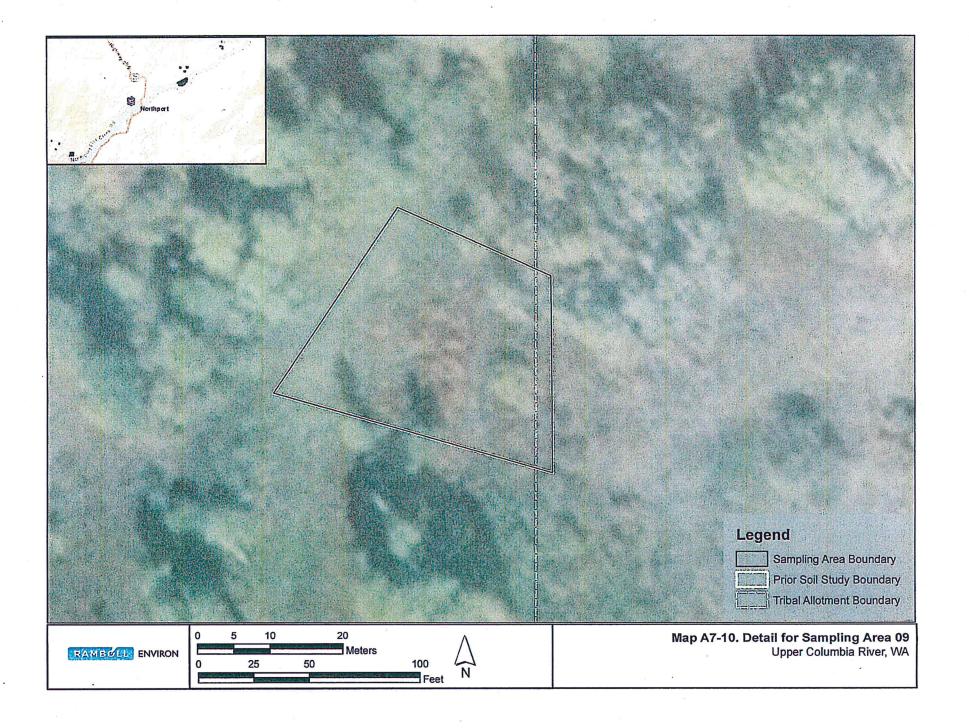


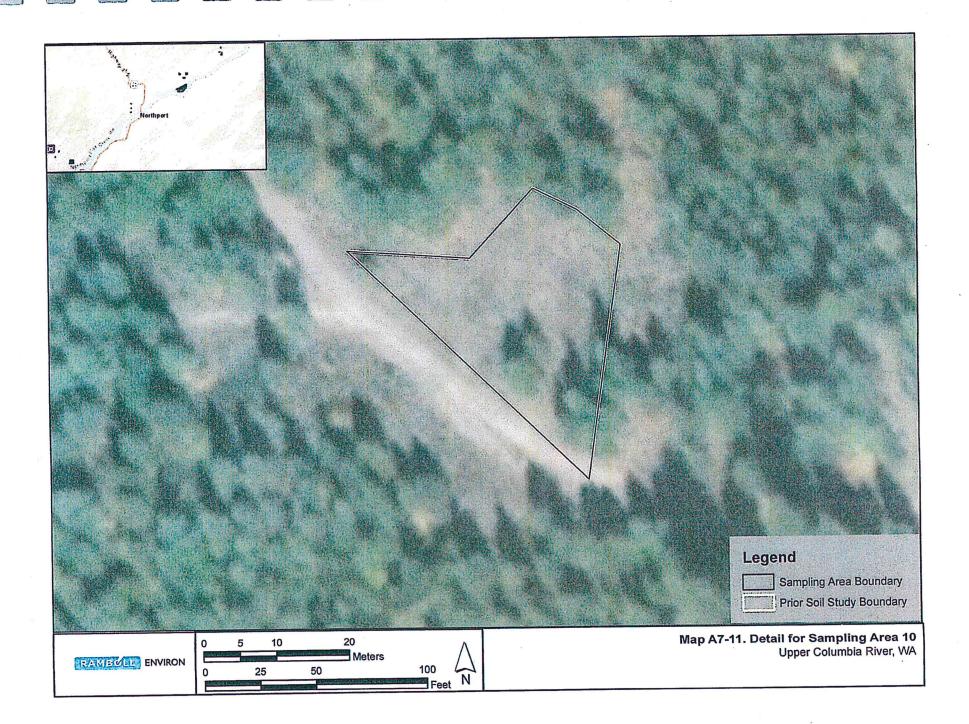


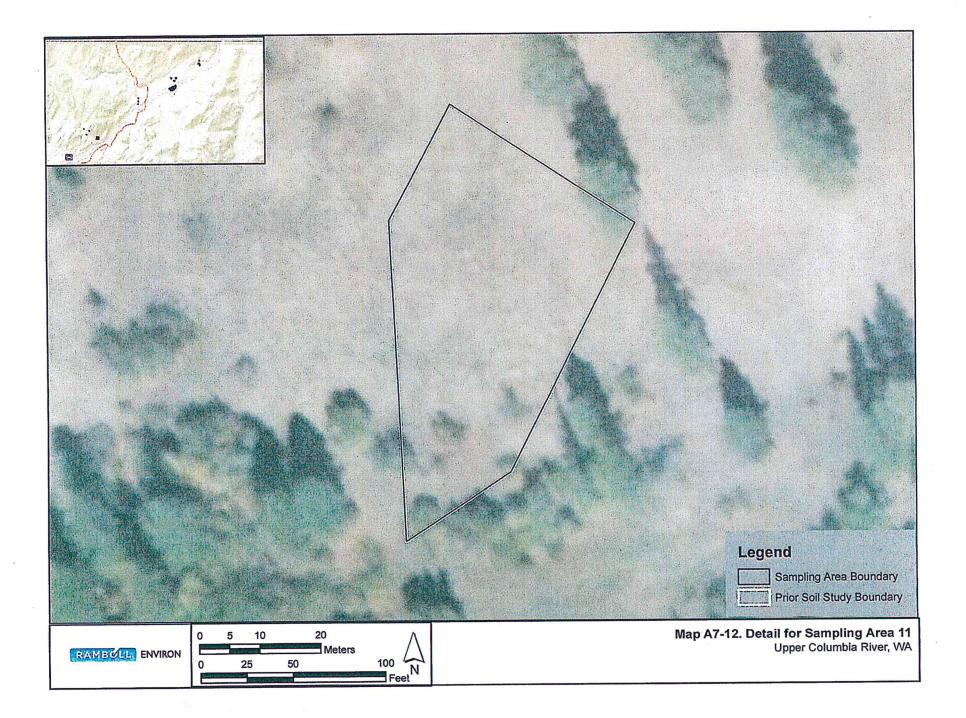


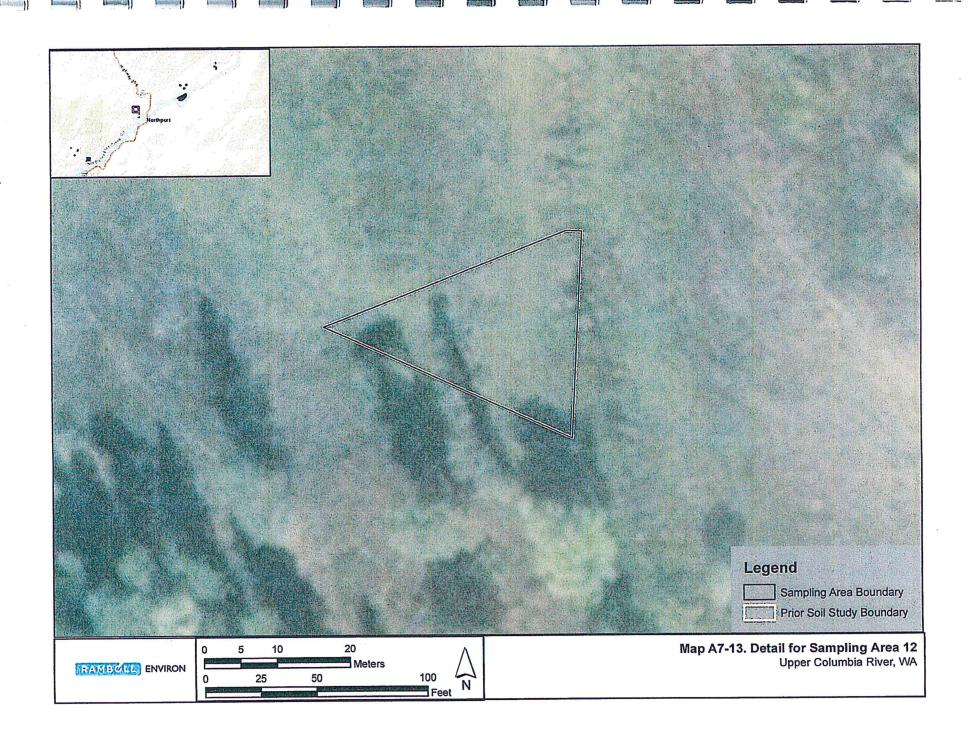


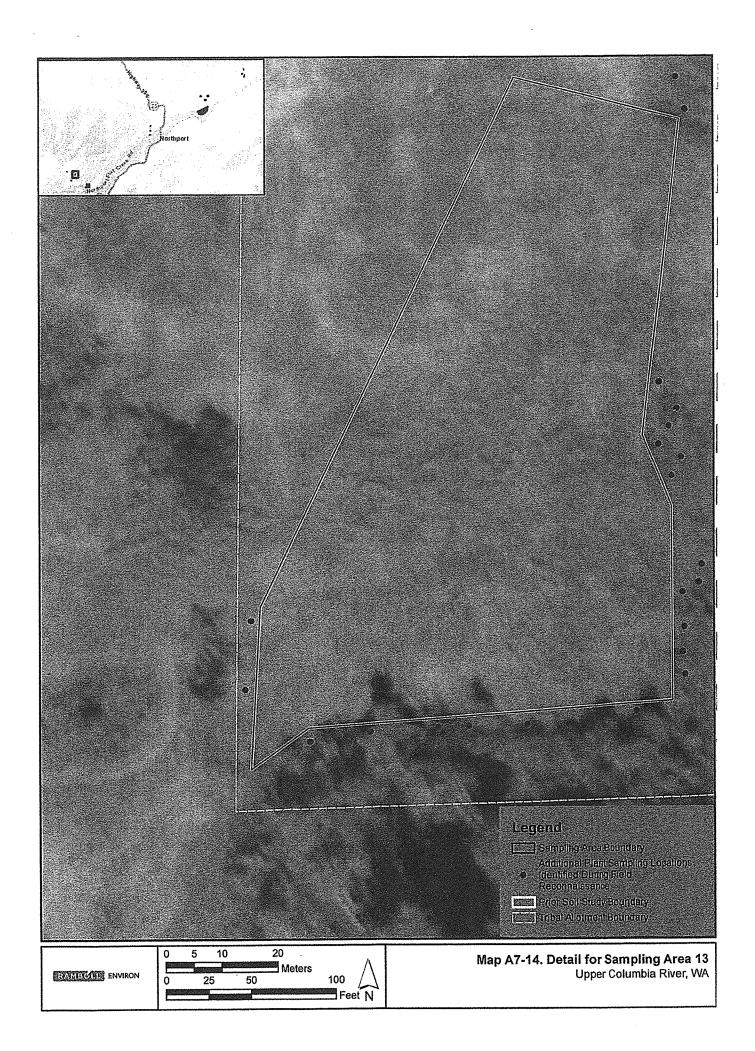


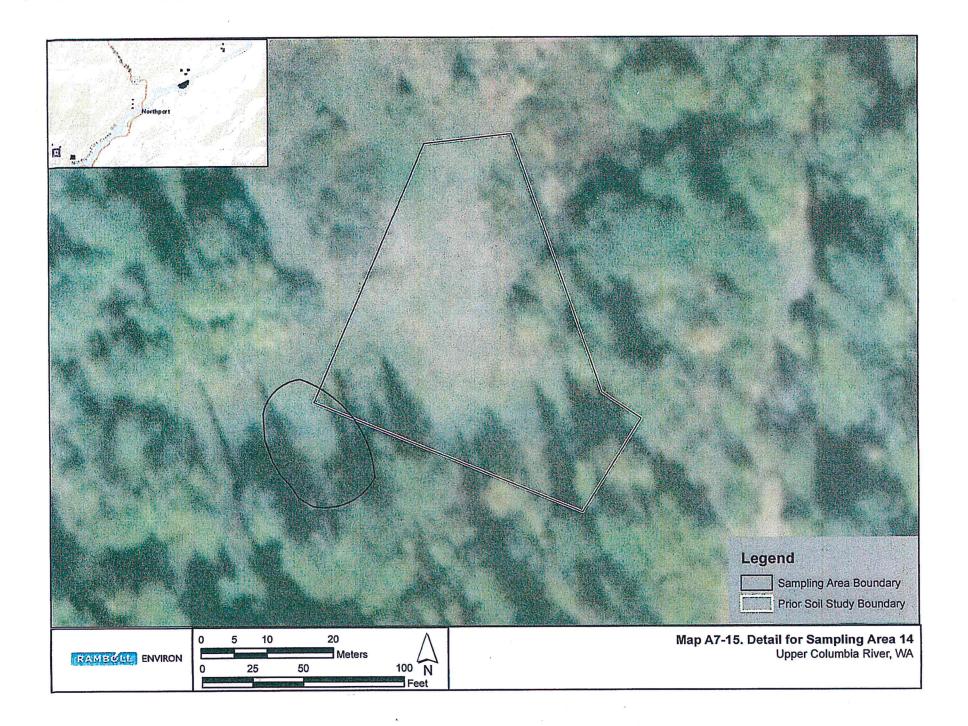


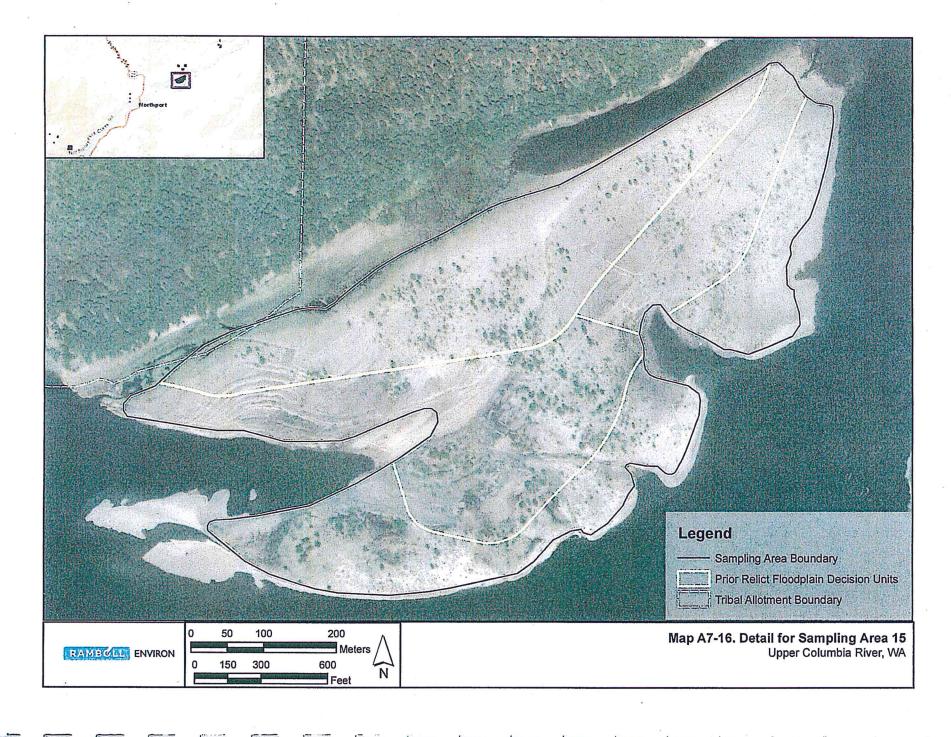












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Appendix C

PROTOCOL MODIFICATION FORM

Project Name: Upper Columbia River Plant Tissue Study, 2018

Field Modification Number: 1

Material to be Sampled: Plant tissue, soil/sediment.

Standard Procedure for Field Collection and Laboratory Analysis (cite reference):

QAPP Attachment 2, SOP-6 (Digital Camera Use and Documentation Procedures).

Reason for Change in Field Procedure or Analysis Variation:

Inadvertent mislabeling on white board included in sample photo.

Variation from Field or Analytical Procedure:

Inadvertent mislabeling in photos for samples SA01-SP09-P01, SA02-SP01-P01, SA03-SP09-P01, SA03-SP12-P01, SA04-SP01-P01, SA04-SP02-P01, SA05-SP02-P01, SA08-SP08-P01, SA16-SP06-P01, SA16-SP07-P01, SA01-SP01-S01, SA02-SP01-P01, SA02-SP01-S01, SA03-SP06-S01, SA04-SP01-S01, SA05-SP02-S01, SA05-SP04-S01, SA07-SP03-S01, SA16-SP06-S01, SA16-SP07-S01.

Special Equipment, Materials or Personnel Required:

N/A

Initiator Name: Stuart Holmes	Date: 6/1/2018
Project Manager: Jennifer Pretare	Date: 6-1-18
QA Manager:	Date:

	PROTOCOL MODIFCATION FORM
Upper (Columbia River Plant Tissue Study, 2018
1	
Page: of	Field Modification No:
Naterial to be Sampled: Plant Ti	SCIAR
	330-2
itandard Procedure for Field Collection and Labo	oratory Analysis (cite reference):
SOP-7	16
Reason for Change in Field Procedure or Analysis	svariation:
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source of any ice is	s sprace, mich pag quoor
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/ariation from Field or Analytical Procedure:	
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tissue, an electric	cooler is being used.
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PROTOCOL MODIFICATION FORM

Project Name: UCR Plant Tissue Study (August 2018) Field Modification Number: 3

Material to be Sampled: Hazelnuts

Standard Procedure for Field Collection and Laboratory Analysis (cite reference):

Field Sampling Plan, SOP 4, Page 13, steps under Hazelnut subsection:

2.Spread a cloth along the ground under the plant of interest and gently shake the branches to collect ripe nuts.

4.Put remaining nuts into a cup or bowl of deionized water and discard those that float (float test; nuts that float are empty or have insect damage that is not visible on the shell).

5.Dry off remaining nuts and put them into the sample bag.

Reason for Change in Field Procedure or Analysis Variation:

During first day of collection of hazelnuts it was found that nuts were more successful collected by picking them.

In addition, the float test was tried in the field. The field crew found that nuts that floated were not necessarily empty or damaged. Therefore the water test was not predictive of sample integrity.

Variation from Field or Analytical Procedure:

Skipping hazelnut collection steps 2, 4, and 5. Picked nuts directly from branches, rather than shaking the plants. Rather than employing the float test, collected additional nuts over the target amount to account for empty or damaged nuts.

Special Equipment, Materials or Personnel Required:

None.

Initiator Name: Jeff Walker	Date: 8-21-18
Project Manager: Jennifer Pretare	Date: 9-20-18
QA Manager:	Date:

Appendix D

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ALS-Environmental-Keiso 1317-S-13th-Ave Kelso, WA 98626 CHAIN OF CUSTODY Ph: 360-577-7222 Fax: 360-636-1068 Client Contact Project Contact: Dias Johnson Site Contact: Jennifer Pretare 510-681-6401 Date: May 4, 2018 COC No: Feck American Incorporated Tel: +1 206 336-1662 Laboratory Contact: Mark Harris Carrier: AECOM driver Josie Smith of COCs Analysis Turnaround Time Calendar (C) or Work Days (W) Cristy Kessel 509.496.1160 Cristy.Kessel@teck.com roject Name: UCR 2018 Plant Tissue Study X 21 days Other ab Quote #: 44121 **FAL Metals** Mercury Sampler's Total No. Sample Identification Sample Date Sample Time QC Sample Initials of Cont. Matrix Sample Specific Notes: 3A -06 -SP-01 S 01 17:00 Soil/Sediment 5/1/2018 1 x I 3A -06 -SP-02 S 01 17:03 Soil/Sediment 5/1/2018 1 x π 3A -07 -SP-01 S 01 15:55 Soil/Sediment 1 5/2/2018 x 3A -07 -SP-02 S 01 16:08 Soil/Sediment 5/2/2018 1 x 3A -07 Soil/Sediment -SP-03 S 01 5/2/2018 16:26 1 ¥ ontainer Type: WMG=Wide Mouth Glass Jar, P=Poly Bag reservation: -20°C Sample Disposal X rchive uniti disposal permitted by EPA Return To Client isposal By Lab secial Instructions/QC Requirements & Comments: -0.1 Company Date/Time: 5.4.18 1032 Date/Time: Received AELOM AECOM FCOM Date/Time: AUS-K 13 5-5-1 KUMM 5-5-18

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Coster 10F: 4.0°C TempBlant 1.3°C ALS-Environmental-Keiso 1317-S-13th-Ave ٨ Kelso. WA 98626 . Ph: 360-577-7222 CHAIN OF CUSTODY Fax: 360-636-1068 Client Contact Project Contact: Lis Nells Site Contact: Jennifer Pretare 510-681-6401 Date: 6/21/2018 COC No: Teck American Incorporated Tel: 206-366-1659 Laboratory Contact: Mark Harris Carrier: Josle Smith AECOM of 2 COCs Analysis Turnaround Time Calendar (C) or Business Days (B) я Cristy Kessel 509.496.1160 Cristy.Kessel@teck.com Project Name: UCR 2018 Plant Tissue Study X 21 days Other Lab Quote =: 44121 TALMetals Versen Sampler's Total No. Sample Identification Sample Date Sample Time Matrix QC Sample Initials of Cent. Sample Specific Notes: SA 04 JU 01 -S 01 1243 Soil 6/19/2018 DL 2 х х Rosa sp SA 04 JU 02 -S 01 1308 Soil 6/19/2018 DL 1 х х Rosa sp SA 04 JU 03 -S 01 1314 Soil 6/19/2018 DL 1 х х Rosa sp. SA 04 JU-04 -S 01 6/19/2015 1335 Soil DL 1 х х Rosa sp. SA 04 ~JU 05 -S 01 1411 Soil 6/19/2018 DL 1 х Vaccinium cespitosum SA 04 -70 06 -S 01 1438 6/19/2018 Soil DL 1 х Vaccinium cespilosum SA 04 -JU 07 -5 01 1501 Soil 6/19/2018 DL 1 ~ х Vaccinium cespitosum SA 04 JU-08 -S 01 0832 6/20/2018 Soil DL 1 х Vaccinium cespitosum SA 04 -JU 09 -S 01 0858 6/20/2018 Soil DL 1 х Vaccinium cespitosum SA 04 JU 10 -S 01 0924 Soil 6/20/2018 DL 1 х Vaccinium cespitosum Container Type: WMG=Wide Mouth Glass Jar, P=Poly Bag *Myre Myre* Preservatiion: 0.4°C 0.4°C Sample Disposal x X Archive unit! disposel permitted by EPA Return To Client isposal By Lab Special Instructions QC Requirements & Comments: Company Date/Time: Reprived By AELOM 6.21.18 1130 AECOM 1130 Company-Date/Time: eceived 6-22-18 11579 search Commany Date Time Received by:

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SA 03 -JU 01 -S 01	1	6/18/2018	1432	Soil/Sediment		GM		<u>x</u>	X													R	osa sp.
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SA 01 - AU 01 -P01	8/22/2018	0818	Plant Tissue		LH	1		†	NC CONTRACTOR								-				-	Prunus virginiana
SA 01 - AU 02 -P01	8/22/2018	0851	Plant Tissue		LH	1	x											1	<u>├</u>			Prunus virginiana
SA 01 - AU 03 -P01	8/22/2018	0858	Plant Tissue		LH	1	x									-	1	1				Prunus virginiana
SA 01 - AU 04 -P01	8/22/2018	0923	Plant Tissue		LH	1	x								1							Prunus virginiana
SA 01 - AU 05 -P01	8/22/2018	0941	Plant Tissue		LH	l	x															Amelanchier alnifolia
SA 01 - AU 06 -P01	8/22/2018	1006	Plant Tissue		РН	1	x															Amelanchier alnifolia
SA 01 - AU 07 -P01	8/22/2018	1030	Plant Tissue		LH	1	x															Amelanchier alnifolia
SA 01 - AU 08 -P01	8/22/2018	1053	Plant Tissue		LH	1	x															Amelanchier alnifolia
SA 01 - AU 09 -P01	8/22/2018	1113	Plant Tissue		AU	1	x															Amelanchier alnifolia
5A 01 - AU 10 -P01	8/22/2018	1230	Plant Tissue		LH	1	x															Pinus ponderosa
SA 01 - AU 11 -P01	8/22/2018	1318	Plant Tissue		PH	1	x															Pinus ponderosa
SA 01 - AU 12 -P01	8/22/2018	1345	Plant Tissue		AU	1	x															Pinus ponderosa
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SA 04 - AU 02 -P01	8/23/2018	0839	Plant Tissue		LH	1	x														+	Corylus corn	
SA 04 - AU 03 -P01	8/23/2018	0856	Plant Tissue		LH	1	x								1	<u> </u>					+	Corylus corn	······
SA 04 - AU 04 -P01	8/23/2018	0913	Plant Tissue		LH	1	x							+	<u> </u>	 						Pinus ponder	
SA 04 - AU 05 -P01	8/23/2018	0930	Plant Tissue		PH	1	x														+	Pinus ponder	
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SA 06 - AU 05 -P01	8/23/2018	1225	Plant Tissue		JW	1	x										+			+	+	Rosa sp	
SA 06 - AU 06 -P01	8/23/2018	1246	Plant Tissue		JW	1	x				-								+	+	+	Rosa sp	
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SA 07 - AU 04 -P04	8/24/2018	1004	Plant Tissue		LH	1	x			+	+		+									Prunus virginiana
SA 07 - AU 05 -P05 (8/24/2018	1020	Plant Tissue		РН	1	x			1			1					+	+			Amelanchier alnifolia
SA 07 - AU 06 -P08 (8/24/2018	1040	Plant Tissue		LH	1	x			+	1		╀──┤						+			Amelanchier alnifolia
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SA 07 - AU 09 -P09 1	8/24/2018	1231	Plant Tissue		РН	1	x						┼──┤							+		Pinus ponderosa
SA 07 - AU 10 -P180	8/24/2018	1249	Plant Tissue		РН	1	x			1		••••••	┟──┤					+	+	+	+	Prunus virginiana
SA 07 - AU 11 -P140	B/24/2018	1306	Plant Tissue		РН	1	x											+	+			Prunus virginiana
SA 07 - AU 12 -P4201	8/24/2018	1324	Plant Tissue		РН	i	x						┝╍╍╍┾					+				Pinus ponderosa
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SA 03 - AU 04 -S01	8/21/2018	1001	Soil		SH	2	x								+	+									
SA 03 - AU 05 -S01	8/21/2018	1038	Soil		SH	1	x																		
SA 03 - AU 06 -S01	8/21/2018	1100	Soil	1	SH	1	x		+						+	+									
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SA 06 - AU 02 -S01	8/23/2018	1110	Soil		SH	1	x				-								+	+		<u> </u>			
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SA 07 - AU 01 -5		8/24/2018	935	Soil		SH	1	x															
SA 07 - AU 02 -5		8/24/2018	936	Soil		SH	1	x															
SA 07 - AU 03 -S		8/24/2018	952	Soil		SH	1	x															
SA 07 - AU 04 -S		8/24/2018	1012	Soil		SH	2	x															
SA 07 - AU 05 -S		8/24/2018	1032	Soil		SH	I	x															
SA 07 - AU 06 -S	1	8/24/2018	1100	Soil		SH	1	x															
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SA 14 - AU 13 -P01	8/27/2018	1215	Plant Tissue		PH	1	x	x															Schoenoplectus acutus
SA 14 - AU 14 -P01	8/27/2018	1223	Plant Tissue		РН	1	<u>x</u>	x															Schoenoplectus acutus
SA 14 - AU 15 -P01	8/27/2018	1237	Plant Tissue	<u> </u>	LH	1	x	x															Rosa sp.
SA 14 - AU 16 -P01	8/27/2018	1250	Plant Tissue	<u> </u>	AU	}	x	x															Amelanchier alnifolia
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