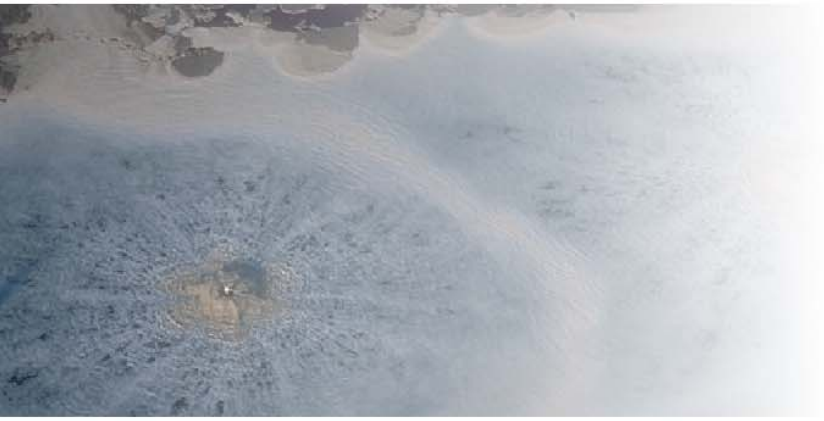

Final
2012 Sampling and Analysis Plan
Quality Assurance Project Plan
Upper Columbia River
Upland Soil Sampling Study
Washington State

Prepared for
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HARTCROWSER

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QUALITY ASSURANCE PROJECT PLAN
UPPER COLUMBIA RIVER UPLAND SOIL STUDY

1.0 INTRODUCTION

This Final Sampling and Analysis Plan and Quality Assurance Project Plan (SAP/QAPP) describes sampling, laboratory, and data evaluation processes for the upland soil study in northern Stevens County, Washington. A Working Field Draft of the SAP/QAPP was submitted to Ecology on October 30, 2012. In November 2012, Ecology approved the document titled "Working Field Draft SAP/QAPP for Upland Soil Study in Northern Stevens County, Washington."

The working draft was approved with the understanding that there may be additional changes to sampling locations before and during the sampling effort. The authorization allowed field teams to complete sample collection before the onset of prohibitive 2012 winter conditions in the study area. Changes made to the working draft SAP/QAPP to finalize the document are described in section 1.1.

1.1 Revision of Working Field Draft

The working draft SAP/QAPP identified 13 subareas in which soil samples would be collected. During the start of field work, a limited number of subareas and proposed soil sample locations were tentative, based on obtaining access to various properties. To begin the field work, these tentative subareas were scheduled later in the field effort. The final proposed modifications to subareas and sample locations were approved by Ecology and field work was completed. These modifications have been incorporated into the following table and figures:

- Table 1 presents the revised information on the final proposed sample locations, aspect, percent slope, soil Map ID, Geology Map ID, and land use.
- Figures 1 and 2 present the revised 13 subareas in the study area, proposed sample locations, soils, and topography.
- Figures 3 and 4 present the revised 13 subareas in the study area, final proposed sample locations, geology, and topography.

No other changes (except for text in Section 1.0) of the working draft document have been made. The final investigation report for the study will present the final sample locations and identify deviations from the working draft SAP/QAPP

and this addendum based on field observations and deviations made at the time of sample collection.

1.2 Purpose of Sampling and Analysis Plan/Quality Assurance Project Plan

This combined Sampling and Analysis Plan/Quality Assurance Project Plan (SAP/QAPP) describes the sampling subareas, locations, field sampling procedures, laboratory analytical methods, data evaluation procedures, and quality control criteria to support the Washington State Department of Ecology (Ecology) upper Columbia River upland soil study. This study will provide, on an area-based scale, an assessment of ambient surface soil conditions near the upper Columbia River valley near the U.S./Canada border. The study focuses on a portion of the general geographic area where historical documents indicate that vegetation has been damaged by operation of the Teck smelter in Trail, British Columbia. The purpose of this study is to collect sufficient data to initially evaluate potential aerial deposition patterns and statistical variability of metals concentrations in surface soil across a portion of the near-border landscape.

Upland soil sampling will be conducted in northern Stevens County, Washington. The study area is generally defined as an approximately 15- to 20-square-mile area extending across either side of the Columbia River, within approximately 2 miles of the U.S./Canada border.

Ecology is expediting this study so that sample collection may be completed before the onset of 2012 winter conditions. The short preparation time before field work may affect obtaining property access to some or all preliminary sampling locations identified in the 13 study subareas (Figures 1 and 2). The final SAP identifies final sampling point locations in the subareas.

2.0 BACKGROUND

The Teck smelter in Trail, British Columbia, has operated for over 100 years, and is one of the largest lead-zinc smelters in the world. The smelter is approximately 10 river miles north of the U.S./Canada border. Air emissions from the smelter have crossed the international border into Washington State. Visible areas of injury to forests caused by the effects of sulfur dioxide were mapped by the US Department of Agriculture (USDA) starting in 1929 (Fraser et al. 2012).

3.0 PROJECT OBJECTIVES AND SUMMARY

The objectives of this study include:

- Assess the concentrations of smelter-related metals in surface soil near the U.S./Canada border in an area that has historically been influenced by the Trail smelter.

- Evaluate potential spatial patterns and statistical variability of smelter-related metals concentrations in study area surface soil across a limited portion of the near-border landscape.

An anticipated 174 surface soil samples (including replicates and profile samples) will be collected (see Figures 1 and 2). These soil samples will be analyzed for:

- EPA Target Analyte List (TAL) metals (silver, aluminum, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, magnesium, manganese, nickel, lead, potassium, sodium, antimony, selenium, thallium, vanadium, zinc, and mercury)
- pH
- Total Organic Carbon (TOC)
- Total solids

A quality assurance data validation review will be performed on analytical sample results. Validated data will be entered into Ecology's Environmental Information Management (EIM) system. Sampling results and laboratory data will be compiled and evaluated. Statistical data evaluation will be performed using EPA's ProUCL 4.0 software.

Sampling locations, procedures, analytical methods, and evaluation of results are discussed in subsequent sections of this SAP/QAPP.

4.0 PROJECT TEAM AND RESPONSIBILITIES

Key staff members and their project functions are listed below.

- Steven Hughes, LG, LHG, Project Manager, Geologist, Hydrogeologist

- Roger McGinnis, PhD, Chemist, Laboratory oversight, sampling design, and statistical evaluation

- Phil Cordell, LG, Geologist, GIS

- Anne Conrad, MS, Geochemist, Data Quality Review, Health and Safety Manager

The following subcontractors will provide support services:

- Chemical analysis will be performed by Analytical Resources, Inc. (ARI), located in Tukwila, Washington. ARI is accredited by the State of Washington. The ARI project manager will be Kelly Bottem.

- If additional field staff are needed to meet the short sampling schedule, TerraGraphics may supply the additional field staff.

5.0 SAMPLING LOCATIONS

Soil samples are planned to be collected from 13 irregularly shaped subareas identified by Ecology's Toxics Cleanup Program (TCP) within approximately 2 miles of the U.S./Canada border. On Figures 1 and 2, subareas with identified soil types are shown, while on Figures 3 and 4, subareas with geologic mapping units are shown. Each subarea is approximately 1 to 2 square miles in extent. The total area evaluated will span approximately 15 to 20 square miles and extend roughly 5 to 6 miles east and 5 to 6 miles west of the Columbia River (Figures 1, 2, 3, and 4). Eight four-point composite samples and one vertical profile sample will be collected from each subarea, as feasible. The eight sample points will be judgmentally selected and geographically distributed within each subarea. The eight sampling point locations collected from within each subarea will each be obtained using a compositing approach, further explained in Section 6.1 and as provided below.

5.1 Sampling Location Selection

A geographic information system (GIS) was used to identify the subareas to be included in this study. The following criteria were used to select a representative range of subarea and composite sample site locations:

The following topological characteristics were used to evaluate and select proposed sample subareas and sampling point locations:

- Geology - Sample locations were selected as feasible to represent major geological units present in the study area.

- Pedology (Soil Type) - Sample locations were selected as feasible to represent major soil types present in the study area.

- Elevation – By judgmentally selecting topographic patterns, subareas have been, in part, selected with respect to a range of elevation conditions. The following zones will be evaluated for distinct differences in metal concentration patterns among plateaus, ridges, valleys, and intermediate slopes:

  - Less than 2,000 feet
  - 2,000 to 3,200 feet
  - 3,200 to 3,800 feet
  - Greater than 3,800 feet

- Slope aspect – Slope aspect also was evaluated when configuring sampling subareas. North-, south- east-, and west-facing slope orientations may enable evaluation of potential smelter plume deposition patterns. Elevation and slope aspect were further considered relative to ridges and valleys to evaluate other potential metals transport and deposition pathways.

- Percent slope – Slope was a secondary evaluation factor. In general, sample locations were selected in areas with less than 30 percent slope for ease of sample collection and to ensure sufficient soil to obtain representative samples was present within the individual sub-sampling areas.

Based on these selection criteria, a list of 122 sample locations (not including replicate sample locations) was developed (Table 1). Sample locations depend on obtaining site access and on site conditions, and may be modified.

6.0 FIELD SAMPLING METHODS

The concentration of air-deposited contaminants in surface soil may vary over short distances. These differences may be the result of small-scale differences in deposition patterns and/or soil characteristics. The resources available for this study and size of the chosen subareas preclude collecting and independently testing multiple, high-density, discrete sampling point locations from each subarea. Therefore, the decision was made to collect eight composite point samples from each subarea in this study to represent soil values. To obtain a composite sample, four sub-samples will be collected within an approximate 20-foot radius and composited to reduce short-range sample variability.

Uppermost soil intervals are anticipated to be the most representative of potential human or ecological contact with and exposure to soil contaminants and, absent physical disturbance of the soil, these intervals may contain the highest concentrations of air-deposited chemicals at a sampling location. For

this study, Ecology infers that the upper 3 inches are likely to include and retain metals deposited by historical smelter emission operations. Therefore, a depth interval of 0 to 3 inches below non-decomposed surface litter will be sampled.

Discrete depth profile samples will be collected from one of the eight composite locations in each subarea, typically near the center of the subarea. The profile sampling is discussed further in Section 6.4.

A list of equipment supplies for the field effort is included as Appendix A.

6.1 Selection of Sample Location

Preferred sampling points shall be identified and placed on a site map before beginning field activities. These locations may be modified during the site visit.

After selecting a sampling point, four subsample locations will be established and marked on the ground using pin flags. A default design for collecting subsamples will be used as a point of departure for modification by field personnel using their best judgment on collecting representative samples. Collectively, the set of four subsamples will be composited to represent conditions at the sampling point.

The default design will be to collect and composite four subsamples within a roughly 1,200-square-foot circular sample compositing zone (about a 20-foot radius). This layout may be modified if necessary to avoid obstacles or excluded areas as long as subsamples are separated by at least 20 feet. If this is not possible, an alternate location should be considered for sampling.

After establishing the center point, a measuring tape will be extended for approximately 20 feet in a specific direction (e.g., to the north) and a pin flag placed. Based on local conditions, the sampler may walk along the circumference of the circle for 90 degrees, and place the next pin flag, and continue the same way for two more subsample locations. Alternatively, the sampler may measure out 20 feet to the north and mark with a pin flag, then return to the center point and measure out 20 feet to the west, east, and south marking each location. Table 1 presents the Aspect (degrees from North) that will be used to establish the direction from the center point to the first subsample location.

After marking subsample locations with pin flags, a photograph of the sampling point will be taken and recorded in the field log book. A site sketch of landmarks on the property, the sample location point, land use, topography, geology, and soil description will be recorded on the field sampling form. In

addition, field staff will record the latitude and longitude at the center of the circle using a global positioning system (GPS) device.

6.2 Sample Exclusion Criteria

Surface soil sampling points will be selected from the least-disturbed portions of the sample locations. The sampling point subsamples should represent a consistent set of soil and vegetation conditions at each sampling point location. The following areas will be excluded when selecting sampling points:

- Disturbed areas and areas of animal burrowing activity;
- Areas composed primarily of rocks or gravel, with no significant soil content;
- Areas near constructed structures and developed or altered lands;
- High-traffic areas (e.g., roads, logging areas, and hiking trails);
- Hummocks, paths used by animals or humans, and other areas disturbed by treefall or animal digging;
- Burn pits, fire pits, other incineration sources, and presence of charcoal or other foreign materials observed in soil,
- Areas where there is evidence of recent fires; and
- Areas near forest roads where wind-blown transport or other disturbances are more likely to occur. All sampling will be performed a minimum of 500 feet from roadways.

If the planned sampling location meets any of the listed exclusion criteria, samples will not be collected and a new sample location will be established from an area with similar geographical characteristics within the same subarea. Alternate sample collection locations will be attempted as near to the original locations as feasible. Alternate locations will be scoped and selected in the field, as needed.

6.3 Surface Soil Sample Collection

Sample collection will be performed in a consistent manner by field personnel at all sampling locations to support data representativeness objectives. Samples collected should be representative of the targeted 0- to 3-inch depth profile. Care should be taken to collect all size fractions (smaller than 2 mm) and avoid

loss of fine material. If soil is scraped from the sidewall of the sampling hole, the bottom of the shallow excavation may be lined with plastic to ensure the entire sample is recovered. Excess soil will be collected so that material can be archived for future additional analyses.

The sample location and site conditions will be recorded in field books and on field sampling forms.

6.3.1 Remove Groundcover

Groundcover may consist of snow, grass, other vegetation, leaves, conifer needles, or rocks/pebbles. An area of approximately 8 inches by 8 inches will need to be uncovered. The actual area may vary by site depending on how rocky the soil is and how much vegetation is present. Groundcover removal procedures include:

- Remove the surface layer of snow, grass, leaves, needles, rocks, or twigs at each subsample point by gloved hand, spade, or trowel. The groundcover should only be removed to the point where primarily decomposed matter and soil is exposed, being careful not to disturb the soil below. An effort should be made to collect soil adhering to roots by shaking or brushing into the collection bowl.

- In forested areas, forest litter (undecomposed identifiable dead plant material) and forest duff (partially decomposed organic material with identifiable plant material) will be removed using a spade or trowel. Scraping the sidewall during sample collection will include the humus horizon (completely decomposed organic material) that underlies the forest duff.

- If the sampling point location does not contain vegetation, then any rocks or pebbles can be brushed aside by the sampler(s) using a gloved hand.

6.3.2 Subsample Collection

Samples will be collected from each of the four sampling point locations from the upper 0 to 3 inches of soil using a precleaned stainless steel spoon, trowel, bulb planter, or other coring device. Sufficient soil must be collected for chemical analytical tests (one 8-ounce jar). Organic matter such as roots, leaves, twigs, pinecones, and debris, should be excluded from the sample. Rocks, pebbles, and gravel should be removed from the sample collected for chemical analysis.

Surface soil (0 to 3 inches) subsamples will be collected as follows:

- Put on a clean pair of nitrile gloves.
- Excavate soil to a depth of 3 inches with a clean spade, spoon, bulb planter, or trowel. Use a ruler to accurately determine the depth.
- Place soil into a stainless steel bowl.
- Repeat this process at all subsample locations collecting a generally uniform amount of soil from each of the four sampling point locations.
- Remove any large fragments of organic matter such as sticks or roots from the bowl, taking care to retain soil particles adhered to debris to the extent practical.
- Using a clean gloved hand, remove any large rocks or gravel from the bowl, taking care to retain soil particles adhered to debris to the extent practical.
- Homogenize the soil in the bowl by mixing with a collection spoon and then separate the soil into four equal aliquots by drawing an "X" in the soil with the spoon.
- Place one spoonful of soil from each quarter into a clean 8-oz sample container until full. Take care to ensure the soil placed in the jars is representative of the vertical distribution in the sample.
- Once containers are full, the rims should be wiped using a clean paper towel or Kimwipe, and the lids tightly screwed on.
- The sample jars should be labeled with the date, time, and sample identification and placed in a ziplock bag. The sample identification should also be marked on the jar lid and the ziplock bag.
- Place the labeled sample containers into an iced cooler as soon as feasible.
- Remove pin flags once soil samples have been collected and return site to original grade as best as possible.

6.3.3 Field Replicate

One field replicate sample shall be collected from each of the 13 subareas. After the primary composite sample location is identified, a second composite

sample will be collected by rotating the primary sample locations 45 degrees clockwise. The field replicate sample collection will follow the procedure listed above. The field replicate will be submitted to the laboratory for the same sample analysis.

6.4 Profile Sample Collection

Within each of the 13 subareas, a single discrete depth profile station will be established and sampled. This station will be located at the center point of a composite sampling point location. Sample collection will be performed in a consistent manner by field personnel at all sampling locations to support data representativeness objectives. Care should be taken to preserve all size fractions smaller than 2 mm and avoid loss of fine material. Adequate soil will be collected so that material can be archived.

The sample location and site conditions will be recorded in field books and on field sampling forms.

After the sampling point location is confirmed, the area will be cleared of surface organic materials, following the procedure described for the subsample locations.

6.4.1 Profile Interval Collection

Using a cleaned auger, shovel, or trowel, depending on soil conditions, a hole will be excavated down to 24 inches or bottom of the soil horizon (e.g. bedrock, rejection, etc.). The following depth intervals will be sampled and submitted for chemical analysis:

- 0 to 3 inches
- 3 to 6 inches
- 6 to 12 inches
- 12 to 24 inches or to bottom of soil horizon

Each profile will be photo-documented and described by a geologist or an environmental scientist.

6.5 Sample Sieving

The soil sample collected for chemical analysis will be sieved by the laboratory using an ASTM No. 10 (2 mm) screen, to obtain finer-grained material consistent

with MTCA requirements (WAC 173-340(7)(a)). Additional details are provided in Section 8.0.

6.6 Equipment Decontamination Procedures

Precleaned equipment will be used for all soil sampling. All reusable or nondedicated field equipment (e.g., sampling spoons, mixing bowls, spade/shovel, etc.) will be decontaminated before use. Decontamination will not be required between collection of subsamples that will be composited. Clean sample equipment will be used for each depth interval for the profile samples. Equipment will be cleaned in the following manner:

- Nitrile gloves (or equivalent) must be worn during decontamination.
- Excess soil will be removed using paper towels or by dry brushing.
- Rinse with potable water.
- Wash with a spray bottle containing Liquinox™ (or equivalent nonphosphate detergent) and water and clean with the stiff-bristle brush until all evidence of soil or other material has been removed.
- Rinse with site water or tap water ensuring that all soap from the previous step has been removed.
- Rinse with deionized or distilled water.
- Place the equipment on a piece of plastic to air dry.
- A trash bag should be provided for waste paper towels, used nitrile gloves, etc.

6.7 Disposal of Investigation-Derived Waste

6.7.1 Disposal of Incidental Trash

Incidental trash generated during this investigation (including discarded nitrile gloves, aluminum foil, paper towels, and disposable equipment) will be placed in plastic trash bags and disposed of as solid waste.

6.7.2 Decontamination Water Disposal

Wash water and rinse water volumes will be small and will be poured onto the ground.

6.8 Sample Containers and Labels

Sample container requirements vary according to analyte. Precleaned sample containers will be obtained from the analytical laboratory. Sample containers shall be cleaned following the requirements described in Specifications and Guidance for Contaminant-Free Sample Containers (EPA 1992a, OSWER Directive 92.0-05a). Required sample containers are summarized in Table 2.

Samples will be identified by the subarea, type of sample, and consecutive number. For example, the first composite sample collected from subarea 8 would be labeled:

- SA8-1C

The profile samples would be labeled with the uppermost sample collected having the lowest number. For example, the profile sample collected from subarea 6, collected at composite sample location 5, would be labeled:

- SA6-5P-1 (0 to 3″ depth)
- SA6-5P-2 (3 to 6″ depth)
- SA6-5P-3 (6 to 12″ depth)
- SA6-5P-4 (12 to 24″ depth)

Field replicates will be labeled with a "D," for example:

- SA8-1D

6.9 Field Documentation

Field notes will be maintained during sampling and processing operations. The following will be included in the field notes:

- Subarea number;
- Date and time of entry;
- Names of the field sampler collecting and logging the samples;

- Weather conditions;
- Date, time, and identification of each sample, including number of jars and tests requested;
- Observations on land use, topography, geology, and soil characteristics;
- Approximate distances and orientation from nearby roadways or observed areas of disturbance.
- Documentation of photographs;
- Details of sample collection, including GPS coordinates; actual sampling point locations will be recorded on a sketch map;
- Soil description (including visual horizons, grain characteristics, color, root and organic matter)
- Any deviation from the approved SAP; and
- General observations.

7.0 SAMPLE HANDLING PROCEDURES

7.1 Sample Preservation and Holding Times

Samples will be preserved according to the requirements of the specific analytical methods to be employed, and all samples will be extracted and analyzed within method-specified holding times. Required sample containers, preservatives, and holding times are summarized in Table 2.

7.2 Chain of Custody and Shipping Procedures

7.2.1 Chain of Custody Procedures

Chain of custody forms will be used to document the collection, custody, and transfer of samples from their initial collection location to the laboratory, and their ultimate use and disposal. Entries for each sample will be made on the custody form after each sample is collected.

Sample custody procedures will be followed to provide a documented record that can be used to follow possession and handling of a sample from collection

through analysis. A sample is considered to be in custody if it meets at least one of the following conditions:

- The sample is in someone's physical possession or view;
- The sample is secured to prevent tampering (i.e., custody seals); and/or
- The sample is locked or secured in an area restricted to authorized personnel.

A chain of custody form will be completed in the field as samples are packaged. At a minimum, the information on the custody form shall include the sample number, date and time of sample collection, sampler, analysis, and number of containers. Two copies of the custody form will be placed in the cooler prior to sealing for delivery to the laboratory with the respective samples. The other copy will be retained and placed in the project files after review by the Project Chemist. Custody seals will be placed on each cooler or package containing samples so the package cannot be opened without breaking the seals.

7.2.2 Sample Shipping Procedures

After sample containers have been filled, they will be packed on ice in coolers. The coolers will be transferred to ARI for chemical analysis. Chain of custody procedures will commence in the field and will track delivery of the samples to the analytical laboratories. Specific procedures are as follows:

- Samples will be packaged and shipped in accordance with U.S. Department of Transportation regulations as specified in 49 CFR 173.6 and 49 CFR 173.24;
- Individual sample containers will be packed to prevent breakage;
- The coolers will be clearly labeled with sufficient information (name of project, time and date container was sealed, person sealing the cooler, and the Hart Crowser office name and address) to enable positive identification;
- A sealed envelope containing custody forms will be enclosed in a plastic bag and taped to the inside lid of the cooler;
- Signed and dated custody seals will be placed on all coolers prior to shipping;
- Samples will either be shipped by overnight courier or will be hand delivered to the laboratory by Hart Crowser personnel; and

- Upon transfer of sample possession to the testing laboratories, the custody form will be signed by the persons transferring custody of the coolers. Upon receipt of samples at the laboratory, the shipping container custody seal will be broken and the laboratory sample-receiving custodian will compare samples to information on the chain of custody form and record the condition of the samples received.

8.0 LABORATORY METHODS

Samples will be individually sieved by the laboratory using decontaminated Number 10 (2mm) sieves. If samples are too wet to sieve, they will be air dried at room temperature to remove excess moisture. Drying should only be performed if necessary. If drying is required, the entire bulk sample should be evenly spread on a tray, approximately 1/2 to 1 inch thick. Dry at ambient room temperature only until the soil matrix is amenable to sieving. Drying at elevated temperature, i.e. "baking," is not allowed. Turning the soil on a daily basis may be necessary to facilitate drying.

8.1 Analytical Methods

Samples will be analyzed according to EPA methods as described in Update III to Test Methods for Evaluating Solid Waste; Physical/Chemical Methods, SW-846 (EPA 1986), and Standard Methods as summarized below.

Soil samples will be analyzed for:

- Total metals (silver, aluminum, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, magnesium, manganese, nickel, lead, potassium, sodium, antimony, selenium, thallium, vanadium, zinc) by EPA Methods 6010B/6020
- Total mercury by EPA Method 7471A
- Total Organic Carbon (TOC) by Plumb, 1981
- pH by EPA Method 9045
- Total solids by SM 2540B or equivalent

Laboratory methods, practical quantitation limits (PQL; reporting limits) and method detection limits are presented in Table 3.

9.0 QUALITY ASSURANCE AND QUALITY CONTROL

The quality of analytical data generated is assessed by the frequency and type of internal QC checks developed for analysis type. The quality of laboratory measurements will be assessed by reviewing results for analysis of method blanks, matrix spikes, duplicate samples, laboratory control samples, surrogate compound recoveries, instrument calibrations, performance evaluation samples, interference checks, etc., as specified in the analytical methods to be used. The following general procedures will be followed for all laboratory analyses:

- Laboratory blank measurements at a minimum frequency of 5 percent or one per batch of 20 samples or fewer for each matrix;
- Matrix spike (MS) analysis to assess accuracy and precision at a minimum frequency of 5 percent or one per batch of 20 samples or fewer for each matrix;
- Laboratory duplicate sample analysis to assess precision at a minimum frequency of 5 percent or one per batch of 20 samples or fewer for each matrix; and
- Laboratory control sample analysis to assess accuracy in the absence of any matrix effect at a minimum frequency of 5 percent or one per batch of 20 samples or fewer for each matrix.

Laboratory quality control procedures, criteria, and corrective action are summarized in Tables 4 and 5 for the various analyses.

9.1 Data Quality Indicators

The overall quality assurance objectives for field sampling, field measurements, and laboratory analysis are to produce data of known and appropriate quality to support the Ecology Upper Columbia River upland soil study. The procedures and quality control checks specified herein will be used so that known and acceptable levels of accuracy and precision are maintained for each data set. This section defines the objectives for accuracy and precision for measurement data. These goals are primarily expressed in terms of acceptance criteria for the quality control checks performed.

The quality of analytical data generated is controlled by the frequency and type of internal quality control checks developed for analysis type. Laboratory results will be evaluated by reviewing results for analysis of method blanks, matrix spikes, duplicate samples, laboratory control samples, calibrations, performance

evaluation samples, interference checks, etc., as specified in the analytical methods to be used.

9.1.1 Precision

Precision is the degree of reproducibility or agreement between independent or repeated measurements. Analytical variability will be expressed as the relative percent difference (RPD) between laboratory replicates and between matrix spike and matrix spike duplicate analyses. RPD will be used to measure precision for this investigation and is defined as follows:

$$RPD = \frac{(D_1 - D_2)}{(D_1 + D_2)/2} \times 100$$

Where,

D_1 = Sample value
D_2 = Duplicate sample value

Composite samples will be collected at each site to minimize sampling variability.

9.1.2 Accuracy

Accuracy is the agreement between a measured value and its true or accepted value. While it is not possible to determine absolute accuracy for environmental samples, the analysis of standards and spiked samples provides an indirect assessment of accuracy.

Laboratory accuracy will be assessed as the percent recovery of matrix spikes, matrix spike duplicates, and laboratory control samples. Accuracy will be defined as the percentage recoverable from the true value and is defined as follows:

$$\%Recovery = \frac{(SSR\text{-}SR)}{SA} \times 100$$

Where,

SSR = spiked sample result
SR = sample results
SA = amount of spike added

9.1.3 Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Care will be taken in the design of the sampling program to ensure sample locations are selected properly, sufficient numbers of samples are collected and subsamples are blended to accurately reflect conditions at the site, and samples are representative of sampling locations. A sufficient volume of sample will be collected at each sampling point to minimize bias or errors associated with sample particle size and heterogeneity.

9.1.4 Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared to another. In order to insure results are comparable, samples will be analyzed using standard EPA methods and protocols as described in *Test Methods for Evaluating Solid Wastes Physical/Chemical Methods* (EPA 1986). Data will also be reviewed to verify that precision and accuracy criteria have been achieved and, if not, that data have been appropriately qualified.

As discussed in Section 6.3, sample collection will be performed in a consistent manner by field personnel at all sampling locations to ensure all data collected as part of this study are comparable. Comparability is attained by careful adherence to standardized sampling and analytical procedures, based on rigorous documentation of sample locations (including depth, time, and date).

9.1.5 Completeness

Completeness is the percentage of measurements made that are judged to be valid. Completeness will be calculated separately for each analytical group, e.g., metals. Results must also contain all quality control check analyses required to verify the precision and accuracy of results to be considered complete. Data qualified as estimated during the validation process will be considered complete. Nonvalid measurements will be results that are rejected during the validation review or samples for which no analytical results were obtained. Completeness will be calculated for each analysis using the following equation:

$$\text{Completeness} = \frac{\text{valid data points obtained}}{\text{total data points planned}} \times 100$$

The target goal for completeness is a minimum of 95 percent. Completeness will be monitored on an on-going basis so that archived sample extracts can be reanalyzed, if required, without remobilization.

9.2 Data Quality Assurance Review

A project chemist at Hart Crowser will perform an independent data quality review of the chemical analytical results provided by ARI and summarize the results in a report. The report will assess the adequacy of the reported detection limits in achieving the project screening levels for soil; the precision, accuracy, representativeness, and completeness of the data; and the usability of the analytical data for project objectives. Exceedances of analytical control limits will be summarized and evaluated.

A data evaluation review will be performed on all results using QC summary sheet results provided by the laboratory for each data package. The data evaluation review is based on the Quality Control Requirements previously described and follows the format of the EPA National Functional Guidelines for Inorganic (EPA 2010) Superfund Data Review, modified to include specific criteria of individual analytical methods. Raw data (instrument tuning, calibrations, instrument printouts, bench sheets, and laboratory worksheets) will be available for review if any problems or discrepancies are discovered during the routine evaluation. The following is an outline of the data evaluation review format:

- Verify that sample numbers and analyses match the chain of custody request;
- Verify sample preservation and holding times;
- Verify that instrument tuning, calibration, and performance criteria were achieved;
- Verify that laboratory blanks were performed at the proper frequency and that no analytes were present in the blanks;
- Verify that laboratory duplicates, matrix spikes, and laboratory control samples were run at the proper frequency and that control limits were met; and
- Verify that required detection limits have been achieved.

Data qualifier flags, beyond any applied by the laboratory, will be added to sample results that fall outside the QC acceptance criteria. An explanation of data qualifiers to be applied during the review is provided below:

U The compound was analyzed for but was not detected. The associated numerical value is the sample reporting limit.

J The associated numerical value is an estimated quantity because QC criteria were slightly exceeded.

UJ The compound was analyzed for, but not detected. The associated numerical value is an estimated reporting limit because QC criteria were not met.

T The associated numerical value is an estimated quantity because reported concentrations were less than the practical quantitation limit (lowest calibration standard).

R Data are not usable because of significant exceedance of QC criteria. The analyte may or may not be present; resampling and/or reanalysis are necessary for verification.

10.0 DATA ANALYSIS AND REPORTING

10.1 Laboratory Reports

The laboratory data reports will consist of complete data packages that will contain complete documentation and all raw data to allow independent data reduction and verification of analytical results from laboratory bench sheets, and instrument raw data outputs. Each laboratory data report will include the following:

- Case narrative identifying the laboratory analytical batch number, matrix and number of samples included, analyses performed and analytical methods used, and description of any problems or exceedance of QC criteria and corrective action taken. The laboratory manager or their designee must sign the narrative.

- Copy of chain of custody forms for all samples included in the analytical batch.

- Tabulated sample analytical results with units, data qualifiers, percent solids, sample weight or volume, dilution factor, laboratory batch and sample number, Hart Crowser sample number, and dates sampled, received, extracted, and analyzed all clearly specified.

- All calibration, quality control, and sample raw data including quantitation reports and other instrument output data.

- Blank summary results indicating samples associated with each blank.

- MS/MSD result summaries with calculated percent recovery and relative percent differences.

- Laboratory control sample results, when applicable, with calculated percent recovery.

- Electronically formatted data deliverable (CD) results.

10.2 Data Evaluation and Analysis

Following the planned field work, sample analysis, and data quality review, statistical evaluation of the data will be accomplished. Statistical evaluation will be performed using ProUCL 4.0 software.

The following evaluations are currently anticipated to be performed, but may vary based on consultation with Ecology:

- Summary statistics to include minimum, maximum, mean, and median will be calculated for all samples and each individual subarea. Results will be evaluated to determine if data follow normal, lognormal, gamma, or nonparametric distributions. The upper 90th percentile metals concentration will be calculated using the appropriate data distributions for all soil samples and each individual subarea.

- Analysis of variance (ANOVA) will be used to compare metal concentrations among subareas.

- If the budget and time permit, exploratory multivariate analysis will be used to investigate potential correlations among metals, geology, soil characteristics, elevation, slope aspect, and slope direction.

10.3 Hart Crowser Reports

In addition to data quality evaluation reporting, Hart Crowser will prepare a draft data and interpretation report summarizing sampling procedures and laboratory testing results. The report will include a map(s) with sampling locations, tabulated analytical testing data, and laboratory analytical documentation. The report or separate memoranda will include field notes, site sketches, and photographs. The statistical evaluation will be incorporated within the report.

A final report will be completed following discussions with Ecology.

11.0 SCHEDULE

A schedule of deliverables is listed below:

Task	Anticipated Completion Date
Submit Draft SAP/QAPP/HASP	October 19, 2012
Ecology Review	October 24, 2012
Submit Final SAP	October 26, 2012
Perform field work	October 29 to November 5, 2012
Samples received by contract laboratory	November 1 through November 7, 2012
Sample analytical results received	December 16, 2012
Data validation completed	December 21, 2012
Data Analysis and Statistical Evaluation	January 31, 2013
Draft Report Submittal	February 15, 2013
Ecology Review	February 29, 2013
Revised Report	March 15, 2013
Project Closeout	March 2013

12.0 REFERENCES

American Society of Testing Materials (ASTM) 2006. ASTM Standard D4700 Standard Guide for Soil Sampling from the Vadose Zone. ASTM International West Conshohocken, PA, 2006.

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Standard Methods for the Examination of Water and Wastewater. Seventeenth Edition, 1989.

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Table 1 - Sample Locations and Characteristics

Sample ID	Sample Elevation (feet)	Aspect (Degrees from North)	Percent Slope	Soil Map ID[1]	Geology Map Symbol[2]	Latitude	Longitude	Land use
SA1-1C	4,002	270	0	12	Eva	48.9886925	-117.7853534	Land
SA1-2C	4,229	0	10	11	Eva	48.9974733	-117.7816431	Land
SA1-3C/1P	3,969	158	25	7	Qgt	48.9951111	-117.7781781	Land
SA1-4C	3,872	30	15	7	Qgt	48.9920350	-117.7785749	Land
SA1-5C	4,261	145	18	10	Eia(s)	48.9972403	-117.7713444	Land
SA1-6C	3,988	152	2	10	Eia(s)	48.9926296	-117.7694668	Land
SA1-7C	3,847	46	25	10	Eia(s)	48.9983312	-117.7647595	Land
SA1-8C	3,921	82	14	12	Eia(s)	48.9906560	-117.7641637	Designated Forest Land
SA2-1C	2,763	115	18	180	Qgt	48.9977902	-117.7304913	Designated Forest Land
SA2-2C/1P	2,213	305	15	36	Qgt	48.9981738	-117.7226310	Designated Forest Land
SA2-3C	3,092	288	20	12	Qgt	48.9905519	-117.7168586	Designated Forest Land
SA2-4C	2,187	110	38	10	Qgt	48.9934482	-117.7277954	Designated Forest Land
SA2-5C	2,155	90	8	98	Qa	48.9848242	-117.7300349	Designated Forest Land
SA2-6C	2,246	160	19	233	CDmt	48.9800764	-117.7206612	Designated Forest Land
SA2-7C	2,721	230	10	168	Qgt	48.9842749	-117.7211995	Designated Forest Land
SA2-8C	2,789	308	15	12	Qgt	48.9972780	-117.7166574	Designated Forest Land
SA3-1C	3,386	316	22	12	Qgt	48.9985904	-117.7087758	Designated Forest Land
SA3-2C	3,662	20	8	11	Qgt	48.9966084	-117.7036234	Designated Forest Land
SA3-3C	3,375	296	30	12	Qgt	48.9941083	-117.7121431	Designated Forest Land
SA3-4C/1P	3,576	150	12	168	Qgt	48.9940827	-117.7035616	Designated Forest Land
SA3-5C	3,301	155	13	168	Qgt	48.9894913	-117.7109191	Designated Forest Land
SA3-6C	3,261	133	30	77	Qgt	48.9913148	-117.7033894	Designated Forest Land
SA3-7C	3,324	50	5	77	Qgt	48.9965166	-117.6967035	Designated Forest Land
SA3-8C	3,175	115	17	12	Qgt	48.9979245	-117.6922897	Designated Forest Land
SA4-1C/1P	2,212	140	25	233	Qgt	48.9800014	-117.7111435	Designated Forest Land
SA4-2C	2,817	182	21	235	CDmt	48.9851250	-117.7110064	Designated Forest Land
SA4-3C	2,287	95	30	235	CDmt	48.9828401	-117.7021707	Designated Forest Land
SA4-4C	2,949	167	15	77	Qgt	48.9874724	-117.7055827	Designated Forest Land
SA4-5C	2,583	141	18	168	Qgt	48.9875332	-117.6970440	Designated Forest Land
SA4-6C	1,966	180	19	235	Qgt	48.9839858	-117.6906449	Designated Forest Land
SA4-7C	2,798	174	16	168	Qgt	48.9891664	-117.6994361	Designated Forest Land
SA4-8C	2,836	150	15	12	Qgt	48.9936024	-117.6913678	Designated Forest Land
SA5-1C	2,833	98	8	12	Qgt	48.9987740	-117.6826201	Designated Forest Land
SA5-2C	2,515	161	26	180	CDmt	48.9913989	-117.6861059	Designated Forest Land
SA5-3C	2,054	90	7	9	Qgt	48.9873340	-117.6823198	Designated Forest Land

Table 1 - Sample Locations and Characteristics

Sample ID	Sample Elevation (feet)	Aspect (Degrees from North)	Percent Slope	Soil Map ID[1]	Geology Map Symbol[2]	Latitude	Longitude	Land use
SA5-4C	2,046	190	7	234	CDmm	48.9888803	-117.6704161	Designated Forest Land
SA5-5C/1P	2,504	200	19	197	Qgt	48.9935713	-117.6697760	Designated Forest Land
SA5-7C	2,024	172	17	72	Qgt	48.9912660	-117.6583640	Land
SA5-8C	2,495	121	24	197	Eia(s)	48.9974239	-117.6499825	Agricultural Current Use
SA6-1C	1,879	130	2	35	Qls	48.9741763	-117.7278322	Designated Forest Land
SA6-2C	1,746	150	2	216	Qgo	48.9742120	-117.7176718	Designated Forest Land
SA6-3C	1,640	170	4	217	Qa	48.9757746	-117.7030769	Designated Forest Land
SA6-4C/1P	1,766	233	4	30	Qgo	48.9760882	-117.6880831	Designated Forest Land
SA6-5C	1,515	169	36	89	Qgl	48.9746466	-117.6811135	Designated Forest Land
SA6-6C	1,610	100	8	89	Qls	48.9733500	-117.6880509	Designated Forest Land
SA6-7C	1,835	160	4	248	Qa	48.9823775	-117.6893802	Designated Forest Land
SA6-8C	1,811	0	0	88	Qgo	48.9821184	-117.6790817	Designated Forest Land
SA7-1C	1,554	151	10	226	Qa	48.9837439	-117.6716944	Designated Forest Land
SA7-2C	1,663	140	45	31	Qa	48.9799330	-117.6755988	Designated Forest Land
SA7-3C	1,403	177	0	30	Qgo	48.9744273	-117.6685321	Designated Forest Land
SA7-4C	1,763	90	15	30	Qgo	48.9822048	-117.6612508	Land
SA7-5C	1,418	120	1	227	Qgo	48.9825504	-117.6466774	Land
SA7-6C/1P	1,707	0	1	88	Qgo	48.9847184	-117.6522055	Agricultural Current Use
SA7-7C	2,040	82	16	12	CDmm	48.9954893	-117.6470071	Agricultural Current Use
SA7-8C	1,480	100	40	12	CDmm	48.9930923	-117.6426513	Land
SA8-1C	1,659	110	3	35	Qgo	48.9999822	-117.6184240	Land
SA8-2C/1P	1,410	90	1	85	Qgo	48.9806220	-117.6339914	Land
SA8-3C	1,576	250	30	34	Qgo	48.9849227	-117.6290891	Land
SA8-4C	1,814	225	5	35	Qgo	48.9776655	-117.6295425	Land
SA8-5C	1,769	290	10	30	Qgd	48.9908639	-117.6239315	Designated Forest Land
SA8-6C	1,650	90	15	88	Qgd	48.9991714	-117.6213904	Land
SA8-7C	1,770	245	12-5	88	Qgd	48.9951544	-117.6200219	Land
SA8-8C	1,608	270	0	34	Qgo	48.9934081	-117.6281837	Land
SA9-1C	2,927	331	39	169	Eia(s)	48.9932733	-117.6087922	Designated Forest Land
SA9-2C	2,200	295	21	163	CDmm	48.9933307	-117.6153150	Designated Forest Land
SA9-3C	3,076	230	25	163	Eia(s)	48.9903639	-117.6088043	Designated Forest Land
SA9-4C	2,618	Flat	0	189	Eia(s)	48.9856004	-117.6138114	Designated Forest Land
SA9-5C	1,920	270	13	8	Qgd	48.9821576	-117.6201374	Designated Forest Land
SA9-6C	2,315	271	21	189	CDmm	48.9787386	-117.6201529	Designated Forest Land

Table 1 - Sample Locations and Characteristics

Sample ID	Sample Elevation (feet)	Aspect (Degrees from North)	Percent Slope	Soil Map ID[1]	Geology Map Symbol[2]	Latitude	Longitude	Land use
SA9-7C/1P	1,954	335	10	6	Qgt	48.9728238	-117.6328616	Designated Forest Land
SA9-8C	2,880	307	36	8	CDmm	48.9677892	-117.6279067	Land
SA9-9C	2,196	306	25	6	Qgt	48.9689673	-117.6358230	Designated Forest Land
SA9-10C	2,294	126	21	12	Qgt	48.9729244	-117.6265885	Land
SA10-1C	3,095	167	9	163	Eia(s)	48.9854363	-117.6076618	Designated Forest Land
SA10-2C/1P	3,160	84	34	8	CDmm	48.9820299	-117.6089904	Designated Forest Land
SA10-3C	3,308	270	7	8	CDmm	48.9782421	-117.6110227	Designated Forest Land
SA10-4C	3,149	350	5	189	Qgd	48.9736177	-117.6131446	Land
SA10-5C	3,131	270	17	12	CDmm	48.9714735	-117.6200819	Land
SA10-6C	3,324	155	12	189	CDmt	48.9699816	-117.6144413	Designated Forest Land
SA10-7C	3,415	90	20	189	Qgd	48.9683325	-117.6185318	Land
SA10-8C	3,324	290	18	104	CDmt	48.9664236	-117.6245851	Land
SA11-1C	3,091	127	20	180	CDmt	48.9687955	-117.6114160	Designated Forest Land
SA11-2C	2,261	50	25	171	Qgd	48.9898971	-117.5922499	Designated Forest Land
SA11-3C	2,133	75	17	200	Qgd	48.9749865	-117.5980079	Designated Forest Land
SA11-4C	2,787	128	40	200	Eia(s)	48.9740664	-117.6050103	Designated Forest Land
SA11-5C	2,212	70	12	168	Eia(s)	48.9859222	-117.5924234	Land
SA11-6C	2,944	210	11	163	Eia(s)	48.9899242	-117.6022769	Designated Forest Land
SA11-7C	2,775	20	40	169	Eia(s)	48.9938194	-117.6020076	Designated Forest Land
SA11-8C/1P	2,143	39	16	7	Qgd	48.9952505	-117.5967094	Land
SA11-9C	3,036	87	31	8	CDmm	48.9802697	-117.6058805	Land
SA12-1C	2,461	182	26	200	CDmm	48.9996630	-117.5799598	Designated Forest Land
SA12-2C	2,233	30	10	35	Qgd	48.9985955	-117.5685284	Designated Forest Land
SA12-3C/1P	2,170	100	5	172	Qgd	48.9974362	-117.5643422	Designated Forest Land
SA12-4C	2,611	290	21	107	Qgd	48.9939112	-117.5551675	Designated Forest Land
SA12-6C	2,184	96	17	34	Qgd	48.9881129	-117.5712024	Designated Forest Land
SA12-7C	2,328	200	3	200	CDmm	48.9954727	-117.5699786	Designated Forest Land
SA12-8C	2,237	220	13	35	Qgd	48.9991934	-117.5582422	Designated Forest Land
SA12-9C	2,775	331	17	106	Qgd	48.9992843	-117.5461825	Designated Forest Land
SA13-1C	2,136	75	20	200	Eia(s)	48.9657430	-117.6008327	Designated Forest Land
SA13-2C	2,139	155	4	170	Eia(s)	48.9708674	-117.5996403	Designated Forest Land
SA13-3C	2,127	40	33	89	Qgd	48.9836651	-117.5762366	Designated Forest Land
SA13-4C	2,242	0	2	98	Qgd	48.9827625	-117.5598095	Designated Forest Land
SA13-5C	2,104	300	14	6	Qgd	48.9959493	-117.5835220	Designated Forest Land

Table 1 - Sample Locations and Characteristics

Sample ID	Sample Elevation (feet)	Aspect (Degrees from North)	Percent Slope	Soil Map ID[1]	Geology Map Symbol[2]	Latitude	Longitude	Land use
SA13-6C/1P	2,144	0	2	36	Qgd	48.9828947	-117.5839489	Designated Forest Land
SA13-7C	2,017	270	5	181	Qgd	48.9886177	-117.5818849	Designated Forest Land
SA13-8C	2,484	72	10	80	Qgd	48.9769247	-117.5460082	Designated Forest Land

Notes:

1 See Figures 1 and 2 and Appendix B for Soil Descriptions

2 See Figures 3 and 4

Table 2 - Sample Containers, Preservation, and Holding Times

Sample Type	Sample Preservation Technique	Maximum Holding Time
Total solids[1]	Cool, <6°C	14 days
Total organic carbon[1]	Cool, <6°C Freeze	14 days 6 months
Metals (except mercury)[1]	Cool, <6°C	6 months
Mercury[1]	Cool, <6°C	28 days
Soil pH (Hydrogen ion) [1]	-	14 days

Notes:

[1] Soil sample for chemical analysis will be collected in one 8 ounce (or larger) wide mouth glass jar. Unused sample will be archived by the laboratory.

Table 3 - Recommended Methods of Sample Preparation and Analysis, Practical Quantitation Limits (PQL), and Method Detection Limits (MDL)

Parameter	Prep Method	Analysis Method	Recommended Practical Quantitation Limits[1]	Method Detection Limits
CONVENTIONALS:				
Total Solids in %	---	SM 2540B	0.1% (wet weight)	
Total Organic Carbon in %	---	Plumb, 1981	0.01	0.005
METALS			**mg/kg (dry weight)**	**mg/kg (dry weight)**
Aluminum	EPA 3050B	EPA 6010B	5	2.5
Antimony	EPA 3050B	EPA 6020	0.2	0.01
Arsenic	EPA 3050B	EPA 6020	0.5	0.025
Barium	EPA 3050B	EPA 6020	0.5	0.025
Beryllium	EPA 3050B	EPA 6020	0.2	0.01
Cadmium	EPA 3050B	EPA 6020	0.1	0.005
Calcium	EPA 3050B	EPA 6010B	5	2.5
Chromium	EPA 3050B	EPA 6020	0.5	0.025
Cobalt	EPA 3050B	EPA 6020	0.2	0.01
Copper	EPA 3050B	EPA 6020	0.5	0.025
Iron	EPA 3050B	EPA 6010B	5	2.5
Lead	EPA 3050B	EPA 6020	0.1	0.005
Magnesium	EPA 3050B	EPA 6010B	5.0	2.5
Manganese	EPA 3050B	EPA 6020	0.5	0.025
Mercury	EPA 7471A	EPA 7471A	0.01	0.002
Nickel	EPA 3050B	EPA 6020	0.5	0.025
Potassium	EPA 3050B	EPA 6010B	50	25
Selenium	EPA 3050B	EPA 6020	0.5	0.025
Silver	EPA 3050B	EPA 6020	0.2	0.01
Sodium	EPA 3050B	EPA 6010B	50	25
Thallium	EPA 3050B	EPA 6020	0.2	0.01
Vanadium	EPA 3050B	EPA 6020	0.2	0.01
Zinc	EPA 3050B	EPA 6020	4.0	0.2

Notes:

1. Recommended practical quantitation limits and method detection limits are taken from Analytical Resources Inc (ARI).

Table 4 - Quality Control Procedures for Metals Analysis

Quality Control Procedure	Frequency	Control Limit	Corrective Action
Instrument Quality Assurance/Quality Control			
Initial Calibration	Daily	Correlation coefficient ≥0.995	Laboratory to optimize and recalibrate the instrument and reanalyze any affected samples
Initial Calibration Verification	Immediately after initial calibration	90 - 110 % recovery for ICP-MS and ICP-OES 85 - 115 % for mercury	Laboratory to resolve discrepancy prior to sample analysis
Continuing Calibration Verification	After every 10 samples or every 2 hours, whichever is more frequent, and after the last sample	90 - 110 % recovery for ICP-MS and ICP-OES 85 - 115 % for mercury	Laboratory to recalibrate and reanalyze affected samples
Initial and Continuing Calibration Blanks	Immediately after initial calibration, then 10 percent of samples or every 2 hours, whichever is more frequent, and after the last sample	Analyte concentration < PQL	Laboratory to recalibrate and reanalyze affected samples
ICP Interelement Interference Check Samples	At the beginning and end of each analytical sequence or twice per 8 hour shift, whichever is more frequent	80 - 120 percent of the true value	Laboratory to correct problem, recalibrate, and reanalyze affected samples
Method Quality Assurance/Quality Control			
Holding Times	Not applicable	See Table 2	Qualify data or collect fresh samples
Detection Limits	Not applicable	See Table 3	Laboratory must initiate corrective actions and contact the QA/QC coordinator and/or the project manager immediately
Method Blanks	With every sample batch or every 20 samples, whichever is more frequent	Analyte concentration ≤ PQL	Laboratory to redigest and reanalyze samples with analyte concentrations < 10 times the highest method blank
Analytical (Laboratory) Replicates and Matrix Spike Duplicates	One duplicate analysis with every sample batch or every 20 samples, whichever is more frequent	RPD ≤ 35 % applied when the analyte concentration is > 5x PQL	Laboratory to redigest and reanalyze samples if analytical problems suspected, or to qualify the data if sample homogeneity problems suspected and the project manager consulted

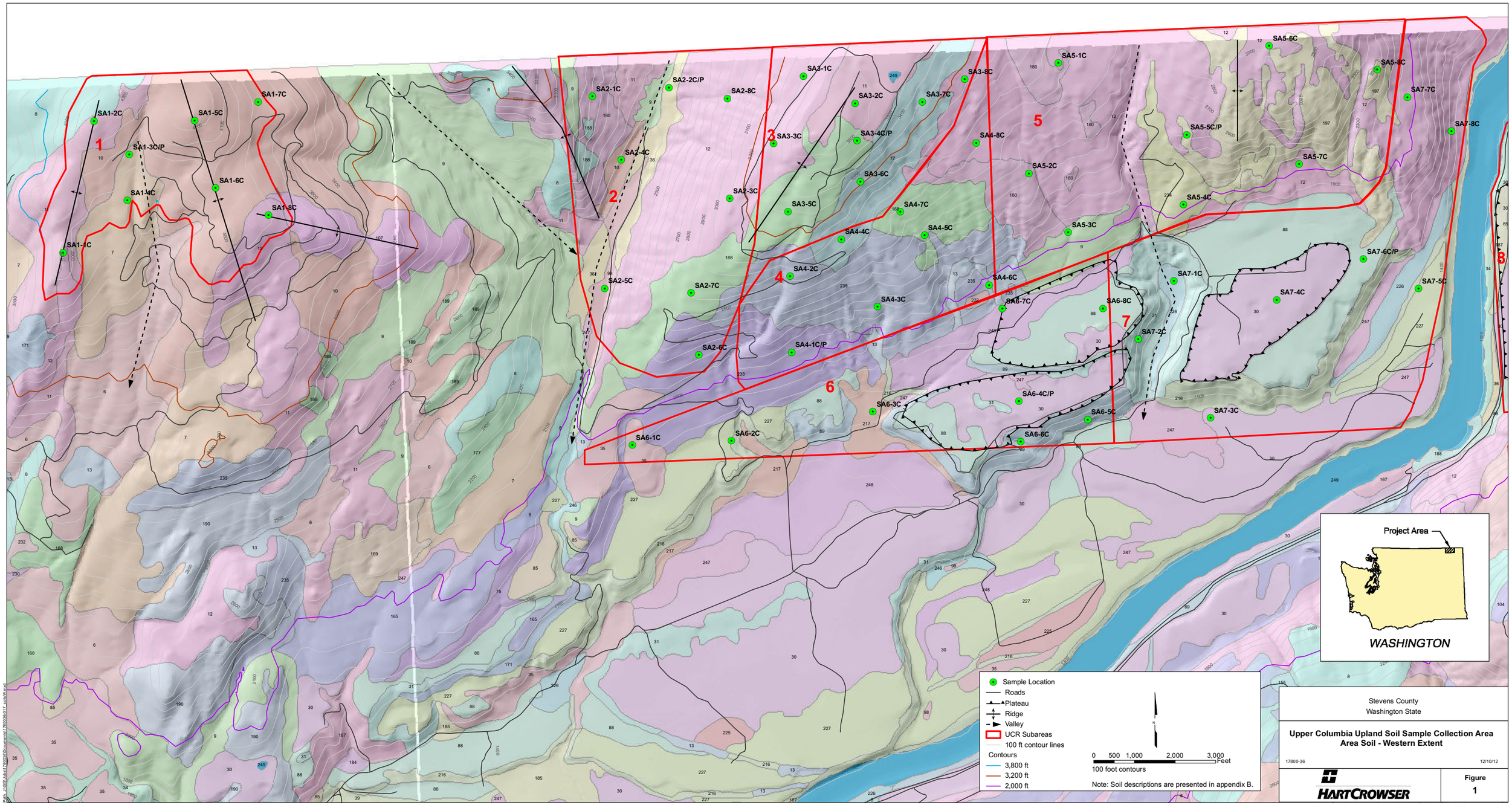
Table 4 - Quality Control Procedures for Metals Analysis (Continued)

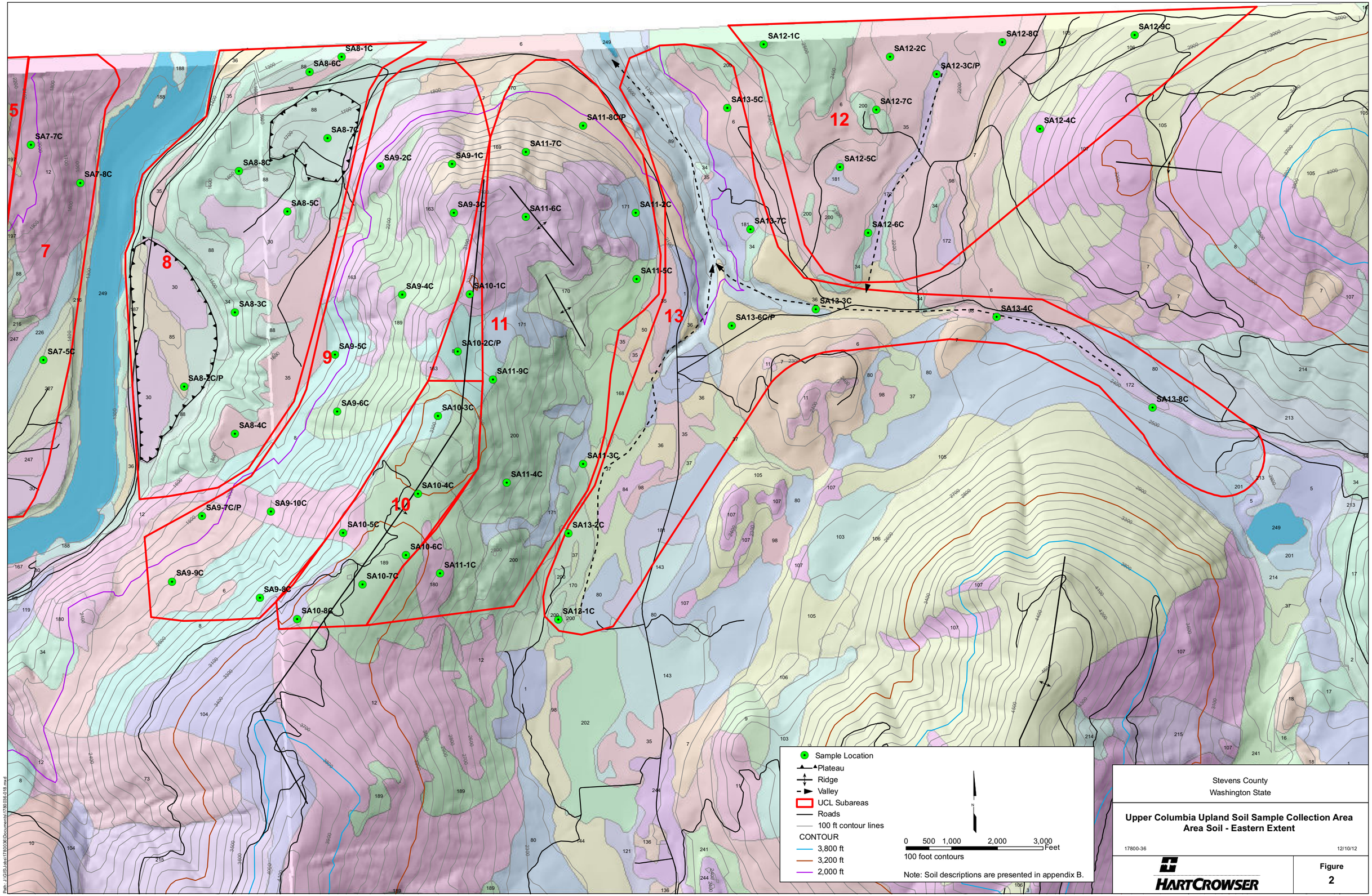
Quality Control Procedure	Frequency	Control Limit	Corrective Action
Matrix Spikes	With every sample batch or every 20 samples, whichever is more frequent	75 - 125 % recovery (ICP-MS) applied when the sample concentration is < 4 times the spiked concentration for a particular analyte 80 - 120 % (mercury)	Laboratory may be able to correct or minimize problem; or qualify and accept data
Laboratory Control Samples	Overall frequency of 5 percent of field samples	80 - 120 % recovery	Laboratory to correct problem to verify the analysis can be performed in a clean matrix with acceptable precision and recovery; then reanalyze affected samples
Field Quality Assurance/Quality Control			
Field Replicates	10 percent of field samples	RPD $\leq$ 50 % applied when the analyte concentration is > 5x PQL	Laboratory to redigest and reanalyze samples if analytical problems suspected, or to qualify the data if sample homogeneity problems suspected and the project manager consulted

Notes:
ICP-MS - inductively coupled plasma/mass spectrometry
ICP-OES – inductively coupled plasma/optical emission spectrometry
PQL - practical quantitation limit
RPD - relative percent difference

Table 5 - Quality Control Procedures for Conventionals Analysis

	Suggested Control Limits						
Analyte	**Initial Calibration**	**Continuing Calibration**	**Calibration Blanks**	**Laboratory Control Samples**	**Matrix Spikes**	**Laboratory Replicates**	**Method Blank**
Total organic carbon	Correlation coefficient ≥0.995	90–110 % recovery	Analyte concentration ≤ PQL	80–120 % recovery	75–125 % recovery	20 % RSD	Analyte concentration ≤ PQL
Total solids	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	20 % RSD	Analyte concentration ≤ PQL


SA1-1C
SA1-2C
SA1-3C/P
SA1-4C
SA1-5C
SA1-6C
SA1-7C
SA1-8C
SA2-1C
SA2-2C/P
SA2-3C
SA2-4C
SA2-5C
SA2-6C
SA2-7C
SA2-8C
SA3-1C
SA3-2C
SA3-3C
SA3-4C/P
SA3-5C
SA3-6C
SA3-7C
SA3-8C
SA4-1C/P
SA4-2C
SA4-3C
SA4-4C
SA4-5C
SA4-6C
SA4-7C
SA4-8C
SA5-1C
SA5-2C
SA5-3C
SA5-4C
SA5-5C/P
SA5-6C
SA5-7C
SA5-8C
SA6-1C
SA6-2C
SA6-3C
SA6-4C/P
SA6-5C
SA6-6C
SA6-7C
SA6-8C
SA7-1C
SA7-2C
SA7-3C
SA7-4C
SA7-5C
SA7-6C/P
SA7-7C
SA7-8C
1
2
3
4
5
6
7
Project Area
WASHINGTON
Sample Location
Roads
Plateau
Ridge
Valley
UCR Subareas
100 ft contour lines
Contours
3,800 ft
3,200 ft
2,000 ft
0 500 1,000 2,000 3,000 Feet
100 foot contours
Note: Soil descriptions are presented in appendix B.
Stevens County
Washington State
Upper Columbia Upland Soil Sample Collection Area
Area Soil - Western Extent
17800-36
12/10/12
HARTCROWSER
Figure
1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SA11-7C
SA11-8C/P
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SA12-3C/P
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SA13-4C
SA13-6C/P
SA9-4C
SA8-3C
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SA10-5C
SA13-2C
SA10-6C
SA11-1C
SA9-9C
SA10-7C
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SA10-8C
SA13-1C
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12
13
Sample Location
Plateau
Ridge
Valley
UCL Subareas
Roads
100 ft contour lines
CONTOUR
3,800 ft
3,200 ft
2,000 ft
0 500 1,000 2,000 3,000 Feet
100 foot contours
Note: Soil descriptions are presented in appendix B.
Stevens County
Washington State
Upper Columbia Upland Soil Sample Collection Area
Area Soil - Eastern Extent
17800-36
12/10/12
HARTCROWSER
Figure
2
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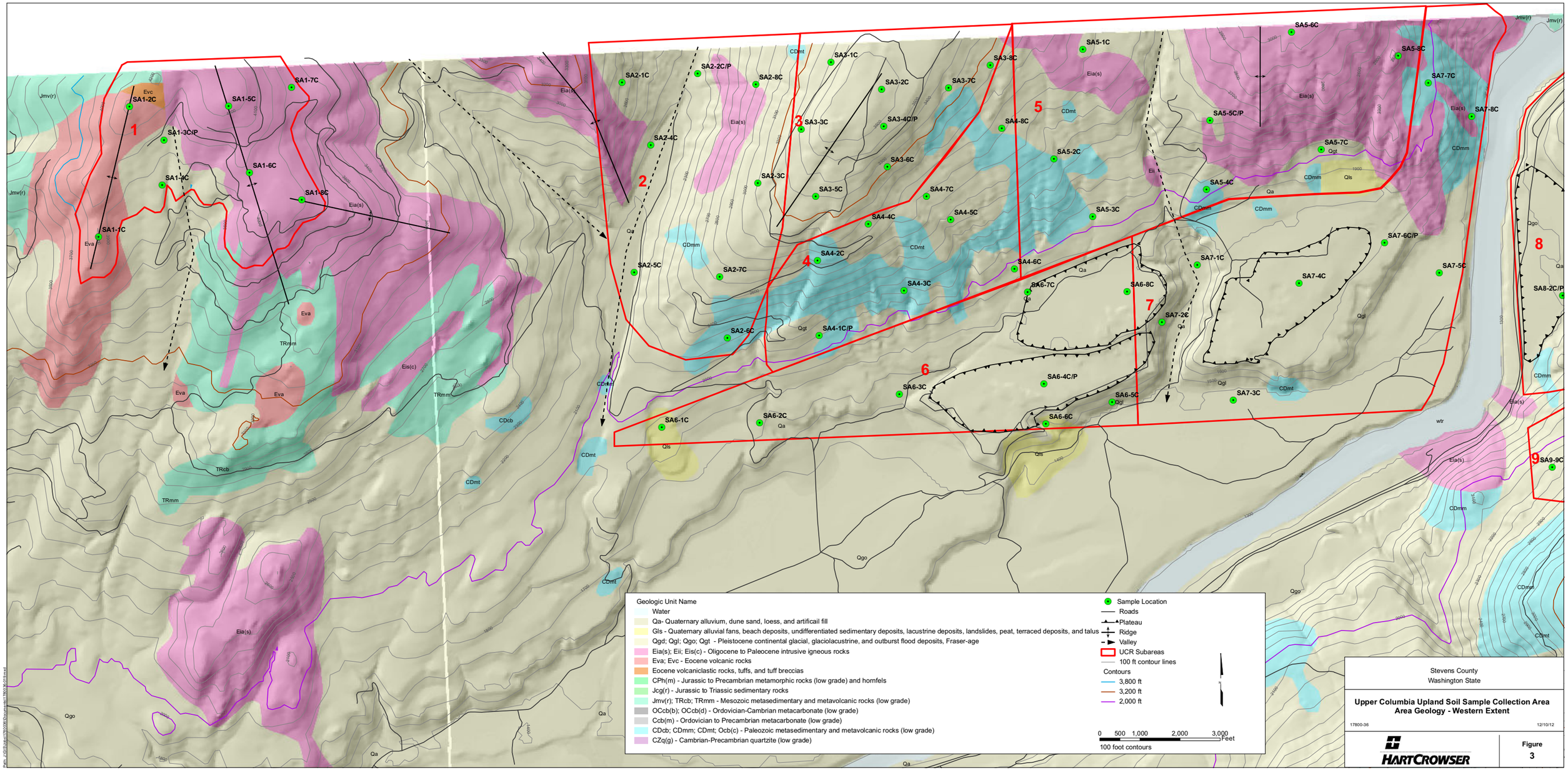


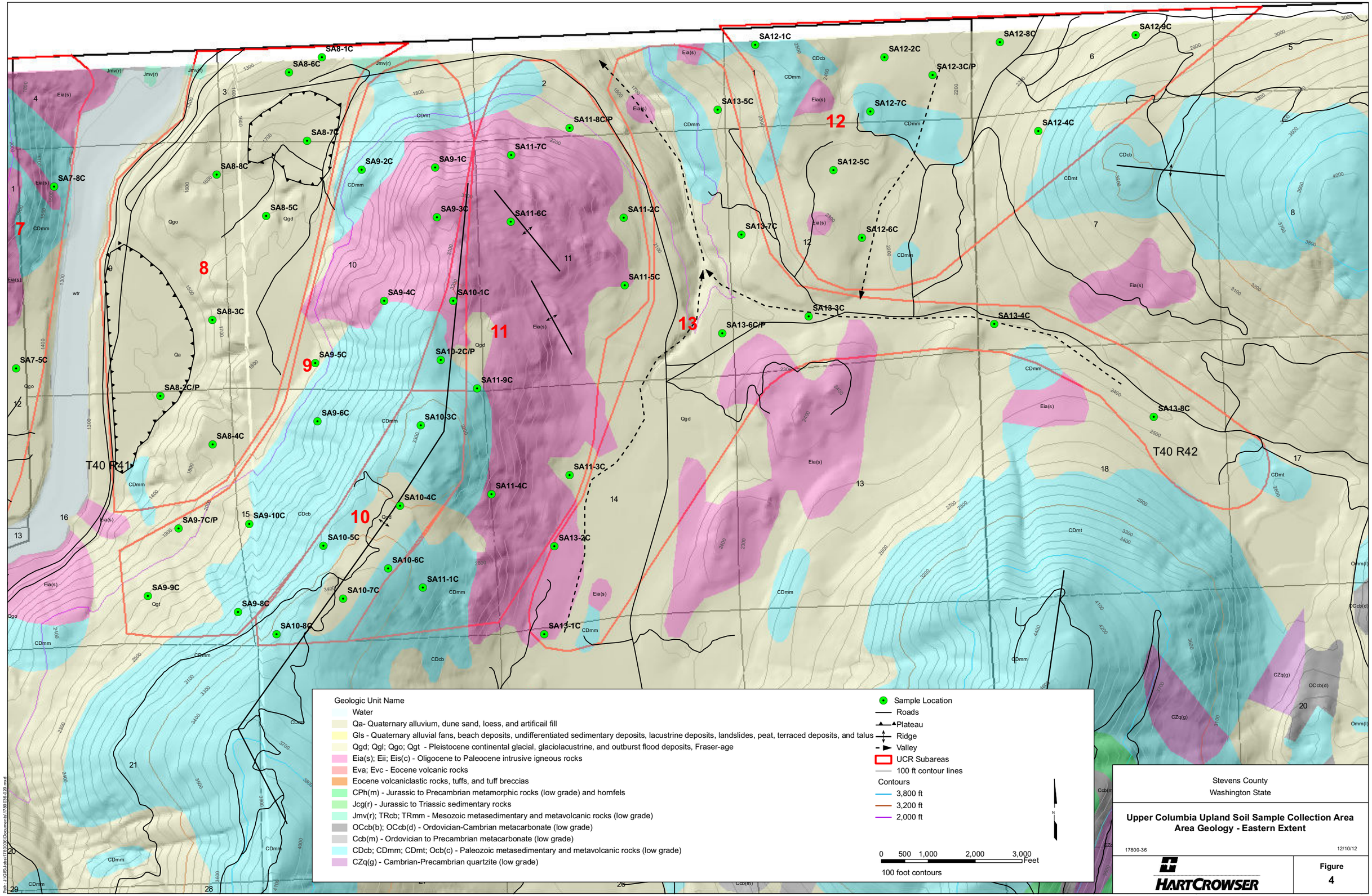
Stevens County
Washington State

Upper Columbia Upland Soil Sample Collection Area
Area Geology - Western Extent

17800-36 12/10/12

HARTCROWSER

Figure
3


SA8-1C
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SA8-4C
SA9-2C
SA9-1C
SA11-7C
SA11-8C/P
SA9-3C
SA11-6C
SA11-2C
SA9-4C
SA10-1C
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SA10-2C/P
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SA9-8C
SA10-8C
SA13-1C
SA12-1C
SA12-2C
SA12-3C/P
SA12-8C
SA12-9C
SA13-5C
SA12-7C
SA12-4C
SA12-5C
SA13-7C
SA12-6C
SA13-3C
SA13-4C
SA13-6C/P
SA13-8C
T40 R41
T40 R42
Qgo
Qa
Qgt
Qgd
wtr
Eia(s)
CDmm
CDmt
CDcb
Jmv(r)
Omm(l)
OCcb(d)
CZq(g)
Ccb(m)
Geologic Unit Name
Water
Qa- Quaternary alluvium, dune sand, loess, and artificail fill
Gls - Quaternary alluvial fans, beach deposits, undifferentiated sedimentary deposits, lacustrine deposits, landslides, peat, terraced deposits, and talus
Qgd; Qgl; Qgo; Qgt - Pleistocene continental glacial, glaciolacustrine, and outburst flood deposits, Fraser-age
Eia(s); Eii; Eis(c) - Oligocene to Paleocene intrusive igneous rocks
Eva; Evc - Eocene volcanic rocks
Eocene volcaniclastic rocks, tuffs, and tuff breccias
CPh(m) - Jurassic to Precambrian metamorphic rocks (low grade) and hornfels
Jcg(r) - Jurassic to Triassic sedimentary rocks
Jmv(r); TRcb; TRmm - Mesozoic metasedimentary and metavolcanic rocks (low grade)
OCcb(b); OCcb(d) - Ordovician-Cambrian metacarbonate (low grade)
Ccb(m) - Ordovician to Precambrian metacarbonate (low grade)
CDcb; CDmm; CDmt; Ocb(c) - Paleozoic metasedimentary and metavolcanic rocks (low grade)
CZq(g) - Cambrian-Precambrian quartzite (low grade)
Sample Location
Roads
Plateau
Ridge
Valley
UCR Subareas
100 ft contour lines
Contours
3,800 ft
3,200 ft
2,000 ft
N
0 500 1,000 2,000 3,000 Feet
100 foot contours
Stevens County
Washington State
Upper Columbia Upland Soil Sample Collection Area
Area Geology - Eastern Extent
17800-36
12/10/12
HARTCROWSER
Figure
4
Path: J:\GIS\Jobs\17800\36\Documents\17800364209.mxd

APPENDIX A
FIELD EQUIPMENT SUPPLY LIST

Field Equipment/Supplies Checklist

Item	Need	Quantity	Have	Loaded in Vehicle
Forms				
SAP/QAPP				
Health and Safety Plan				
Surface Soil Sample Collection Forms				
Field Notebook				
Maps / Coordinates				
HC Chain of Custody				
Cooler Custody Seals, Address labels, FedEx				
Sample Labels				
Packing Materials				
Large Trash Bags				
Large Ziploc Bags (1 gallon / 2 gallon)				
Medium Ziploc Bags (quart)				
Ice / Ice bags				
Scissors				
Clear tape/ strapping tape/ duct tape				
Coolers				
Sampling Containers				
8-oz jars				
Large plastic bags/ buckets with lids				
Sampling Equipment				
Large Bowls (Stainless Steel)				
Large Stainless Steel Spoons				
No. 10 Sieve				
Trowels / Bulb planter				
Disposable aluminum trays				
Stakes and flags				
Plastic sheeting				
Decon Equipment				
Potable water				
Lab Grade DI water				
Liquinox				
Sprayers for DI water and Liquinox				
Buckets & Lids				
Paper Towels				
Aluminum foil				
Brushes (big and small)				
Recording/Miscellaneous Equipment				
Camera				
GPS				
Compass				
Field Phone				
Grass Clippers / Pruners				
Shovel/Spade				
Hand Auger				
75' Tape Measure / small ruler				
PPE				
Raingear				
Field gear, including boots, coat				
Nitrile Gloves				
Heavy gloves / leather gloves				
First Aid Kit				
Miscellaneous				
Clipboards				
Sharpies (big and small), pencils, pens				
Tools (calculator, spare batteries, chargers)				

APPENDIX B
ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Acreage and Proportionate Extent of the Soils

Stevens County, Washington

Map unit: 1 - Ahren loam, 2 to 20 percent slopes

Component: Ahren (75%)

The Ahren component makes up 75 percent of the map unit. Slopes are 2 to 20 percent. This component is on hills. The parent material consists of volcanic ash and loess over calcareous glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 10 percent.

Map unit: 2 - Ahren loam, 20 to 40 percent slopes

Component: Ahren (75%)

The Ahren component makes up 75 percent of the map unit. Slopes are 20 to 40 percent. This component is on hills. The parent material consists of volcanic ash and loess over calcareous glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 10 percent.

Map unit: 3 - Ahren loam, 40 to 65 percent slopes

Component: Ahren (75%)

The Ahren component makes up 75 percent of the map unit. Slopes are 40 to 65 percent. This component is on hills. The parent material consists of volcanic ash and loess over calcareous glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 10 percent.

Acreage and Proportionate Extent of the Soils

Stevens County, Washington

Map unit: 4 - Ahren-Rock outcrop complex, 40 to 65 percent slopes

Component: Ahren (60%)

The Ahren component makes up 60 percent of the map unit. Slopes are 40 to 65 percent. This component is on hills. The parent material consists of volcanic ash and loess over calcareous glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 10 percent.

Component: Rock outcrop (25%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 5 - Aits loam, 0 to 15 percent slopes

Component: Aits (80%)

The Aits component makes up 80 percent of the map unit. Slopes are 0 to 15 percent. This component is on hills. The parent material consists of volcanic ash and loess over calcareous glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Map unit: 6 - Aits loam, 15 to 25 percent slopes

Component: Aits (80%)

The Aits component makes up 80 percent of the map unit. Slopes are 15 to 25 percent. This component is on hills. The parent material consists of volcanic ash and loess over calcareous glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

Acreage and Proportionate Extent of the Soils

Stevens County, Washington

Map unit: 7 - Aits loam, 25 to 40 percent slopes

Component: Aits (80%)

The Aits component makes up 80 percent of the map unit. Slopes are 25 to 40 percent. This component is on hills. The parent material consists of volcanic ash and loess over calcareous glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.

Map unit: 8 - Aits loam, 40 to 65 percent slopes

Component: Aits (80%)

The Aits component makes up 80 percent of the map unit. Slopes are 40 to 65 percent. This component is on hills. The parent material consists of volcanic ash and loess over calcareous glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 9 - Aits stony loam, 0 to 40 percent slopes

Component: Aits (80%)

The Aits component makes up 80 percent of the map unit. Slopes are 0 to 40 percent. This component is on hills. The parent material consists of volcanic ash and loess over calcareous glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

Map unit: 10 - Aits stony loam, 40 to 65 percent slopes

Component: Aits (80%)

The Aits component makes up 80 percent of the map unit. Slopes are 40 to 65 percent. This component is on hills. The parent material consists of volcanic ash and loess over calcareous glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Acreage and Proportionate Extent of the Soils

Stevens County, Washington

Map unit: 11 - Aits-Rock outcrop complex, 0 to 40 percent slopes

Component: Aits (70%)

The Aits component makes up 70 percent of the map unit. Slopes are 0 to 40 percent. This component is on hills. The parent material consists of volcanic ash and loess over calcareous glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

Component: Rock outcrop (20%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 12 - Aits-Rock outcrop complex, 40 to 65 percent slopes

Component: Aits (70%)

The Aits component makes up 70 percent of the map unit. Slopes are 40 to 65 percent. This component is on hills. The parent material consists of volcanic ash and loess over calcareous glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Component: Rock outcrop (20%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 13 - Aquolls, sloping

Component: Aquolls (85%)

The Aquolls component makes up 85 percent of the map unit. Slopes are 5 to 40 percent. This component is on drainageways on hills. The parent material consists of alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 30 inches during February, March, April, May. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 6w. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent.

Acreage and Proportionate Extent of the Soils

Stevens County, Washington

Map unit: 14 - Belzar silt loam, 5 to 25 percent slopes

Component: Belzar (75%)

The Belzar component makes up 75 percent of the map unit. Slopes are 5 to 25 percent. This component is on hills. The parent material consists of volcanic ash and loess over residuum and colluvium derived from calcareous limestone and shale. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 8 percent.

Map unit: 15 - Belzar silt loam, 25 to 40 percent slopes

Component: Belzar (75%)

The Belzar component makes up 75 percent of the map unit. Slopes are 25 to 40 percent. This component is on hills. The parent material consists of volcanic ash and loess over residuum and colluvium derived from calcareous limestone and shale. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 8 percent.

Map unit: 16 - Belzar silt loam, 40 to 65 percent slopes

Component: Belzar (75%)

The Belzar component makes up 75 percent of the map unit. Slopes are 40 to 65 percent. This component is on hills. The parent material consists of volcanic ash and loess over residuum and colluvium derived from calcareous limestone and shale. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 8 percent.

Map unit: 17 - Belzar-Rock outcrop complex, 5 to 40 percent slopes

Component: Belzar (65%)

The Belzar component makes up 65 percent of the map unit. Slopes are 5 to 40 percent. This component is on hills. The parent material consists of volcanic ash and loess over residuum and colluvium derived from calcareous limestone and shale. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 8 percent.

Component: Rock outcrop (20%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 18 - Belzar-Rock outcrop complex, 40 to 65 percent slopes

Component: Belzar (65%)

The Belzar component makes up 65 percent of the map unit. Slopes are 40 to 65 percent. This component is on hills. The parent material consists of volcanic ash and loess over residuum and colluvium derived from calcareous limestone and shale. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 8 percent.

Component: Rock outcrop (20%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 19 - Bernhill very stony loam, 0 to 40 percent slopes

Component: Bernhill (85%)

The Bernhill component makes up 85 percent of the map unit. Slopes are 0 to 40 percent. This component is on hills. The parent material consists of volcanic ash and loess over glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

Acreage and Proportionate Extent of the Soils

Stevens County, Washington

Map unit: 20 - Bernhill very stony loam, 40 to 65 percent slopes

Component: Bernhill (80%)

The Bernhill component makes up 80 percent of the map unit. Slopes are 40 to 65 percent. This component is on hills. The parent material consists of volcanic ash and loess over glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 21 - Bernhill silt loam, 0 to 15 percent slopes

Component: Bernhill (85%)

The Bernhill component makes up 85 percent of the map unit. Slopes are 0 to 15 percent. This component is on hills. The parent material consists of volcanic ash and loess over glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 3e. Irrigated land capability classification is 4e. This soil does not meet hydric criteria.

Map unit: 22 - Bernhill silt loam, 15 to 25 percent slopes

Component: Bernhill (85%)

The Bernhill component makes up 85 percent of the map unit. Slopes are 15 to 25 percent. This component is on hills. The parent material consists of volcanic ash and loess over glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 4e. Irrigated land capability classification is 6e. This soil does not meet hydric criteria.

Map unit: 23 - Bernhill silt loam, 25 to 40 percent slopes

Component: Bernhill (80%)

The Bernhill component makes up 80 percent of the map unit. Slopes are 25 to 40 percent. This component is on hills. The parent material consists of volcanic ash and loess over glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.

Acreage and Proportionate Extent of the Soils

Stevens County, Washington

Map unit: 24 - Bernhill silt loam, 40 to 65 percent slopes

Component: Bernhill (80%)

The Bernhill component makes up 80 percent of the map unit. Slopes are 40 to 65 percent. This component is on hills. The parent material consists of volcanic ash and loess over glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 25 - Bernhill-Rock outcrop complex, 0 to 25 percent slopes

Component: Bernhill (70%)

The Bernhill component makes up 70 percent of the map unit. Slopes are 0 to 25 percent. This component is on hills. The parent material consists of volcanic ash and loess over glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

Component: Rock outcrop (20%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 26 - Bernhill-Rock outcrop complex, 25 to 65 percent slopes

Component: Bernhill (70%)

The Bernhill component makes up 70 percent of the map unit. Slopes are 25 to 65 percent. This component is on hills. The parent material consists of volcanic ash and loess over glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Component: Rock outcrop (20%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Acreage and Proportionate Extent of the Soils

Stevens County, Washington

Map unit: 27 - Bestrom silt loam, 0 to 15 percent slopes

Component: Bestrom (85%)

The Bestrom component makes up 85 percent of the map unit. Slopes are 0 to 15 percent. This component is on hills. The parent material consists of volcanic ash and loess over glacial till. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Map unit: 28 - Bestrom silt loam, 15 to 25 percent slopes

Component: Bestrom (85%)

The Bestrom component makes up 85 percent of the map unit. Slopes are 15 to 25 percent. This component is on hills. The parent material consists of volcanic ash and loess over glacial till. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

Map unit: 29 - Bestrom silt loam, 25 to 40 percent slopes

Component: Bestrom (80%)

The Bestrom component makes up 80 percent of the map unit. Slopes are 25 to 40 percent. This component is on hills. The parent material consists of volcanic ash and loess over glacial till. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.

Map unit: 30 - Bisbee loamy fine sand, 0 to 15 percent slopes

Component: Bisbee (85%)

The Bisbee component makes up 85 percent of the map unit. Slopes are 0 to 15 percent. This component is on terraces. The parent material consists of wind worked sandy outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 3e. Irrigated land capability classification is 4e. This soil does not meet hydric criteria.

Map unit: 31 - Bisbee loamy fine sand, 25 to 45 percent slopes

Component: Bisbee (80%)

The Bisbee component makes up 80 percent of the map unit. Slopes are 25 to 45 percent. This component is on terraces. The parent material consists of wind worked sandy outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.

Map unit: 32 - Bong sandy loam, 0 to 15 percent slopes

Component: Bong (85%)

The Bong component makes up 85 percent of the map unit. Slopes are 0 to 15 percent. This component is on terraces. The parent material consists of mixed sandy glacial outwash with a component of loess and volcanic ash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 3e. Irrigated land capability classification is 4e. This soil does not meet hydric criteria.

Map unit: 33 - Bong sandy loam, 15 to 25 percent slopes

Component: Bong (85%)

The Bong component makes up 85 percent of the map unit. Slopes are 15 to 25 percent. This component is on terraces. The parent material consists of mixed sandy glacial outwash with a component of loess and volcanic ash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 4e. Irrigated land capability classification is 6e. This soil does not meet hydric criteria.

Map unit: 34 - Bonner gravelly sandy loam, 30 to 65 percent slopes

Component: Bonner (80%)

The Bonner component makes up 80 percent of the map unit. Slopes are 30 to 65 percent. This component is on escarpments. The parent material consists of volcanic ash and loess over glacial outwash. Depth to a root restrictive layer, strongly contrasting textural stratification, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 35 - Bonner silt loam, 0 to 10 percent slopes

Component: Bonner (85%)

The Bonner component makes up 85 percent of the map unit. Slopes are 0 to 10 percent. This component is on terraces. The parent material consists of volcanic ash and loess over glacial outwash. Depth to a root restrictive layer, strongly contrasting textural stratification, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 3e. Irrigated land capability classification is 3e. This soil does not meet hydric criteria.

Map unit: 36 - Bonner cobbly silt loam, 0 to 10 percent slopes

Component: Bonner (85%)

The Bonner component makes up 85 percent of the map unit. Slopes are 0 to 10 percent. This component is on terraces. The parent material consists of volcanic ash and loess over glacial outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 3s. This soil does not meet hydric criteria.

Map unit: 37 - Bossburg muck

Component: Bossburg (85%)

The Bossburg component makes up 85 percent of the map unit. Slopes are 0 to 3 percent. This component is on alluvial cones, depressions. The parent material consists of mixed volcanic ash alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very high. Shrink-swell potential is low. This soil is frequently flooded. It is not ponded. A seasonal zone of water saturation is at 6 inches during February, March, April, May. Organic matter content in the surface horizon is about 43 percent. This component is in the R044XY601WA Wet Meadow 16-24 Pz ecological site. Nonirrigated land capability classification is 5w. This soil meets hydric criteria.

Map unit: 38 - Brickel stony loam, 20 to 60 percent slopes

Component: Brickel (80%)

The Brickel component makes up 80 percent of the map unit. Slopes are 20 to 60 percent. This component is on mountains. The parent material consists of residuum, colluvium and glacial till derived from granitic rock mixed with a component of volcanic ash and loess. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 5 percent. This component is in the R043AY704WA Subalpine Park 24+ Pz ecological site. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 39 - Bridgeson silt loam

Component: Bridgeson (80%)

The Bridgeson component makes up 80 percent of the map unit. Slopes are 0 to 3 percent. This component is on flood plains, terraces. The parent material consists of mixed alluvium with igneous material, lacustrine sediments, volcanic ash and loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 12 inches during February, March, April, May, June. Organic matter content in the surface horizon is about 3 percent. This component is in the R044XY601WA Wet Meadow 16-24 Pz ecological site. Nonirrigated land capability classification is 5w. This soil meets hydric criteria.

Map unit: 40 - Bridgeson silt loam, drained

Component: Bridgeson (90%)

The Bridgeson component makes up 90 percent of the map unit. Slopes are 0 to 3 percent. This component is on depressions. The parent material consists of mixed alluvium with igneous material, lacustrine sediments, volcanic ash and loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 36 inches during February, March, April, May, June. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 3w. This soil does not meet hydric criteria.

Map unit: 41 - Buhrig very stony loam, 25 to 40 percent slopes

Component: Buhrig (80%)

The Buhrig component makes up 80 percent of the map unit. Slopes are 25 to 40 percent. This component is on mountains. The parent material consists of volcanic ash and loess over colluvium and residuum derived from metasedimentary and igneous rocks. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 7s. This soil does not meet hydric criteria.

Map unit: 42 - Buhrig very stony loam, 40 to 65 percent slopes

Component: Buhrig (80%)

The Buhrig component makes up 80 percent of the map unit. Slopes are 40 to 65 percent. This component is on mountains. The parent material consists of volcanic ash and loess over colluvium and residuum derived from metasedimentary and igneous rocks. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 43 - Buhrig-Rock outcrop complex, 25 to 40 percent slopes

Component: Buhrig (65%)

The Buhrig component makes up 65 percent of the map unit. Slopes are 25 to 40 percent. This component is on mountains. The parent material consists of volcanic ash and loess over colluvium and residuum derived from metasedimentary and igneous rocks. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 7s. This soil does not meet hydric criteria.

Component: Rock outcrop (20%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 44 - Buhrig-Rock outcrop complex, 40 to 65 percent slopes

Component: Buhrig (65%)

The Buhrig component makes up 65 percent of the map unit. Slopes are 40 to 65 percent. This component is on mountains. The parent material consists of volcanic ash and loess over colluvium and residuum derived from metasedimentary and igneous rocks. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Component: Rock outcrop (20%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 45 - Cedonia silt loam, 0 to 5 percent slopes

Component: Cedonia (85%)

The Cedonia component makes up 85 percent of the map unit. Slopes are 0 to 5 percent. This component is on terraces. The parent material consists of volcanic ash and loess over glacial lake sediments. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 2e. Irrigated land capability classification is 2e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 13 percent.

Acreage and Proportionate Extent of the Soils

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Map unit: 46 - Cedonia silt loam, 5 to 15 percent slopes

Component: Cedonia (85%)

The Cedonia component makes up 85 percent of the map unit. Slopes are 5 to 15 percent. This component is on terraces. The parent material consists of volcanic ash and loess over glacial lake sediments. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 3e. Irrigated land capability classification is 4e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 13 percent.

Map unit: 47 - Cedonia silt loam, 5 to 25 percent slopes, eroded

Component: Cedonia (70%)

The Cedonia component makes up 70 percent of the map unit. Slopes are 5 to 25 percent. This component is on terraces. The parent material consists of volcanic ash and loess over glacial lake sediments. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 13 percent.

Map unit: 48 - Cedonia silt loam, 15 to 30 percent slopes

Component: Cedonia (85%)

The Cedonia component makes up 85 percent of the map unit. Slopes are 15 to 30 percent. This component is on terraces, escarpments. The parent material consists of volcanic ash and loess over glacial lake sediments. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 4e. Irrigated land capability classification is 6e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 13 percent.

Map unit: 49 - Cedonia silt loam, 30 to 65 percent slopes

Component: Cedonia (80%)

The Cedonia component makes up 80 percent of the map unit. Slopes are 30 to 65 percent. This component is on escarpments. The parent material consists of volcanic ash and loess over glacial lake sediments. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 13 percent.

Map unit: 50 - Chamokane gravelly sandy loam

Component: Chamokane (90%)

The Chamokane component makes up 90 percent of the map unit. Slopes are 0 to 3 percent. This component is on depressions. The parent material consists of mixed alluvium. Depth to a root restrictive layer, strongly contrasting textural stratification, is 20 to 40 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 36 inches during January, February, March, April. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 3w. This soil does not meet hydric criteria.

Map unit: 51 - Chamokane loam

Component: Chamokane (90%)

The Chamokane component makes up 90 percent of the map unit. Slopes are 0 to 3 percent. This component is on depressions. The parent material consists of mixed alluvium. Depth to a root restrictive layer, strongly contrasting textural stratification, is 20 to 40 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 36 inches during January, February, March, April. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 3w. This soil does not meet hydric criteria.

Map unit: 52 - Cheney silt loam, 0 to 15 percent slopes

Component: Cheney (85%)

The Cheney component makes up 85 percent of the map unit. Slopes are 0 to 15 percent. This component is on terraces. The parent material consists of volcanic ash and loess over glacial outwash. Depth to a root restrictive layer, strongly contrasting textural stratification, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. This component is in the R009XY102WA Loamy 16-24 Pz ecological site. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Map unit: 53 - Cheney stony silt loam, 5 to 25 percent slopes

Component: Cheney (85%)

The Cheney component makes up 85 percent of the map unit. Slopes are 5 to 25 percent. This component is on terraces. The parent material consists of volcanic ash and loess over glacial outwash. Depth to a root restrictive layer, strongly contrasting textural stratification, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. This component is in the R009XY102WA Loamy 16-24 Pz ecological site. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

Map unit: 54 - Cheney stony silt loam, 25 to 65 percent slopes

Component: Cheney (80%)

The Cheney component makes up 80 percent of the map unit. Slopes are 25 to 65 percent. This component is on escarpments. The parent material consists of volcanic ash and loess over glacial outwash. Depth to a root restrictive layer, strongly contrasting textural stratification, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. This component is in the R009XY102WA Loamy 16-24 Pz ecological site. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 55 - Chewelah fine sandy loam

Component: Chewelah (80%)

The Chewelah component makes up 80 percent of the map unit. Slopes are 0 to 3 percent. This component is on terraces. The parent material consists of mixed alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 36 inches during February, March, April, May. Organic matter content in the surface horizon is about 4 percent. This component is in the R044XY601WA Wet Meadow 16-24 Pz ecological site. Nonirrigated land capability classification is 3w. Irrigated land capability classification is 3w. This soil does not meet hydric criteria.

Map unit: 56 - Clayton fine sandy loam, 0 to 5 percent slopes

Component: Clayton (85%)

The Clayton component makes up 85 percent of the map unit. Slopes are 0 to 5 percent. This component is on terraces. The parent material consists of mixed glaciofluvial deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 2e. Irrigated land capability classification is 2e. This soil does not meet hydric criteria.

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Map unit: 57 - Clayton fine sandy loam, 5 to 15 percent slopes

Component: Clayton (80%)

The Clayton component makes up 80 percent of the map unit. Slopes are 5 to 15 percent. This component is on terraces. The parent material consists of mixed glaciofluvial deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 3e. Irrigated land capability classification is 4e. This soil does not meet hydric criteria.

Map unit: 58 - Colville silt loam

Component: Colville (80%)

The Colville component makes up 80 percent of the map unit. Slopes are 0 to 3 percent. This component is on flood plains, depressions. The parent material consists of mixed alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is very high. Shrink-swell potential is moderate. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 9 inches during February, March, April, May, June. Organic matter content in the surface horizon is about 3 percent. This component is in the R009XY401WA Alkali Bottom 16-24 Pz ecological site. Nonirrigated land capability classification is 5w. Irrigated land capability classification is 4w. This soil meets hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 25 percent. The soil has a slightly sodic horizon within 30 inches of the soil surface.

Map unit: 59 - Colville silt loam, drained

Component: Colville (80%)

The Colville component makes up 80 percent of the map unit. Slopes are 0 to 3 percent. This component is on depressions. The parent material consists of mixed alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is very high. Shrink-swell potential is moderate. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 36 inches during February, March, April, May, June. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 3w. Irrigated land capability classification is 3w. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 25 percent. The soil has a slightly sodic horizon within 30 inches of the soil surface.

Map unit: 60 - Dart loamy coarse sand, 0 to 8 percent slopes

Component: Dart (85%)

The Dart component makes up 85 percent of the map unit. Slopes are 0 to 8 percent. This component is on terraces. The parent material consists of mixed sandy alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 4s. Irrigated land capability classification is 4s. This soil does not meet hydric criteria.

Map unit: 61 - Dearyton silt loam, 0 to 5 percent slopes

Component: Dearyton (85%)

The Dearyton component makes up 85 percent of the map unit. Slopes are 0 to 5 percent. This component is on hills. The parent material consists of volcanic ash and loess over glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during February, March, April. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 3w. This soil does not meet hydric criteria.

Map unit: 62 - Dearyton silt loam, 5 to 15 percent slopes

Component: Dearyton (80%)

The Dearyton component makes up 80 percent of the map unit. Slopes are 5 to 15 percent. This component is on hills. The parent material consists of volcanic ash and loess over glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during February, March, April. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Map unit: 63 - Dehart gravelly sandy loam, 15 to 25 percent slopes

Component: Dehart (85%)

The Dehart component makes up 85 percent of the map unit. Slopes are 15 to 25 percent. This component is on hills. The parent material consists of volcanic ash, loess, glacial till and colluvium derived from metasedimentary rocks. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

Map unit: 64 - Dehart gravelly sandy loam, 25 to 40 percent slopes

Component: Dehart (80%)

The Dehart component makes up 80 percent of the map unit. Slopes are 25 to 40 percent. This component is on hills. The parent material consists of volcanic ash, loess, glacial till and colluvium derived from metasedimentary rocks. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.

Map unit: 65 - Dehart gravelly sandy loam, 40 to 65 percent slopes

Component: Dehart (75%)

The Dehart component makes up 75 percent of the map unit. Slopes are 40 to 65 percent. This component is on hills. The parent material consists of volcanic ash, loess, glacial till and colluvium derived from metasedimentary rocks. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 66 - Dehart cobbly loam, 5 to 20 percent slopes

Component: Dehart (80%)

The Dehart component makes up 80 percent of the map unit. Slopes are 5 to 20 percent. This component is on hills. The parent material consists of volcanic ash, loess, glacial till and colluvium derived from metasedimentary rocks. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 4s. This soil does not meet hydric criteria.

Map unit: 67 - Dehart cobbly loam, 20 to 40 percent slopes

Component: Dehart (80%)

The Dehart component makes up 80 percent of the map unit. Slopes are 20 to 40 percent. This component is on hills. The parent material consists of volcanic ash, loess, glacial till and colluvium derived from metasedimentary rocks. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.

Map unit: 68 - Dehart cobbly loam, 40 to 65 percent slopes

Component: Dehart (80%)

The Dehart component makes up 80 percent of the map unit. Slopes are 40 to 65 percent. This component is on hills. The parent material consists of volcanic ash, loess, glacial till and colluvium derived from metasedimentary rocks. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 69 - Dehart-Rock outcrop complex, 40 to 65 percent slopes

Component: Dehart (65%)

The Dehart component makes up 65 percent of the map unit. Slopes are 40 to 65 percent. This component is on hills. The parent material consists of volcanic ash, loess, glacial till and colluvium derived from metasedimentary rocks. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Component: Rock outcrop (20%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 70 - Donavan loam, 0 to 8 percent slopes

Component: Donavan (85%)

The Donavan component makes up 85 percent of the map unit. Slopes are 0 to 8 percent. This component is on hills. The parent material consists of glacial till mixed with a component of volcanic ash and loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 2e. Irrigated land capability classification is 2e. This soil does not meet hydric criteria.

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Map unit: 71 - Donavan loam, 8 to 25 percent slopes

Component: Donavan (85%)

The Donavan component makes up 85 percent of the map unit. Slopes are 8 to 25 percent. This component is on hills. The parent material consists of glacial till mixed with a component of volcanic ash and loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 4e. Irrigated land capability classification is 6e. This soil does not meet hydric criteria.

Map unit: 72 - Donavan loam, 25 to 40 percent slopes

Component: Donavan (80%)

The Donavan component makes up 80 percent of the map unit. Slopes are 25 to 40 percent. This component is on hills. The parent material consists of glacial till mixed with a component of volcanic ash and loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.

Map unit: 73 - Donavan loam, 40 to 65 percent slopes

Component: Donavan (75%)

The Donavan component makes up 75 percent of the map unit. Slopes are 40 to 65 percent. This component is on hills. The parent material consists of glacial till mixed with a component of volcanic ash and loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 74 - Donavan stony loam, 0 to 30 percent slopes

Component: Donavan (85%)

The Donavan component makes up 85 percent of the map unit. Slopes are 0 to 30 percent. This component is on hills. The parent material consists of glacial till mixed with a component of volcanic ash and loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7s. This soil does not meet hydric criteria.

Acreage and Proportionate Extent of the Soils

Stevens County, Washington

Map unit: 75 - Donavan stony loam, 30 to 65 percent slopes

Component: Donavan (75%)

The Donavan component makes up 75 percent of the map unit. Slopes are 30 to 65 percent. This component is on hills. The parent material consists of glacial till mixed with a component of volcanic ash and loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 76 - Donavan-Rock outcrop complex, 0 to 30 percent slopes

Component: Donavan (65%)

The Donavan component makes up 65 percent of the map unit. Slopes are 0 to 30 percent. This component is on hills. The parent material consists of glacial till mixed with a component of volcanic ash and loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7s. This soil does not meet hydric criteria.

Component: Rock outcrop (20%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 77 - Donavan-Rock outcrop complex, 30 to 65 percent slopes

Component: Donavan (65%)

The Donavan component makes up 65 percent of the map unit. Slopes are 30 to 65 percent. This component is on hills. The parent material consists of glacial till mixed with a component of volcanic ash and loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Component: Rock outcrop (20%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 78 - Dragoon silt loam, 8 to 25 percent slopes

Component: Dragoon (85%)

The Dragoon component makes up 85 percent of the map unit. Slopes are 8 to 25 percent. This component is on hills. The parent material consists of residuum derived from granitic rock mixed with a component of volcanic ash and loess. Depth to a root restrictive layer, bedrock, paralithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

Map unit: 79 - Dragoon silt loam, 25 to 45 percent slopes

Component: Dragoon (80%)

The Dragoon component makes up 80 percent of the map unit. Slopes are 25 to 45 percent. This component is on hills. The parent material consists of residuum derived from granitic rock mixed with a component of volcanic ash and loess. Depth to a root restrictive layer, bedrock, paralithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.

Map unit: 80 - Eloika silt loam, 0 to 15 percent slopes

Component: Eloika (80%)

The Eloika component makes up 80 percent of the map unit. Slopes are 0 to 15 percent. This component is on terraces. The parent material consists of volcanic ash and loess over glacial outwash and glacial till. Depth to a root restrictive layer, strongly contrasting textural stratification, is 40 to 59 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Map unit: 81 - Eloika very stony silt loam, 0 to 25 percent slopes

Component: Eloika (80%)

The Eloika component makes up 80 percent of the map unit. Slopes are 0 to 25 percent. This component is on terraces. The parent material consists of volcanic ash and loess over glacial outwash and glacial till. Depth to a root restrictive layer, strongly contrasting textural stratification, is 40 to 59 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

Map unit: 82 - Eloika very stony silt loam, 25 to 40 percent slopes

Component: Eloika (75%)

The Eloika component makes up 75 percent of the map unit. Slopes are 25 to 40 percent. This component is on escarpments. The parent material consists of volcanic ash and loess over glacial outwash and glacial till. Depth to a root restrictive layer, strongly contrasting textural stratification, is 40 to 59 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.

Map unit: 83 - Garrison loam, 0 to 5 percent slopes

Component: Garrison (85%)

The Garrison component makes up 85 percent of the map unit. Slopes are 0 to 5 percent. This component is on terraces. The parent material consists of glacial outwash mixed with a component of volcanic ash and loess. Depth to a root restrictive layer, strongly contrasting textural stratification, is 20 to 40 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 3s. Irrigated land capability classification is 3s. This soil does not meet hydric criteria.

Map unit: 84 - Garrison loam, 5 to 15 percent slopes

Component: Garrison (85%)

The Garrison component makes up 85 percent of the map unit. Slopes are 5 to 15 percent. This component is on terraces. The parent material consists of glacial outwash mixed with a component of volcanic ash and loess. Depth to a root restrictive layer, strongly contrasting textural stratification, is 20 to 40 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 3e. Irrigated land capability classification is 4e. This soil does not meet hydric criteria.

Map unit: 85 - Garrison gravelly loam, 0 to 5 percent slopes

Component: Garrison (80%)

The Garrison component makes up 80 percent of the map unit. Slopes are 0 to 5 percent. This component is on terraces. The parent material consists of glacial outwash mixed with a component of volcanic ash and loess. Depth to a root restrictive layer, strongly contrasting textural stratification, is 20 to 40 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 3s. Irrigated land capability classification is 3s. This soil does not meet hydric criteria.

Acreage and Proportionate Extent of the Soils

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Map unit: 86 - Green Bluff silt loam, 0 to 5 percent slopes

Component: Green Bluff (80%)

The Green Bluff component makes up 80 percent of the map unit. Slopes are 0 to 5 percent. This component is on plateaus. The parent material consists of glacial till mixed with a component of volcanic ash and loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 2e. This soil does not meet hydric criteria.

Map unit: 87 - Green Bluff silt loam, 5 to 15 percent slopes

Component: Green Bluff (80%)

The Green Bluff component makes up 80 percent of the map unit. Slopes are 5 to 15 percent. This component is on plateaus. The parent material consists of glacial till mixed with a component of volcanic ash and loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Map unit: 88 - Hagen sandy loam, 0 to 15 percent slopes

Component: Hagen (80%)

The Hagen component makes up 80 percent of the map unit. Slopes are 0 to 15 percent. This component is on terraces. The parent material consists of mixed sandy outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 3e. Irrigated land capability classification is 4e. This soil does not meet hydric criteria.

Map unit: 89 - Hagen sandy loam, 15 to 40 percent slopes

Component: Hagen (80%)

The Hagen component makes up 80 percent of the map unit. Slopes are 15 to 40 percent. This component is on terraces, escarpments. The parent material consists of mixed sandy outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

Map unit: 90 - Hardesty silt loam

Component: Hardesty (85%)

The Hardesty component makes up 85 percent of the map unit. Slopes are 0 to 5 percent. This component is on depressions, alluvial fans. The parent material consists of alluvium derived from volcanic ash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 45 inches during January, February, March, April, December. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 2e. Irrigated land capability classification is 2e. This soil does not meet hydric criteria.

Map unit: 91 - Hartill silt loam, 0 to 15 percent slopes

Component: Hartill (80%)

The Hartill component makes up 80 percent of the map unit. Slopes are 0 to 15 percent. This component is on mountains. The parent material consists of volcanic ash over colluvium and residuum derived from shale. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Map unit: 92 - Hartill silt loam, 15 to 25 percent slopes

Component: Hartill (80%)

The Hartill component makes up 80 percent of the map unit. Slopes are 15 to 25 percent. This component is on mountains. The parent material consists of volcanic ash over colluvium and residuum derived from shale. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

Map unit: 93 - Hartill silt loam, 25 to 40 percent slopes

Component: Hartill (75%)

The Hartill component makes up 75 percent of the map unit. Slopes are 25 to 40 percent. This component is on mountains. The parent material consists of volcanic ash over colluvium and residuum derived from shale. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.

Acreage and Proportionate Extent of the Soils

Stevens County, Washington

Map unit: 94 - Hartill silt loam, 40 to 65 percent slopes

Component: Hartill (75%)

The Hartill component makes up 75 percent of the map unit. Slopes are 40 to 65 percent. This component is on mountains. The parent material consists of volcanic ash over colluvium and residuum derived from shale. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 95 - Hesseltine silt loam, 0 to 8 percent slopes

Component: Hesseltine (80%)

The Hesseltine component makes up 80 percent of the map unit. Slopes are 0 to 8 percent. This component is on hills. The parent material consists of volcanic ash, loess and glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 2e. This soil does not meet hydric criteria.

Map unit: 96 - Hesseltine stony silt loam, 0 to 15 percent slopes

Component: Hesseltine (80%)

The Hesseltine component makes up 80 percent of the map unit. Slopes are 0 to 15 percent. This component is on terraces. The parent material consists of volcanic ash, loess and glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

Map unit: 97 - Hesseltine-Rock outcrop complex, 0 to 25 percent slopes

Component: Hesseltine (65%)

The Hesseltine component makes up 65 percent of the map unit. Slopes are 0 to 25 percent. This component is on hills. The parent material consists of volcanic ash, loess and glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

Acreage and Proportionate Extent of the Soils

Stevens County, Washington

Map unit: 97 - Hesseltine-Rock outcrop complex, 0 to 25 percent slopes

Component: Rock outcrop (20%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 98 - Histosols, ponded

Component: Histosols (100%)

The Histosols component makes up 100 percent of the map unit. Slopes are 0 to 2 percent. This component is on depressions. The parent material consists of organic material and volcanic ash alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very high. Shrink-swell potential is low. This soil is not flooded. It is frequently ponded. A seasonal zone of water saturation is at 0 inches during January, February, March, April, May, June, July, August, November, December. Organic matter content in the surface horizon is about 65 percent. Nonirrigated land capability classification is 5w. This soil meets hydric criteria.

Map unit: 99 - Hodgson silt loam, 0 to 3 percent slopes

Component: Hodgson (85%)

The Hodgson component makes up 85 percent of the map unit. Slopes are 0 to 3 percent. This component is on terraces. The parent material consists of volcanic ash and loess over glacial lake sediments. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 30 inches during February, March, April. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 3w. Irrigated land capability classification is 3w. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 13 percent.

Map unit: 100 - Hodgson silt loam, 3 to 15 percent slopes

Component: Hodgson (80%)

The Hodgson component makes up 80 percent of the map unit. Slopes are 3 to 15 percent. This component is on terraces. The parent material consists of volcanic ash and loess over glacial lake sediments. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 30 inches during February, March, April. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 3e. Irrigated land capability classification is 4e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 13 percent.

Acreage and Proportionate Extent of the Soils

Stevens County, Washington

Map unit: 101 - Hodgson silt loam, 15 to 25 percent slopes

Component: Hodgson (80%)

The Hodgson component makes up 80 percent of the map unit. Slopes are 15 to 25 percent. This component is on terraces. The parent material consists of volcanic ash and loess over glacial lake sediments. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 30 inches during February, March, April. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 4e. Irrigated land capability classification is 6e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 13 percent.

Map unit: 102 - Hodgson silt loam, 25 to 40 percent slopes

Component: Hodgson (80%)

The Hodgson component makes up 80 percent of the map unit. Slopes are 25 to 40 percent. This component is on escarpments. The parent material consists of volcanic ash and loess over glacial lake sediments. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 30 inches during February, March, April. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 13 percent.

Map unit: 103 - Huckleberry silt loam, 0 to 15 percent slopes

Component: Huckleberry (80%)

The Huckleberry component makes up 80 percent of the map unit. Slopes are 0 to 15 percent. This component is on mountains. The parent material consists of volcanic ash and loess over colluvium and residuum derived from shale. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.

Map unit: 104 - Huckleberry silt loam, 15 to 25 percent slopes

Component: Huckleberry (80%)

The Huckleberry component makes up 80 percent of the map unit. Slopes are 15 to 25 percent. This component is on mountains. The parent material consists of volcanic ash and loess over colluvium and residuum derived from shale. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.

Map unit: 105 - Huckleberry silt loam, 25 to 40 percent slopes

Component: Huckleberry (80%)

The Huckleberry component makes up 80 percent of the map unit. Slopes are 25 to 40 percent. This component is on mountains. The parent material consists of volcanic ash and loess over colluvium and residuum derived from shale. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.

Map unit: 106 - Huckleberry silt loam, 40 to 65 percent slopes

Component: Huckleberry (80%)

The Huckleberry component makes up 80 percent of the map unit. Slopes are 40 to 65 percent. This component is on mountains. The parent material consists of volcanic ash and loess over colluvium and residuum derived from shale. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 107 - Huckleberry-Rock outcrop complex, 30 to 65 percent slopes

Component: Huckleberry (65%)

The Huckleberry component makes up 65 percent of the map unit. Slopes are 30 to 65 percent. This component is on mountains. The parent material consists of volcanic ash and loess over colluvium and residuum derived from shale. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Component: Rock outcrop (20%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Acreage and Proportionate Extent of the Soils

Stevens County, Washington

Map unit: 108 - Hunters silt loam, 0 to 5 percent slopes

Component: Hunters (85%)

The Hunters component makes up 85 percent of the map unit. Slopes are 0 to 5 percent. This component is on terraces. The parent material consists of volcanic ash and loess mixed with glacial lake sediments. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 2e. Irrigated land capability classification is 2e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 25 percent.

Map unit: 109 - Hunters silt loam, 5 to 15 percent slopes

Component: Hunters (85%)

The Hunters component makes up 85 percent of the map unit. Slopes are 5 to 15 percent. This component is on terraces. The parent material consists of volcanic ash and loess mixed with glacial lake sediments. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 3e. Irrigated land capability classification is 4e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 25 percent.

Map unit: 110 - Inkler silt loam, 0 to 20 percent slopes

Component: Inkler (85%)

The Inkler component makes up 85 percent of the map unit. Slopes are 0 to 20 percent. This component is on hills. The parent material consists of volcanic ash, loess, glacial till, residuum and colluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Map unit: 111 - Inkler gravelly silt loam, 20 to 40 percent slopes

Component: Inkler (85%)

The Inkler component makes up 85 percent of the map unit. Slopes are 20 to 40 percent. This component is on hills. The parent material consists of volcanic ash, loess, glacial till, residuum and colluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.

Map unit: 112 - Inkler gravelly silt loam, 40 to 65 percent slopes

Component: Inkler (80%)

The Inkler component makes up 80 percent of the map unit. Slopes are 40 to 65 percent. This component is on hills. The parent material consists of volcanic ash, loess, glacial till, residuum and colluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 113 - Inkler-Rock outcrop complex, 20 to 40 percent slopes

Component: Inkler (65%)

The Inkler component makes up 65 percent of the map unit. Slopes are 20 to 40 percent. This component is on hills. The parent material consists of volcanic ash, loess, glacial till, residuum and colluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.

Component: Rock outcrop (20%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 114 - Inkler-Rock outcrop complex, 40 to 65 percent slopes

Component: Inkler (65%)

The Inkler component makes up 65 percent of the map unit. Slopes are 40 to 65 percent. This component is on hills. The parent material consists of volcanic ash, loess, glacial till, residuum and colluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Component: Rock outcrop (20%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 115 - Kegel loam

Component: Kegel (80%)

The Kegel component makes up 80 percent of the map unit. Slopes are 0 to 3 percent. This component is on terraces. The parent material consists of mixed alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 18 inches during January, February, March, April, May. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 4w. This soil does not meet hydric criteria.

Map unit: 116 - Kiehl gravelly silt loam, 0 to 20 percent slopes

Component: Kiehl (85%)

The Kiehl component makes up 85 percent of the map unit. Slopes are 0 to 20 percent. This component is on terraces. The parent material consists of volcanic ash, loess and glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Map unit: 117 - Kiehl gravelly silt loam, 20 to 65 percent slopes

Component: Kiehl (80%)

The Kiehl component makes up 80 percent of the map unit. Slopes are 20 to 65 percent. This component is on escarpments. The parent material consists of volcanic ash, loess and glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 118 - Koerling fine sandy loam, 0 to 5 percent slopes

Component: Koerling (85%)

The Koerling component makes up 85 percent of the map unit. Slopes are 0 to 5 percent. This component is on terraces. The parent material consists of volcanic ash and loess mixed into glaciofluvial material over stratified, calcareous glacial lake sediment. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 30 inches during February, March, April. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 3w. Irrigated land capability classification is 3w. This soil does not meet hydric criteria.

Map unit: 119 - Koerling fine sandy loam, 5 to 15 percent slopes

Component: Koerling (85%)

The Koerling component makes up 85 percent of the map unit. Slopes are 5 to 15 percent. This component is on terraces. The parent material consists of volcanic ash and loess mixed into glaciofluvial material over stratified, calcareous glacial lake sediment. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 30 inches during February, March, April. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 3e. Irrigated land capability classification is 4e. This soil does not meet hydric criteria.

Map unit: 120 - Koerling silt loam, 30 to 65 percent slopes

Component: Koerling (80%)

The Koerling component makes up 80 percent of the map unit. Slopes are 30 to 65 percent. This component is on escarpments. The parent material consists of volcanic ash and loess mixed into glaciofluvial material over stratified, calcareous glacial lake sediment. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 30 inches during February, March, April. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 121 - Konner silty clay loam

Component: Konner (80%)

The Konner component makes up 80 percent of the map unit. Slopes are 0 to 3 percent. This component is on depressions. The parent material consists of mixed alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 18 inches during February, March, April, May. Organic matter content in the surface horizon is about 4 percent. This component is in the R044XY601WA Wet Meadow 16-24 Pz ecological site. Nonirrigated land capability classification is 4w. This soil does not meet hydric criteria.

Map unit: 122 - Konner silty clay loam, drained

Component: Konner (80%)

The Konner component makes up 80 percent of the map unit. Slopes are 0 to 3 percent. This component is on depressions. The parent material consists of mixed alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 48 inches during February, March, April, May. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 3w. This soil does not meet hydric criteria.

Acreage and Proportionate Extent of the Soils

Stevens County, Washington

Map unit: 123 - Koseth loam, 15 to 40 percent slopes

Component: Koseth (80%)

The Koseth component makes up 80 percent of the map unit. Slopes are 15 to 40 percent. This component is on hills. The parent material consists of calcareous till mixed with volcanic ash and loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 20 percent.

Map unit: 124 - Koseth loam, 40 to 65 percent slopes

Component: Koseth (75%)

The Koseth component makes up 75 percent of the map unit. Slopes are 40 to 65 percent. This component is on hills. The parent material consists of calcareous till mixed with volcanic ash and loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 20 percent.

Map unit: 125 - Koseth-Rock outcrop complex, 30 to 65 percent slopes

Component: Koseth (65%)

The Koseth component makes up 65 percent of the map unit. Slopes are 30 to 65 percent. This component is on hills. The parent material consists of calcareous till mixed with volcanic ash and loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 20 percent.

Component: Rock outcrop (25%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 126 - Laketon silt loam, 0 to 5 percent slopes

Component: Laketon (85%)

The Laketon component makes up 85 percent of the map unit. Slopes are 0 to 5 percent. This component is on terraces. The parent material consists of volcanic ash and loess over glacial lake sediments. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 27 inches during February, March, April. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 3w. Irrigated land capability classification is 3w. This soil does not meet hydric criteria.

Map unit: 127 - Laketon silt loam, 5 to 15 percent slopes

Component: Laketon (80%)

The Laketon component makes up 80 percent of the map unit. Slopes are 5 to 15 percent. This component is on terraces. The parent material consists of volcanic ash and loess over glacial lake sediments. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 27 inches during February, March, April. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 3e. Irrigated land capability classification is 4e. This soil does not meet hydric criteria.

Map unit: 128 - Leadpoint silt loam, 0 to 25 percent slopes

Component: Leadpoint (80%)

The Leadpoint component makes up 80 percent of the map unit. Slopes are 0 to 25 percent. This component is on hills. The parent material consists of glacial till, colluvium and residuum derived from shale mixed with loess in the upper part. Depth to a root restrictive layer, bedrock, paralithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Map unit: 129 - Leadpoint silt loam, 25 to 40 percent slopes

Component: Leadpoint (80%)

The Leadpoint component makes up 80 percent of the map unit. Slopes are 25 to 40 percent. This component is on hills. The parent material consists of glacial till, colluvium and residuum derived from shale mixed with loess in the upper part. Depth to a root restrictive layer, bedrock, paralithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.

Map unit: 130 - Leadpoint silt loam, 40 to 65 percent slopes

Component: Leadpoint (75%)

The Leadpoint component makes up 75 percent of the map unit. Slopes are 40 to 65 percent. This component is on hills. The parent material consists of glacial till, colluvium and residuum derived from shale mixed with loess in the upper part. Depth to a root restrictive layer, bedrock, paralithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 131 - Leadpoint-Rock outcrop complex, 25 to 40 percent slopes

Component: Leadpoint (65%)

The Leadpoint component makes up 65 percent of the map unit. Slopes are 25 to 40 percent. This component is on hills. The parent material consists of glacial till, colluvium and residuum derived from shale mixed with loess in the upper part. Depth to a root restrictive layer, bedrock, paralithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.

Component: Rock outcrop (20%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 132 - Leadpoint-Rock outcrop complex, 40 to 65 percent slopes

Component: Leadpoint (65%)

The Leadpoint component makes up 65 percent of the map unit. Slopes are 40 to 65 percent. This component is on hills. The parent material consists of glacial till, colluvium and residuum derived from shale mixed with loess in the upper part. Depth to a root restrictive layer, bedrock, paralithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Component: Rock outcrop (20%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 133 - Maki gravelly loam, 25 to 40 percent slopes

Component: Maki (85%)

The Maki component makes up 85 percent of the map unit. Slopes are 25 to 40 percent. This component is on hills. The parent material consists of glacial till, calcareous colluvium and residuum mixed with volcanic ash and loess. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent.

Map unit: 134 - Maki gravelly loam, 40 to 65 percent slopes

Component: Maki (80%)

The Maki component makes up 80 percent of the map unit. Slopes are 40 to 65 percent. This component is on hills. The parent material consists of glacial till, calcareous colluvium and residuum mixed with volcanic ash and loess. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent.

Map unit: 135 - Maki-Rock outcrop complex, 25 to 40 percent slopes

Component: Maki (60%)

The Maki component makes up 60 percent of the map unit. Slopes are 25 to 40 percent. This component is on hills. The parent material consists of glacial till, calcareous colluvium and residuum mixed with volcanic ash and loess. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent.

Component: Rock outcrop (25%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 136 - Maki-Rock outcrop complex, 40 to 65 percent slopes

Component: Maki (60%)

The Maki component makes up 60 percent of the map unit. Slopes are 40 to 65 percent. This component is on hills. The parent material consists of glacial till, calcareous colluvium and residuum mixed with volcanic ash and loess. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent.

Component: Rock outcrop (25%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 137 - Manley silt loam, 0 to 20 percent slopes

Component: Manley (80%)

The Manley component makes up 80 percent of the map unit. Slopes are 0 to 20 percent. This component is on hills. The parent material consists of volcanic ash over glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.

Map unit: 138 - Manley silt loam, 20 to 40 percent slopes

Component: Manley (80%)

The Manley component makes up 80 percent of the map unit. Slopes are 20 to 40 percent. This component is on hills. The parent material consists of volcanic ash over glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.

Map unit: 139 - Manley silt loam, 40 to 65 percent slopes

Component: Manley (75%)

The Manley component makes up 75 percent of the map unit. Slopes are 40 to 65 percent. This component is on hills. The parent material consists of volcanic ash over glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 140 - Manley-Rock outcrop complex, 0 to 40 percent slopes

Component: Manley (70%)

The Manley component makes up 70 percent of the map unit. Slopes are 0 to 40 percent. This component is on hills. The parent material consists of volcanic ash over glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.

Component: Rock outcrop (15%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 141 - Manley-Rock outcrop complex, 40 to 65 percent slopes

Component: Manley (70%)

The Manley component makes up 70 percent of the map unit. Slopes are 40 to 65 percent. This component is on hills. The parent material consists of volcanic ash over glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Component: Rock outcrop (15%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 142 - Marble loamy sand, 5 to 25 percent slopes

Component: Marble (80%)

The Marble component makes up 80 percent of the map unit. Slopes are 5 to 25 percent. This component is on terraces. The parent material consists of wind worked mixed sandy outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 4e. Irrigated land capability classification is 6e. This soil does not meet hydric criteria.

Map unit: 143 - Martella silt loam, 0 to 5 percent slopes

Component: Martella (85%)

The Martella component makes up 85 percent of the map unit. Slopes are 0 to 5 percent. This component is on terraces. The parent material consists of volcanic ash and loess over glacial lake sediments. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 30 inches during February, March, April. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 3w. Irrigated land capability classification is 3w. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 19 percent.

Map unit: 144 - Martella silt loam, 5 to 15 percent slopes

Component: Martella (80%)

The Martella component makes up 80 percent of the map unit. Slopes are 5 to 15 percent. This component is on terraces. The parent material consists of volcanic ash and loess over glacial lake sediments. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 30 inches during February, March, April. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 3e. Irrigated land capability classification is 4e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 19 percent.

Map unit: 145 - Martella silt loam, 15 to 25 percent slopes

Component: Martella (80%)

The Martella component makes up 80 percent of the map unit. Slopes are 15 to 25 percent. This component is on terraces. The parent material consists of volcanic ash and loess over glacial lake sediments. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 30 inches during February, March, April. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 4e. Irrigated land capability classification is 6e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 19 percent.

Acreage and Proportionate Extent of the Soils

Stevens County, Washington

Map unit: 146 - Martella silt loam, 25 to 40 percent slopes

Component: Martella (75%)

The Martella component makes up 75 percent of the map unit. Slopes are 25 to 40 percent. This component is on escarpments. The parent material consists of volcanic ash and loess over glacial lake sediments. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 30 inches during February, March, April. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 6e. Irrigated land capability classification is 7e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 19 percent.

Map unit: 147 - Merkel stony sandy loam, 0 to 40 percent slopes

Component: Merkel (85%)

The Merkel component makes up 85 percent of the map unit. Slopes are 0 to 40 percent. This component is on hills. The parent material consists of glacial till derived from granite mixed with volcanic ash in the upper part. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7s. This soil does not meet hydric criteria.

Map unit: 148 - Merkel stony sandy loam, 40 to 65 percent slopes

Component: Merkel (85%)

The Merkel component makes up 85 percent of the map unit. Slopes are 40 to 65 percent. This component is on hills. The parent material consists of glacial till derived from granite mixed with volcanic ash in the upper part. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 149 - Merkel-Rock outcrop complex, 0 to 40 percent slopes

Component: Merkel (65%)

The Merkel component makes up 65 percent of the map unit. Slopes are 0 to 40 percent. This component is on hills. The parent material consists of glacial till derived from granite mixed with volcanic ash in the upper part. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7s. This soil does not meet hydric criteria.

Map unit: 149 - Merkel-Rock outcrop complex, 0 to 40 percent slopes

Component: Rock outcrop (20%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 150 - Merkel-Rock outcrop complex, 40 to 65 percent slopes

Component: Merkel (65%)

The Merkel component makes up 65 percent of the map unit. Slopes are 40 to 65 percent. This component is on hills. The parent material consists of glacial till derived from granite mixed with volcanic ash in the upper part. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Component: Rock outcrop (20%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 151 - Mobate gravelly loam, 0 to 30 percent slopes

Component: Mobate (80%)

The Mobate component makes up 80 percent of the map unit. Slopes are 0 to 30 percent. This component is on hills. The parent material consists of residuum weathered from granite mixed with a component of loess and volcanic ash. Depth to a root restrictive layer, bedrock, paralithic, is 10 to 20 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

Map unit: 152 - Mobate gravelly loam, 30 to 65 percent slopes

Component: Mobate (80%)

The Mobate component makes up 80 percent of the map unit. Slopes are 30 to 65 percent. This component is on hills. The parent material consists of residuum weathered from granite mixed with a component of loess and volcanic ash. Depth to a root restrictive layer, bedrock, paralithic, is 10 to 20 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 153 - Molcal gravelly loam, limestone substratum, 25 to 65 percent slopes

Component: Molcal (80%)

The Molcal component makes up 80 percent of the map unit. Slopes are 25 to 65 percent. This component is on hills. The parent material consists of loess and volcanic ash over glacial till derived from calcareous shale, and glacial lake deposits. Depth to a root restrictive layer, bedrock, paralithic, is 40 to 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. This component is in the R043AY101WA Dry Loamy 16-24 Pz ecological site. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 25 percent.

Map unit: 154 - Molcal silt loam, 0 to 8 percent slopes

Component: Molcal (85%)

The Molcal component makes up 85 percent of the map unit. Slopes are 0 to 8 percent. This component is on hills. The parent material consists of loess and volcanic ash over glacial till derived from calcareous shale, and glacial lake deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. This component is in the R043AY101WA Dry Loamy 16-24 Pz ecological site. Nonirrigated land capability classification is 2e. Irrigated land capability classification is 2e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 25 percent.

Map unit: 155 - Molcal silt loam, 8 to 15 percent slopes

Component: Molcal (85%)

The Molcal component makes up 85 percent of the map unit. Slopes are 8 to 15 percent. This component is on hills. The parent material consists of loess and volcanic ash over glacial till derived from calcareous shale, and glacial lake deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. This component is in the R043AY101WA Dry Loamy 16-24 Pz ecological site. Nonirrigated land capability classification is 3e. Irrigated land capability classification is 4e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 25 percent.

Acreage and Proportionate Extent of the Soils

Stevens County, Washington

Map unit: 156 - Molcal gravelly silt loam, 0 to 25 percent slopes

Component: Molcal (80%)

The Molcal component makes up 80 percent of the map unit. Slopes are 0 to 25 percent. This component is on hills. The parent material consists of loess and volcanic ash over glacial till derived from calcareous shale, and glacial lake deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. This component is in the R043AY101WA Dry Loamy 16-24 Pz ecological site. Nonirrigated land capability classification is 3e. Irrigated land capability classification is 4e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 25 percent.

Map unit: 157 - Molcal gravelly silt loam, 25 to 40 percent slopes

Component: Molcal (80%)

The Molcal component makes up 80 percent of the map unit. Slopes are 25 to 40 percent. This component is on hills. The parent material consists of loess and volcanic ash over glacial till derived from calcareous shale, and glacial lake deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. This component is in the R043AY101WA Dry Loamy 16-24 Pz ecological site. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 25 percent.

Map unit: 158 - Molcal gravelly silt loam, 40 to 65 percent slopes

Component: Molcal (80%)

The Molcal component makes up 80 percent of the map unit. Slopes are 40 to 65 percent. This component is on hills. The parent material consists of loess and volcanic ash over glacial till derived from calcareous shale, and glacial lake deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. This component is in the R043AY101WA Dry Loamy 16-24 Pz ecological site. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 25 percent.

Acreage and Proportionate Extent of the Soils

Stevens County, Washington

Map unit: 159 - Moscow silt loam, 0 to 25 percent slopes

Component: Moscow (85%)

The Moscow component makes up 85 percent of the map unit. Slopes are 0 to 25 percent. This component is on mountains. The parent material consists of volcanic ash and loess over residuum and colluvium derived from granite. Depth to a root restrictive layer, bedrock, paralithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Map unit: 160 - Moscow silt loam, 25 to 40 percent slopes

Component: Moscow (80%)

The Moscow component makes up 80 percent of the map unit. Slopes are 25 to 40 percent. This component is on mountains. The parent material consists of volcanic ash and loess over residuum and colluvium derived from granite. Depth to a root restrictive layer, bedrock, paralithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.

Map unit: 161 - Moscow silt loam, 40 to 65 percent slopes

Component: Moscow (75%)

The Moscow component makes up 75 percent of the map unit. Slopes are 40 to 65 percent. This component is on mountains. The parent material consists of volcanic ash and loess over residuum and colluvium derived from granite. Depth to a root restrictive layer, bedrock, paralithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 162 - Moscow-Rock outcrop complex, 0 to 30 percent slopes

Component: Moscow (65%)

The Moscow component makes up 65 percent of the map unit. Slopes are 0 to 30 percent. This component is on mountains. The parent material consists of volcanic ash and loess over residuum and colluvium derived from granite. Depth to a root restrictive layer, bedrock, paralithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

Map unit: 162 - Moscow-Rock outcrop complex, 0 to 30 percent slopes

Component: Rock outcrop (20%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 163 - Moscow-Rock outcrop complex, 30 to 65 percent slopes

Component: Moscow (65%)

The Moscow component makes up 65 percent of the map unit. Slopes are 30 to 65 percent. This component is on mountains. The parent material consists of volcanic ash and loess over residuum and colluvium derived from granite. Depth to a root restrictive layer, bedrock, paralithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Component: Rock outcrop (20%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 164 - Narcisse silt loam

Component: Narcisse (80%)

The Narcisse component makes up 80 percent of the map unit. Slopes are 0 to 3 percent. This component is on depressions. The parent material consists of mixed alluvium with volcanic ash and loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 48 inches during February, March, April, May. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 3w. This soil does not meet hydric criteria.

Map unit: 165 - Newbell silt loam, 0 to 25 percent slopes

Component: Newbell (80%)

The Newbell component makes up 80 percent of the map unit. Slopes are 0 to 25 percent. This component is on hills. The parent material consists of volcanic ash and loess over glacial till derived from granite. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 3e. Irrigated land capability classification is 4e. This soil does not meet hydric criteria.

Map unit: 166 - Newbell silt loam, 25 to 40 percent slopes

Component: Newbell (80%)

The Newbell component makes up 80 percent of the map unit. Slopes are 25 to 40 percent. This component is on hills. The parent material consists of volcanic ash and loess over glacial till derived from granite. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.

Map unit: 167 - Newbell silt loam, 40 to 65 percent slopes

Component: Newbell (75%)

The Newbell component makes up 75 percent of the map unit. Slopes are 40 to 65 percent. This component is on hills. The parent material consists of volcanic ash and loess over glacial till derived from granite. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 168 - Newbell stony silt loam, 0 to 40 percent slopes

Component: Newbell (80%)

The Newbell component makes up 80 percent of the map unit. Slopes are 0 to 40 percent. This component is on hills. The parent material consists of volcanic ash and loess over glacial till derived from granite. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

Map unit: 169 - Newbell stony silt loam, 40 to 65 percent slopes

Component: Newbell (75%)

The Newbell component makes up 75 percent of the map unit. Slopes are 40 to 65 percent. This component is on hills. The parent material consists of volcanic ash and loess over glacial till derived from granite. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 170 - Newbell-Rock outcrop complex, 15 to 40 percent slopes

Component: Newbell (35%)

The Newbell component makes up 35 percent of the map unit. Slopes are 15 to 30 percent. This component is on hills. The parent material consists of volcanic ash and loess over glacial till derived from granite. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

Component: Rock outcrop (30%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 171 - Newbell-Rock outcrop complex, 40 to 65 percent slopes

Component: Newbell (65%)

The Newbell component makes up 65 percent of the map unit. Slopes are 40 to 65 percent. This component is on hills. The parent material consists of volcanic ash and loess over glacial till derived from granite. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Component: Rock outcrop (20%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 172 - Peone silt loam

Component: Peone (80%)

The Peone component makes up 80 percent of the map unit. Slopes are 0 to 3 percent. This component is on alluvial fans. The parent material consists of mixed alluvium with diatomite and volcanic ash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is frequently flooded. It is not ponded. A seasonal zone of water saturation is at 12 inches during February, March, April, May. Organic matter content in the surface horizon is about 4 percent. This component is in the R044XY601WA Wet Meadow 16-24 Pz ecological site. Nonirrigated land capability classification is 5w. This soil meets hydric criteria.

Map unit: 173 - Peone silt loam, drained

Component: Peone (80%)

The Peone component makes up 80 percent of the map unit. Slopes are 0 to 3 percent. This component is on depressions. The parent material consists of mixed alluvium with diatomite and volcanic ash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 30 inches during February, March, April, May. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 3w. This soil does not meet hydric criteria.

Map unit: 174 - Phoebe sandy loam, 0 to 5 percent slopes

Component: Phoebe (85%)

The Phoebe component makes up 85 percent of the map unit. Slopes are 0 to 5 percent. This component is on terraces. The parent material consists of volcanic ash, loess and glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 2e. Irrigated land capability classification is 2e. This soil does not meet hydric criteria.

Map unit: 175 - Phoebe sandy loam, 5 to 15 percent slopes

Component: Phoebe (85%)

The Phoebe component makes up 85 percent of the map unit. Slopes are 5 to 15 percent. This component is on terraces. The parent material consists of volcanic ash, loess and glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 3e. Irrigated land capability classification is 4e. This soil does not meet hydric criteria.

Map unit: 176 - Raisio shaly loam, 0 to 20 percent slopes

Component: Raisio (85%)

The Raisio component makes up 85 percent of the map unit. Slopes are 0 to 20 percent. This component is on mountains. The parent material consists of residuum derived from shale mixed with some glacial till and volcanic ash. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 4s. This soil does not meet hydric criteria.

Acreage and Proportionate Extent of the Soils

Stevens County, Washington

Map unit: 177 - Raisio shaly loam, 20 to 40 percent slopes

Component: Raisio (80%)

The Raisio component makes up 80 percent of the map unit. Slopes are 20 to 40 percent. This component is on mountains. The parent material consists of residuum derived from shale mixed with some glacial till and volcanic ash. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.

Map unit: 178 - Raisio shaly loam, 40 to 65 percent slopes

Component: Raisio (75%)

The Raisio component makes up 75 percent of the map unit. Slopes are 40 to 65 percent. This component is on mountains. The parent material consists of residuum derived from shale mixed with some glacial till and volcanic ash. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 179 - Raisio-Rock outcrop complex, 25 to 40 percent slopes

Component: Raisio (65%)

The Raisio component makes up 65 percent of the map unit. Slopes are 25 to 40 percent. This component is on mountains. The parent material consists of residuum derived from shale mixed with some glacial till and volcanic ash. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.

Component: Rock outcrop (20%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 180 - Raisio-Rock outcrop complex, 40 to 65 percent slopes

Component: Raisio (65%)

The Raisio component makes up 65 percent of the map unit. Slopes are 40 to 65 percent. This component is on mountains. The parent material consists of residuum derived from shale mixed with some glacial till and volcanic ash. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Component: Rock outcrop (20%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 181 - Rathdrum silt loam

Component: Rathdrum (80%)

The Rathdrum component makes up 80 percent of the map unit. Slopes are 0 to 3 percent. This component is on depressions on terraces. The parent material consists of alluvial volcanic ash over outwash material. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 3c. Irrigated land capability classification is 3e. This soil does not meet hydric criteria.

Map unit: 182 - Republic gravelly sandy loam, 0 to 25 percent slopes

Component: Republic (85%)

The Republic component makes up 85 percent of the map unit. Slopes are 0 to 25 percent. This component is on hills. The parent material consists of alluvium and till mixed with loess and volcanic ash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 3e. Irrigated land capability classification is 4e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 8 percent.

Map unit: 183 - Republic gravelly sandy loam, 25 to 40 percent slopes

Component: Republic (80%)

The Republic component makes up 80 percent of the map unit. Slopes are 25 to 40 percent. This component is on hills. The parent material consists of alluvium and till mixed with loess and volcanic ash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 8 percent.

Map unit: 184 - Republic silt loam, 0 to 8 percent slopes

Component: Republic (85%)

The Republic component makes up 85 percent of the map unit. Slopes are 0 to 8 percent. This component is on alluvial fans. The parent material consists of alluvium and till mixed with loess and volcanic ash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 3e. Irrigated land capability classification is 3e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 8 percent.

Map unit: 185 - Republic silt loam, 8 to 15 percent slopes

Component: Republic (85%)

The Republic component makes up 85 percent of the map unit. Slopes are 8 to 15 percent. This component is on alluvial fans. The parent material consists of alluvium and till mixed with loess and volcanic ash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 3e. Irrigated land capability classification is 4e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 8 percent.

Map unit: 186 - Republic silt loam, 15 to 40 percent slopes

Component: Republic (80%)

The Republic component makes up 80 percent of the map unit. Slopes are 15 to 40 percent. This component is on alluvial fans. The parent material consists of alluvium and till mixed with loess and volcanic ash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 4e. Irrigated land capability classification is 6e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 8 percent.

Map unit: 187 - Riverwash

Component: Riverwash (100%)

Generated brief soil descriptions are created for major soil components. The Riverwash is a miscellaneous area.

Map unit: 188 - Rock outcrop

Component: Rock outcrop (100%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 189 - Rock outcrop-Aits complex, 30 to 65 percent slopes

Component: Rock outcrop (50%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Component: Aits (35%)

The Aits component makes up 35 percent of the map unit. Slopes are 30 to 65 percent. This component is on hills. The parent material consists of volcanic ash and loess over glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 190 - Rock outcrop-Donavan complex, 30 to 65 percent slopes

Component: Rock outcrop (50%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Component: Donavan (35%)

The Donavan component makes up 35 percent of the map unit. Slopes are 30 to 65 percent. This component is on hills. The parent material consists of glacial till mixed with a component of volcanic ash and loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 191 - Rock outcrop-Huckleberry complex, 30 to 65 percent slop es

Component: Rock outcrop (55%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Component: Huckleberry (30%)

The Huckleberry component makes up 30 percent of the map unit. Slopes are 30 to 65 percent. This component is on mountains. The parent material consists of volcanic ash and loess over colluvium and residuum derived from shale. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 192 - Rock outcrop-Inkler complex, 30 to 65 percent slopes

Component: Rock outcrop (55%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 192 - Rock outcrop-Inkler complex, 30 to 65 percent slopes

Component: Inkler (30%)

The Inkler component makes up 30 percent of the map unit. Slopes are 30 to 65 percent. This component is on hills. The parent material consists of volcanic ash, loess, glacial till, residuum and colluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 193 - Rock outcrop-Maki complex, 30 to 65 percent slopes

Component: Rock outcrop (55%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Component: Maki (30%)

The Maki component makes up 30 percent of the map unit. Slopes are 30 to 65 percent. This component is on hills. The parent material consists of glacial till, calcareous colluvium and residuum mixed with volcanic ash and loess. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent.

Map unit: 194 - Rock outcrop-Merkel complex, 30 to 50 percent slopes

Component: Rock outcrop (55%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Component: Merkel (30%)

The Merkel component makes up 30 percent of the map unit. Slopes are 30 to 50 percent. This component is on hills. The parent material consists of glacial till derived from granite mixed with volcanic ash in the upper part. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Acreage and Proportionate Extent of the Soils

Stevens County, Washington

Map unit: 195 - Rock outcrop-Moscow complex, 30 to 65 percent slopes

Component: Rock outcrop (55%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Component: Moscow (30%)

The Moscow component makes up 30 percent of the map unit. Slopes are 30 to 65 percent. This component is on mountains. The parent material consists of volcanic ash and loess over residuum and colluvium derived from granite. Depth to a root restrictive layer, bedrock, paralithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 196 - Rock outcrop-Spokane complex, 30 to 65 percent slopes

Component: Rock outcrop (55%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Component: Spokane (30%)

The Spokane component makes up 30 percent of the map unit. Slopes are 30 to 65 percent. This component is on mountains. The parent material consists of colluvium and residuum derived from granite mixed with loess and volcanic ash. Depth to a root restrictive layer, bedrock, paralithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 197 - Rock outcrop-Stevens complex, 30 to 65 percent slopes

Component: Rock outcrop (55%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 197 - Rock outcrop-Stevens complex, 30 to 65 percent slopes

Component: Stevens (30%)

The Stevens component makes up 30 percent of the map unit. Slopes are 30 to 65 percent. This component is on hills. The parent material consists of glacial till mixed with loess and volcanic ash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. This component is in the F043XY803WA Pinus Ponderosa Var. Ponderosa/purshia Tridentata/achnatherum Hymenoides ecological site. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent.

Map unit: 198 - Rock outcrop-Thout complex, 30 to 65 percent slopes

Component: Rock outcrop (55%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Component: Thout (30%)

The Thout component makes up 30 percent of the map unit. Slopes are 30 to 65 percent. This component is on hills. The parent material consists of residuum, colluvium and glacial till mixed with volcanic ash. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 199 - Rufus shaly loam, 30 to 65 percent slopes

Component: Rufus (80%)

The Rufus component makes up 80 percent of the map unit. Slopes are 30 to 65 percent. This component is on mountains. The parent material consists of colluvium and residuum derived from shale. Depth to a root restrictive layer, bedrock, lithic, is 10 to 20 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Acreage and Proportionate Extent of the Soils

Stevens County, Washington

Map unit: 200 - Rufus-Rock outcrop complex, 30 to 65 percent slopes

Component: Rufus (65%)

The Rufus component makes up 65 percent of the map unit. Slopes are 30 to 65 percent. This component is on mountains. The parent material consists of colluvium and residuum derived from shale. Depth to a root restrictive layer, bedrock, lithic, is 10 to 20 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Component: Rock outcrop (20%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 201 - Saltese muck

Component: Saltese (85%)

The Saltese component makes up 85 percent of the map unit. Slopes are 0 to 2 percent. This component is on depressions. The parent material consists of organic material mixed with alluvium, diatomite and volcanic ash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very high. Shrink-swell potential is low. This soil is not flooded. It is frequently ponded. A seasonal zone of water saturation is at 0 inches during February, March, April, May. Organic matter content in the surface horizon is about 65 percent. This component is in the R044XY601WA Wet Meadow 16-24 Pz ecological site. Nonirrigated land capability classification is 5w. This soil meets hydric criteria.

Map unit: 202 - Saltese muck, drained

Component: Saltese (90%)

The Saltese component makes up 90 percent of the map unit. Slopes are 0 to 2 percent. This component is on depressions. The parent material consists of organic material mixed with alluvium, diatomite and volcanic ash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very high. Shrink-swell potential is low. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 30 inches during February, March, April, May. Organic matter content in the surface horizon is about 65 percent. Nonirrigated land capability classification is 4w. This soil meets hydric criteria.

Map unit: 203 - Scoap gravelly loam, 5 to 20 percent slopes

Component: Scoap (85%)

The Scoap component makes up 85 percent of the map unit. Slopes are 5 to 20 percent. This component is on hills. The parent material consists of glacial till and colluvium mixed with volcanic ash and loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 3e. Irrigated land capability classification is 4e. This soil does not meet hydric criteria.

Map unit: 204 - Scoap gravelly loam, 20 to 40 percent slopes

Component: Scoap (85%)

The Scoap component makes up 85 percent of the map unit. Slopes are 20 to 40 percent. This component is on hills. The parent material consists of glacial till and colluvium mixed with volcanic ash and loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 6e. Irrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 205 - Scoap gravelly loam, 40 to 65 percent slopes

Component: Scoap (80%)

The Scoap component makes up 80 percent of the map unit. Slopes are 40 to 65 percent. This component is on hills. The parent material consists of glacial till and colluvium mixed with volcanic ash and loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 206 - Scoap-Rock outcrop complex, 30 to 65 percent slopes

Component: Scoap (65%)

The Scoap component makes up 65 percent of the map unit. Slopes are 30 to 65 percent. This component is on hills. The parent material consists of glacial till and colluvium mixed with volcanic ash and loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Acreage and Proportionate Extent of the Soils

Stevens County, Washington

Map unit: 206 - Scoap-Rock outcrop complex, 30 to 65 percent slopes

Component: Rock outcrop (20%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 207 - Scrabblers very fine sandy loam, 0 to 20 percent slopes

Component: Scrabblers (85%)

The Scrabblers component makes up 85 percent of the map unit. Slopes are 0 to 20 percent. This component is on terraces. The parent material consists of volcanic ash and loess over glacial outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 3e. Irrigated land capability classification is 4e. This soil does not meet hydric criteria.

Map unit: 208 - Scrabblers very fine sandy loam, 30 to 65 percent slopes

Component: Scrabblers (80%)

The Scrabblers component makes up 80 percent of the map unit. Slopes are 30 to 65 percent. This component is on escarpments. The parent material consists of volcanic ash and loess over glacial outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 209 - Skanid loam, 0 to 25 percent slopes

Component: Skanid (85%)

The Skanid component makes up 85 percent of the map unit. Slopes are 0 to 25 percent. This component is on mountains. The parent material consists of residuum derived from granite mixed with loess and volcanic ash. Depth to a root restrictive layer, bedrock, paralithic, is 10 to 20 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

Map unit: 210 - Skanid loam, 25 to 40 percent slopes

Component: Skanid (85%)

The Skanid component makes up 85 percent of the map unit. Slopes are 25 to 40 percent. This component is on mountains. The parent material consists of residuum derived from granite mixed with loess and volcanic ash. Depth to a root restrictive layer, bedrock, paralithic, is 10 to 20 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.

Map unit: 211 - Skanid loam, 40 to 65 percent slopes

Component: Skanid (80%)

The Skanid component makes up 80 percent of the map unit. Slopes are 40 to 65 percent. This component is on mountains. The parent material consists of residuum derived from granite mixed with loess and volcanic ash. Depth to a root restrictive layer, bedrock, paralithic, is 10 to 20 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 212 - Smackout loam, 0 to 5 percent slopes

Component: Smackout (85%)

The Smackout component makes up 85 percent of the map unit. Slopes are 0 to 5 percent. This component is on hills. The parent material consists of volcanic ash and loess over glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Map unit: 213 - Smackout loam, 5 to 20 percent slopes

Component: Smackout (80%)

The Smackout component makes up 80 percent of the map unit. Slopes are 5 to 20 percent. This component is on hills. The parent material consists of volcanic ash and loess over glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Map unit: 214 - Smackout loam, 20 to 40 percent slopes

Component: Smackout (75%)

The Smackout component makes up 75 percent of the map unit. Slopes are 20 to 40 percent. This component is on hills. The parent material consists of volcanic ash and loess over glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.

Map unit: 215 - Smackout loam, 40 to 65 percent slopes

Component: Smackout (75%)

The Smackout component makes up 75 percent of the map unit. Slopes are 40 to 65 percent. This component is on hills. The parent material consists of volcanic ash and loess over glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 216 - Spens extremely gravelly loamy sand, 30 to 65 percent slopes

Component: Spens (80%)

The Spens component makes up 80 percent of the map unit. Slopes are 30 to 65 percent. This component is on escarpments. The parent material consists of mixed glacial outwash and colluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is very high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 217 - Spens stony loamy sand, 25 to 45 percent slopes

Component: Spens (80%)

The Spens component makes up 80 percent of the map unit. Slopes are 25 to 45 percent. This component is on escarpments. The parent material consists of mixed glacial outwash and colluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is very high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7s. This soil does not meet hydric criteria.

Acreage and Proportionate Extent of the Soils

Stevens County, Washington

Map unit: 218 - Spokane loam, 0 to 25 percent slopes

Component: Spokane (85%)

The Spokane component makes up 85 percent of the map unit. Slopes are 0 to 25 percent. This component is on mountains. The parent material consists of colluvium and residuum derived from granite mixed with loess and volcanic ash. Depth to a root restrictive layer, bedrock, paralithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 4s. Irrigated land capability classification is 4e. This soil does not meet hydric criteria.

Map unit: 219 - Spokane loam, 25 to 40 percent slopes

Component: Spokane (85%)

The Spokane component makes up 85 percent of the map unit. Slopes are 25 to 40 percent. This component is on mountains. The parent material consists of colluvium and residuum derived from granite mixed with loess and volcanic ash. Depth to a root restrictive layer, bedrock, paralithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.

Map unit: 220 - Spokane loam, 40 to 65 percent slopes

Component: Spokane (80%)

The Spokane component makes up 80 percent of the map unit. Slopes are 40 to 65 percent. This component is on mountains. The parent material consists of colluvium and residuum derived from granite mixed with loess and volcanic ash. Depth to a root restrictive layer, bedrock, paralithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 221 - Spokane stony loam, 0 to 40 percent slopes

Component: Spokane (85%)

The Spokane component makes up 85 percent of the map unit. Slopes are 0 to 40 percent. This component is on mountains. The parent material consists of colluvium and residuum derived from granite mixed with loess and volcanic ash. Depth to a root restrictive layer, bedrock, paralithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 7s. This soil does not meet hydric criteria.

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Map unit: 222 - Spokane stony loam, 40 to 65 percent slopes

Component: Spokane (80%)

The Spokane component makes up 80 percent of the map unit. Slopes are 40 to 65 percent. This component is on mountains. The parent material consists of colluvium and residuum derived from granite mixed with loess and volcanic ash. Depth to a root restrictive layer, bedrock, paralithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 223 - Spokane-Rock outcrop complex, 0 to 40 percent slopes

Component: Spokane (65%)

The Spokane component makes up 65 percent of the map unit. Slopes are 0 to 40 percent. This component is on mountains. The parent material consists of colluvium and residuum derived from granite mixed with loess and volcanic ash. Depth to a root restrictive layer, bedrock, paralithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 7s. This soil does not meet hydric criteria.

Component: Rock outcrop (20%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 224 - Spokane-Rock outcrop complex, 40 to 65 percent slopes

Component: Spokane (65%)

The Spokane component makes up 65 percent of the map unit. Slopes are 40 to 65 percent. This component is on mountains. The parent material consists of colluvium and residuum derived from granite mixed with loess and volcanic ash. Depth to a root restrictive layer, bedrock, paralithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Component: Rock outcrop (20%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 225 - Springdale sandy loam, 0 to 15 percent slopes

Component: Springdale (85%)

The Springdale component makes up 85 percent of the map unit. Slopes are 0 to 15 percent. This component is on terraces. The parent material consists of volcanic ash, loess and glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 4s. Irrigated land capability classification is 4e. This soil does not meet hydric criteria.

Map unit: 226 - Springdale gravelly sandy loam, 0 to 15 percent slopes

Component: Springdale (85%)

The Springdale component makes up 85 percent of the map unit. Slopes are 0 to 15 percent. This component is on terraces. The parent material consists of volcanic ash, loess and glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 4s. Irrigated land capability classification is 4e. This soil does not meet hydric criteria.

Map unit: 227 - Springdale cobbly sandy loam, 0 to 15 percent slopes

Component: Springdale (85%)

The Springdale component makes up 85 percent of the map unit. Slopes are 0 to 15 percent. This component is on terraces. The parent material consists of volcanic ash, loess and glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 4s. This soil does not meet hydric criteria.

Map unit: 228 - Stevens silt loam, 0 to 8 percent slopes

Component: Stevens (85%)

The Stevens component makes up 85 percent of the map unit. Slopes are 0 to 8 percent. This component is on hills. The parent material consists of glacial till mixed with loess and volcanic ash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. This component is in the F043XY803WA Pinus Ponderosa Var. Ponderosa/purshia Tridentata/achnatherum Hymenoides ecological site. Nonirrigated land capability classification is 2e. Irrigated land capability classification is 2e. This soil does not meet hydric criteria.

Map unit: 229 - Stevens silt loam, 8 to 15 percent slopes

Component: Stevens (85%)

The Stevens component makes up 85 percent of the map unit. Slopes are 8 to 15 percent. This component is on hills. The parent material consists of glacial till mixed with loess and volcanic ash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. This component is in the F043XY803WA Pinus Ponderosa Var. Ponderosa/purshia Tridentata/achnatherum Hymenoides ecological site. Nonirrigated land capability classification is 3e. Irrigated land capability classification is 4e. This soil does not meet hydric criteria.

Map unit: 230 - Stevens channery silt loam, 8 to 25 percent slopes

Component: Stevens (85%)

The Stevens component makes up 85 percent of the map unit. Slopes are 8 to 25 percent. This component is on hills. The parent material consists of glacial till mixed with loess and volcanic ash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. This component is in the F043XY803WA Pinus Ponderosa Var. Ponderosa/purshia Tridentata/achnatherum Hymenoides ecological site. Nonirrigated land capability classification is 4e. Irrigated land capability classification is 6e. This soil does not meet hydric criteria.

Map unit: 231 - Stevens channery silt loam, 25 to 40 percent slopes

Component: Stevens (85%)

The Stevens component makes up 85 percent of the map unit. Slopes are 25 to 40 percent. This component is on hills. The parent material consists of glacial till mixed with loess and volcanic ash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. This component is in the F043XY803WA Pinus Ponderosa Var. Ponderosa/purshia Tridentata/achnatherum Hymenoides ecological site. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.

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Map unit: 232 - Stevens stony silt loam, 0 to 40 percent slopes

Component: Stevens (85%)

The Stevens component makes up 85 percent of the map unit. Slopes are 0 to 40 percent. This component is on hills. The parent material consists of glacial till mixed with loess and volcanic ash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. This component is in the F043XY803WA Pinus Ponderosa Var. Ponderosa/purshia Tridentata/achnatherum Hymenoides ecological site. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent.

Map unit: 233 - Stevens stony silt loam, 40 to 65 percent slopes

Component: Stevens (85%)

The Stevens component makes up 85 percent of the map unit. Slopes are 40 to 65 percent. This component is on hills. The parent material consists of glacial till mixed with loess and volcanic ash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. This component is in the F043XY803WA Pinus Ponderosa Var. Ponderosa/purshia Tridentata/achnatherum Hymenoides ecological site. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent.

Map unit: 234 - Stevens-Rock outcrop complex, 25 to 40 percent slopes

Component: Stevens (65%)

The Stevens component makes up 65 percent of the map unit. Slopes are 25 to 40 percent. This component is on hills. The parent material consists of glacial till mixed with loess and volcanic ash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. This component is in the F043XY803WA Pinus Ponderosa Var. Ponderosa/purshia Tridentata/achnatherum Hymenoides ecological site. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent.

Component: Rock outcrop (20%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 235 - Stevens-Rock outcrop complex, 40 to 65 percent slopes

Component: Stevens (65%)

The Stevens component makes up 65 percent of the map unit. Slopes are 40 to 65 percent. This component is on hills. The parent material consists of glacial till mixed with loess and volcanic ash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. This component is in the F043XY803WA Pinus Ponderosa Var. Ponderosa/purshia Tridentata/achnatherum Hymenoides ecological site. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent.

Component: Rock outcrop (20%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 236 - Thout-Rock outcrop complex, 8 to 40 percent slopes

Component: Thout (65%)

The Thout component makes up 65 percent of the map unit. Slopes are 8 to 40 percent. This component is on hills. The parent material consists of residuum, colluvium and glacial till mixed with volcanic ash. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

Component: Rock outcrop (20%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 237 - Thout-Rock outcrop complex, 40 to 65 percent slopes

Component: Thout (65%)

The Thout component makes up 65 percent of the map unit. Slopes are 40 to 65 percent. This component is on hills. The parent material consists of residuum, colluvium and glacial till mixed with volcanic ash. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 237 - Thout-Rock outcrop complex, 40 to 65 percent slopes

Component: Rock outcrop (20%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 238 - Vassar silt loam, 30 to 65 percent slopes

Component: Vassar (85%)

The Vassar component makes up 85 percent of the map unit. Slopes are 30 to 65 percent. This component is on mountains. The parent material consists of volcanic ash and loess over colluvium and residuum weathered from granite and gneiss. Depth to a root restrictive layer, bedrock, paralithic, is 40 to 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 239 - Vassar silt loam, shaly substratum, 30 to 65 percent slopes

Component: Vassar (80%)

The Vassar component makes up 80 percent of the map unit. Slopes are 30 to 65 percent. This component is on mountains. The parent material consists of volcanic ash and loess over colluvium and residuum weathered from granite and gneiss. Depth to a root restrictive layer, bedrock, paralithic, is 40 to 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 240 - Waits loam, 0 to 15 percent slopes

Component: Waits (85%)

The Waits component makes up 85 percent of the map unit. Slopes are 0 to 15 percent. This component is on hills. The parent material consists of volcanic ash and loess over glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 15 percent.

Map unit: 241 - Waits loam, 15 to 25 percent slopes

Component: Waits (80%)

The Waits component makes up 80 percent of the map unit. Slopes are 15 to 25 percent. This component is on hills. The parent material consists of volcanic ash and loess over glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 15 percent.

Map unit: 242 - Waits loam, 25 to 40 percent slopes

Component: Waits (80%)

The Waits component makes up 80 percent of the map unit. Slopes are 25 to 40 percent. This component is on hills. The parent material consists of volcanic ash and loess over glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 15 percent.

Map unit: 243 - Waits loam, 40 to 65 percent slopes

Component: Waits (75%)

The Waits component makes up 75 percent of the map unit. Slopes are 40 to 65 percent. This component is on hills. The parent material consists of volcanic ash and loess over glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 15 percent.

Map unit: 244 - Waits-Rock outcrop complex, 25 to 40 percent slopes

Component: Waits (65%)

The Waits component makes up 65 percent of the map unit. Slopes are 25 to 40 percent. This component is on hills. The parent material consists of volcanic ash and loess over glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 15 percent.

Component: Rock outcrop (20%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 245 - Waits-Rock outcrop complex, 40 to 65 percent slopes

Component: Waits (65%)

The Waits component makes up 65 percent of the map unit. Slopes are 40 to 65 percent. This component is on hills. The parent material consists of volcanic ash and loess over glacial till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 15 percent.

Component: Rock outcrop (20%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 246 - Wethey loamy sand

Component: Wethey (85%)

The Wethey component makes up 85 percent of the map unit. Slopes are 0 to 3 percent. This component is on depressions. The parent material consists of mixed sandy alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 36 inches during February, March, April, May. Organic matter content in the surface horizon is about 2 percent. This component is in the R044XY601WA Wet Meadow 16-24 Pz ecological site. Nonirrigated land capability classification is 3w. This soil does not meet hydric criteria.

Acreage and Proportionate Extent of the Soils

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Map unit: 247 - Wolfeson very fine sandy loam

Component: Wolfeson (80%)

The Wolfeson component makes up 80 percent of the map unit. Slopes are 0 to 3 percent. This component is on depressions. The parent material consists of glaciofluvial deposits with loess and volcanic ash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 30 inches during February, March, April, May. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 3w. This soil does not meet hydric criteria.

Map unit: 248 - Wolfeson very fine sandy loam, wet

Component: Wolfeson (80%)

The Wolfeson component makes up 80 percent of the map unit. Slopes are 0 to 3 percent. This component is on depressions. The parent material consists of glaciofluvial deposits with loess and volcanic ash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 18 inches during February, March, April, May. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 4w. This soil does not meet hydric criteria.

Map unit: 249 - Water

Component: Water (100%)

Generated brief soil descriptions are created for major soil components. The Water is a miscellaneous area.

Map unit: 1001 - Bridgeson ashy silt loam, 0 to 3 percent slopes

Component: Bridgeson (80%)

The Bridgeson component makes up 80 percent of the map unit. Slopes are 0 to 3 percent. This component is on drainageways, valleys. The parent material consists of Alluvium derived from glaciolacustrine sediments with an influence of volcanic ash in the upper part. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very high. Shrink-swell potential is moderate. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 12 inches during February, March, April, May. Organic matter content in the surface horizon is about 8 percent. This component is in the R044XY601WA Wet Meadow 16-24 Pz ecological site. Nonirrigated land capability classification is 5w. This soil meets hydric criteria.

Acreage and Proportionate Extent of the Soils

Stevens County, Washington

Map unit: 1040 - Hardesty ashy silt loam, 0 to 3 percent slopes

Component: Hardesty (75%)

The Hardesty component makes up 75 percent of the map unit. Slopes are 0 to 3 percent. This component is on stream terraces, valleys, drainageways, depressions, scablands. The parent material consists of alluvium derived from volcanic ash mixed with loess in the upper part. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is rarely flooded. It is not ponded. A seasonal zone of water saturation is at 23 inches during February. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 2w. This soil does not meet hydric criteria.

Map unit: 1050 - Hoodoo-Kronquist complex, 0 to 3 percent slopes

Component: Hoodoo (45%)

The Hoodoo component makes up 45 percent of the map unit. Slopes are 0 to 3 percent. This component is on valleys, flood plains. The parent material consists of Alluvium derived from volcanic ash with loess mixed in the upper part. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very high. Shrink-swell potential is low. This soil is frequently flooded. It is not ponded. A seasonal zone of water saturation is at 0 inches during January, February, March, April, May. Organic matter content in the surface horizon is about 4 percent. This component is in the R044XY601WA Wet Meadow 16-24 Pz ecological site. Nonirrigated land capability classification is 5w. This soil meets hydric criteria.

Component: Kronquist (40%)

The Kronquist component makes up 40 percent of the map unit. Slopes are 0 to 3 percent. This component is on flood plains, valleys. The parent material consists of alluvium mixed with volcanic ash and loess in the upper part. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 10 inches during April. Organic matter content in the surface horizon is about 4 percent. This component is in the R044XY601WA Wet Meadow 16-24 Pz ecological site. Nonirrigated land capability classification is 5w. This soil meets hydric criteria.

Map unit: 1092 - Hoodoo ashy silt loam, 0 to 3 percent slopes

Component: Hoodoo (70%)

The Hoodoo component makes up 70 percent of the map unit. Slopes are 0 to 3 percent. This component is on valleys, flood plains. The parent material consists of Alluvium derived from volcanic ash with loess mixed in the upper part. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very high. Shrink-swell potential is low. This soil is frequently flooded. It is not ponded. A seasonal zone of water saturation is at 0 inches during January, February, March, April, May. Organic matter content in the surface horizon is about 4 percent. This component is in the R044XY601WA Wet Meadow 16-24 Pz ecological site. Nonirrigated land capability classification is 5w. This soil meets hydric criteria.

Acreage and Proportionate Extent of the Soils

Stevens County, Washington

Map unit: 1130 - Colburn ashy loam, 0 to 3 percent slopes

Component: Colburn (80%)

The Colburn component makes up 80 percent of the map unit. Slopes are 0 to 3 percent. This component is on valleys, drainageways. The parent material consists of mixed alluvium with an influence of loess and volcanic ash in the upper part. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 22 inches during April. Organic matter content in the surface horizon is about 75 percent. This component is in the R044XY602WA Semi-wet Meadow 15+ Pz ecological site. Nonirrigated land capability classification is 3w. This soil does not meet hydric criteria.

Map unit: 1200 - Endoaquolls and Fluvaquents, 0 to 3 percent slopes

Component: Endoaquolls (40%)

The Endoaquolls component makes up 40 percent of the map unit. Slopes are 0 to 3 percent. This component is on stream terraces, drainageways, valleys, flood plains. The parent material consists of mixed alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is frequently flooded. It is not ponded. A seasonal zone of water saturation is at 0 inches during January, February, March, April. Organic matter content in the surface horizon is about 5 percent. This component is in the R009XY601WA Wet Meadow 16-24 Pz ecological site. Nonirrigated land capability classification is 5w. This soil meets hydric criteria.

Component: Fluvaquents (40%)

The Fluvaquents component makes up 40 percent of the map unit. Slopes are 0 to 3 percent. This component is on flood plains, valleys, drainageways, stream terraces. The parent material consists of mixed alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is frequently flooded. It is not ponded. A seasonal zone of water saturation is at 0 inches during January, February, March, April. Organic matter content in the surface horizon is about 1 percent. This component is in the R009XY601WA Wet Meadow 16-24 Pz ecological site. Nonirrigated land capability classification is 5w. This soil meets hydric criteria.

Map unit: 3030 - Bonner ashy fine sandy loam, 0 to 8 percent slopes

Component: Bonner (70%)

The Bonner component makes up 70 percent of the map unit. Slopes are 0 to 8 percent. This component is on outwash terraces, valleys. The parent material consists of thick mantle of volcanic ash mixed with loess over outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 75 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Acreage and Proportionate Extent of the Soils

Stevens County, Washington

Map unit: 3031 - Bonner-Wapal complex, 8 to 15 percent slopes

Component: Bonner (60%)

The Bonner component makes up 60 percent of the map unit. Slopes are 8 to 15 percent. This component is on outwash terraces, valleys. The parent material consists of thick mantle of volcanic ash mixed with loess over outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 75 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Component: Wapal (20%)

The Wapal component makes up 20 percent of the map unit. Slopes are 8 to 15 percent. This component is on outwash terraces, valleys. The parent material consists of sandy and gravelly glaciofluvial deposits with minor amounts of volcanic ash and loess in the upper part. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 75 percent. Nonirrigated land capability classification is 4s. This soil does not meet hydric criteria.

Map unit: 3055 - Clayton-Hagen complex, 8 to 25 percent slopes

Component: Clayton (55%)

The Clayton component makes up 55 percent of the map unit. Slopes are 8 to 25 percent. This component is on valleys, terraces. The parent material consists of Sandy glaciofluvial deposits with minor amounts of volcanic ash and loess in the upper part. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

Component: Hagen (25%)

The Hagen component makes up 25 percent of the map unit. Slopes are 8 to 25 percent. This component is on outwash terraces, valleys. The parent material consists of sandy glaciofluvial deposits with minor amounts of loess and volcanic ash in the upper part. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

Acreage and Proportionate Extent of the Soils

Stevens County, Washington

Map unit: 3070 - Eloika ashy very fine sandy loam, 0 to 8 percent slopes

Component: Eloika (65%)

The Eloika component makes up 65 percent of the map unit. Slopes are 0 to 8 percent. This component is on valleys, outwash plains. The parent material consists of thick mantle of volcanic ash mixed with loess over outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 75 percent. Nonirrigated land capability classification is 3c. This soil does not meet hydric criteria.

Map unit: 3074 - Eloika ashy very fine sandy loam, moist, 0 to 8 percent slopes

Component: Eloika, moist (65%)

The Eloika, moist component makes up 65 percent of the map unit. Slopes are 0 to 8 percent. This component is on valleys, outwash plains. The parent material consists of thick mantle of volcanic ash mixed with loess over outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 75 percent. Nonirrigated land capability classification is 3c. This soil does not meet hydric criteria.

Map unit: 3120 - Marble loamy sand, 0 to 8 percent slopes

Component: Marble (80%)

The Marble component makes up 80 percent of the map unit. Slopes are 0 to 8 percent. This component is on outwash plains, valleys. The parent material consists of Sandy glaciofluvial deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 75 percent. Nonirrigated land capability classification is 4s. This soil does not meet hydric criteria.

Map unit: 3143 - Spens very gravelly loamy coarse sand 30 to 65 percent slopes

Component: Spens (60%)

The Spens component makes up 60 percent of the map unit. Slopes are 30 to 65 percent. This component is on valleys, outwash terraces. The parent material consists of sandy and gravelly glaciofluvial deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is very high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Acreage and Proportionate Extent of the Soils

Stevens County, Washington

Map unit: 3202 - Torboy-Blackprince complex, 8 to 15 percent slopes

Component: Torboy (55%)

The Torboy component makes up 55 percent of the map unit. Slopes are 8 to 15 percent. This component is on valleys, outwash terraces. The parent material consists of Sandy and gravelly glaciofluvial deposits with minor amounts of volcanic ash and loess in the upper part. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 75 percent. Nonirrigated land capability classification is 4s. This soil does not meet hydric criteria.

Component: Blackprince (20%)

The Blackprince component makes up 20 percent of the map unit. Slopes are 15 to 20 percent. This component is on hills, mountains. The parent material consists of Loess mixed with minor amounts of volcanic ash over residuum derived from granite. Depth to a root restrictive layer, bedrock, paralithic, is 21 to 41 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 75 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

Map unit: 3220 - Stapaloop ashy fine sandy loam, 0 to 8 percent slopes

Component: Stapaloop (75%)

The Stapaloop component makes up 75 percent of the map unit. Slopes are 0 to 8 percent. This component is on valleys, outwash plains. The parent material consists of glaciofluvial deposits with an influence of volcanic ash and loess in the upper part. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 3c. This soil does not meet hydric criteria.

Map unit: 3221 - Stapaloop-Kaniksu, dry complex, 8 to 25 percent slopes

Component: Stapaloop (55%)

The Stapaloop component makes up 55 percent of the map unit. Slopes are 8 to 25 percent. This component is on valleys, outwash plains. The parent material consists of glaciofluvial deposits with an influence of volcanic ash and loess in the upper part. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

Acreage and Proportionate Extent of the Soils

Stevens County, Washington

Map unit: 3221 - Stapaloop-Kaniksu, dry complex, 8 to 25 percent slopes

Component: Kaniksu, dry (30%)

The Kaniksu, dry component makes up 30 percent of the map unit. Slopes are 8 to 25 percent. This component is on valleys, outwash plains. The parent material consists of sandy glaciofluvial deposits with minor amounts of volcanic ash and loess in the upper part. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

Map unit: 3301 - Scrabblers ashy fine sandy loam, 3 to 8 percent slopes

Component: Scrabblers (75%)

The Scrabblers component makes up 75 percent of the map unit. Slopes are 3 to 8 percent. This component is on valleys, outwash plains. The parent material consists of thin mantle of volcanic ash mixed with loess over outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 75 percent. Nonirrigated land capability classification is 3s. This soil does not meet hydric criteria.

Map unit: 4040 - Wolfeson-Fan Lake complex, 0 to 8 percent slopes

Component: Wolfeson (60%)

The Wolfeson component makes up 60 percent of the map unit. Slopes are 0 to 3 percent. This component is on outwash plains, valleys, terraces. The parent material consists of Loess mixed with minor amounts of volcanic ash over glaciofluvial and glacialacustrine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 21 inches during February, March, April. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 3w. This soil does not meet hydric criteria.

Component: Fan Lake (25%)

The Fan Lake component makes up 25 percent of the map unit. Slopes are 0 to 8 percent. This component is on terraces, outwash plains, valleys. The parent material consists of thin mantle of volcanic ash mixed with loess over glaciolfluvial deposits or latah formation. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 16 inches during April. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 4w. This soil does not meet hydric criteria.

Acreage and Proportionate Extent of the Soils

Stevens County, Washington

Map unit: 4041 - Wolfeson ashy very fine sandy loam, 0 to 3 percent slopes

Component: Wolfeson (85%)

The Wolfeson component makes up 85 percent of the map unit. Slopes are 0 to 3 percent. This component is on outwash plains, valleys, terraces. The parent material consists of Loess mixed with minor amounts of volcanic ash over glaciofluvial and glacialacustrine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 21 inches during February, March, April. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 3w. This soil does not meet hydric criteria.

Map unit: 4050 - Fan Lake ashy very fine sandy loam, 0 to 8 percent slopes

Component: Fan Lake (85%)

The Fan Lake component makes up 85 percent of the map unit. Slopes are 0 to 8 percent. This component is on outwash plains, valleys, terraces. The parent material consists of thin mantle of volcanic ash mixed with loess over glaciolfluvial deposits or latah formation. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 16 inches during April. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 4w. This soil does not meet hydric criteria.

Map unit: 5026 - Micapeak-Spokane complex, 15 to 30 percent slopes

Component: Micapeak (40%)

The Micapeak component makes up 40 percent of the map unit. Slopes are 15 to 30 percent. This component is on mountains, hills. The parent material consists of residuum and/or colluvium derived from granite, gneiss and schist with an influence of volcanic ash and loess in the upper part. Depth to a root restrictive layer, bedrock, paralithic, is 21 to 41 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 75 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

Component: Spokane (30%)

The Spokane component makes up 30 percent of the map unit. Slopes are 15 to 30 percent. This component is on hills, mountains. The parent material consists of loess mixed with minor amounts of volcanic ash over residuum and/or colluvium derived from granite, gniess or schist. Depth to a root restrictive layer, bedrock, paralithic, is 21 to 41 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 75 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

Acreage and Proportionate Extent of the Soils

Stevens County, Washington

Map unit: 5037 - Spokane-Rock outcrop complex, 30 to 55 percent slopes

Component: Spokane (45%)

The Spokane component makes up 45 percent of the map unit. Slopes are 30 to 55 percent. This component is on hills, mountains. The parent material consists of loess mixed with minor amounts of volcanic ash over residuum and/or colluvium derived from granite, gniess or schist. Depth to a root restrictive layer, bedrock, paralithic, is 21 to 41 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 75 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Component: Rock outcrop (25%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 5040 - Spokane-Swakane complex, 3 to 15 percent slopes

Component: Spokane (40%)

The Spokane component makes up 40 percent of the map unit. Slopes are 3 to 15 percent. This component is on hills, mountains, ridges on mountains. The parent material consists of loess mixed with minor amounts of volcanic ash over residuum and/or colluvium derived from granite, gniess or schist. Depth to a root restrictive layer, bedrock, paralithic, is 21 to 41 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 75 percent. Nonirrigated land capability classification is 4s. This soil does not meet hydric criteria.

Component: Swakane (35%)

The Swakane component makes up 35 percent of the map unit. Slopes are 3 to 15 percent. This component is on mountains, hills, ridges on mountains. The parent material consists of loess mixed with minor amounts of volcanic ash over residuum and/or colluvium derived from granite. schist or gneiss. Depth to a root restrictive layer, bedrock, lithic, is 10 to 20 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 75 percent. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

Acreage and Proportionate Extent of the Soils

Stevens County, Washington

Map unit: 5067 - Quinnamose-Micapeak complex, 15 to 30 percent slopes

Component: Quinnamose (40%)

The Quinnamose component makes up 40 percent of the map unit. Slopes are 15 to 30 percent. This component is on mountains, hills, mountains. The parent material consists of loess mixed with minor amounts of volcanic ash over residuum and/or colluvium derived from granitie and schist. Depth to a root restrictive layer, bedrock, paralithic, is 43 to 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 75 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

Component: Micapeak (30%)

The Micapeak component makes up 30 percent of the map unit. Slopes are 15 to 30 percent. This component is on mountains, hills, ridges, mountains. The parent material consists of residuum and/or colluvium derived from granite, gneiss and schist with an influence of volcanic ash and loess in the upper part. Depth to a root restrictive layer, bedrock, paralithic, is 21 to 41 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 75 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

Map unit: 5068 - Quinnamose-Micapeak complex, 30 to 55 percent slopes

Component: Quinnamose (45%)

The Quinnamose component makes up 45 percent of the map unit. Slopes are 30 to 55 percent. This component is on mountains, hills, mountains. The parent material consists of loess mixed with minor amounts of volcanic ash over residuum and/or colluvium derived from granitie and schist. Depth to a root restrictive layer, bedrock, paralithic, is 43 to 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 75 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Component: Micapeak (35%)

The Micapeak component makes up 35 percent of the map unit. Slopes are 30 to 55 percent. This component is on mountains, hills, ridges, mountains. The parent material consists of residuum and/or colluvium derived from granite, gneiss and schist with an influence of volcanic ash and loess in the upper part. Depth to a root restrictive layer, bedrock, paralithic, is 21 to 41 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 75 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Acreage and Proportionate Extent of the Soils

Stevens County, Washington

Map unit: 5070 - Lenz-Spokane complex, 3 to 15 percent slopes

Component: Lenz (45%)

The Lenz component makes up 45 percent of the map unit. Slopes are 3 to 15 percent. This component is on hills, mountains. The parent material consists of Loess mixed with minor amounts of volcanic ash over residuum and/or colluvium derived from granitic and metamorphic rocks. Depth to a root restrictive layer, bedrock, lithic, is 21 to 41 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 75 percent. Nonirrigated land capability classification is 4s. This soil does not meet hydric criteria.

Component: Spokane (35%)

The Spokane component makes up 35 percent of the map unit. Slopes are 3 to 15 percent. This component is on hills, mountains. The parent material consists of loess mixed with minor amounts of volcanic ash over residuum and/or colluvium derived from granite, gniess or schist. Depth to a root restrictive layer, bedrock, paralithic, is 21 to 41 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 75 percent. Nonirrigated land capability classification is 4s. This soil does not meet hydric criteria.

Map unit: 5071 - Lenz-Spokane complex, 15 to 30 percent slopes

Component: Lenz (45%)

The Lenz component makes up 45 percent of the map unit. Slopes are 15 to 30 percent. This component is on hills, mountains. The parent material consists of Loess mixed with minor amounts of volcanic ash over residuum and/or colluvium derived from granitic and metamorphic rocks. Depth to a root restrictive layer, bedrock, lithic, is 21 to 41 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 75 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

Component: Spokane (30%)

The Spokane component makes up 30 percent of the map unit. Slopes are 15 to 30 percent. This component is on hills, mountains. The parent material consists of loess mixed with minor amounts of volcanic ash over residuum and/or colluvium derived from granite, gniess or schist. Depth to a root restrictive layer, bedrock, paralithic, is 21 to 41 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 75 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

Map unit: 5073 - Lenz-Rock outcrop complex, 15 to 30 percent slopes

Component: Lenz (50%)

The Lenz component makes up 50 percent of the map unit. Slopes are 15 to 30 percent. This component is on hills, mountains. The parent material consists of Loess mixed with minor amounts of volcanic ash over residuum and/or colluvium derived from granitic and metamorphic rocks. Depth to a root restrictive layer, bedrock, lithic, is 21 to 41 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 75 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

Component: Rock outcrop (20%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 5074 - Lenz-Rock outcrop complex, 30 to 60 percent slopes

Component: Lenz (45%)

The Lenz component makes up 45 percent of the map unit. Slopes are 30 to 60 percent. This component is on hills, mountains. The parent material consists of Loess mixed with minor amounts of volcanic ash over residuum and/or colluvium derived from granitic and metamorphic rocks. Depth to a root restrictive layer, bedrock, lithic, is 21 to 41 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 75 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Component: Rock outcrop (25%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 5090 - Brevco-Ardtoo complex, 3 to 15 percent slopes

Component: Brevco (50%)

The Brevco component makes up 50 percent of the map unit. Slopes are 3 to 15 percent. This component is on hills, mountains, mountains. The parent material consists of Loess mixed with minor amounts of volcanic ash over residuum and/or colluvium derived from granite. Depth to a root restrictive layer, bedrock, lithic, is 21 to 41 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 75 percent. Nonirrigated land capability classification is 4s. This soil does not meet hydric criteria.

Acreage and Proportionate Extent of the Soils

Stevens County, Washington

Map unit: 5090 - Brevco-Ardtoo complex, 3 to 15 percent slopes

Component: Ardtoo (25%)

The Ardtoo component makes up 25 percent of the map unit. Slopes are 3 to 15 percent. This component is on mountains, hills, mountains. The parent material consists of loess mixed with minor amounts of volcanic ash over residuum and/or colluvium derived from granite. Depth to a root restrictive layer, bedrock, paralithic, is 41 to 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 75 percent. Nonirrigated land capability classification is 4s. This soil does not meet hydric criteria.

Map unit: 5091 - Brevco gravelly ashy sandy loam, 15 to 30 percent slopes

Component: Brevco (70%)

The Brevco component makes up 70 percent of the map unit. Slopes are 15 to 30 percent. This component is on mountains, mountains, hills. The parent material consists of Loess mixed with minor amounts of volcanic ash over residuum and/or colluvium derived from granite. Depth to a root restrictive layer, bedrock, lithic, is 21 to 41 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 75 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

Map unit: 5092 - Brevco-Rock outcrop complex, 30 to 60 percent slopes

Component: Brevco (60%)

The Brevco component makes up 60 percent of the map unit. Slopes are 30 to 60 percent. This component is on mountains, mountains, hills. The parent material consists of Loess mixed with minor amounts of volcanic ash over residuum and/or colluvium derived from granite. Depth to a root restrictive layer, bedrock, lithic, is 21 to 41 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 75 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Component: Rock outcrop (15%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: 5093 - Blackprince-Ardtoo complex, 15 to 30 percent slopes

Component: Blackprince (40%)

The Blackprince component makes up 40 percent of the map unit. Slopes are 15 to 30 percent. This component is on hills, mountains, mountains. The parent material consists of Loess mixed with minor amounts of volcanic ash over residuum derived from granite. Depth to a root restrictive layer, bedrock, paralithic, is 21 to 41 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 75 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

Component: Ardtoo (35%)

The Ardtoo component makes up 35 percent of the map unit. Slopes are 15 to 30 percent. This component is on mountains, hills, mountains. The parent material consists of loess mixed with minor amounts of volcanic ash over residuum and/or colluvium derived from granite. Depth to a root restrictive layer, bedrock, paralithic, is 41 to 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 75 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

Map unit: 5130 - Brodeer ashy silt loam, 3 to 15 percent slopes

Component: Brodeer (70%)

The Brodeer component makes up 70 percent of the map unit. Slopes are 3 to 15 percent. This component is on hills, mountains. The parent material consists of thick mantle of volcanic ash over residuum weathered from granite, gniess or quartz-monzonite. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 75 percent. Nonirrigated land capability classification is 4c. This soil does not meet hydric criteria.

Map unit: 5140 - Jacot-Hysing complex, dry, 3 to 15 percent slopes

Component: Jacot, dry (50%)

The Jacot, dry component makes up 50 percent of the map unit. Slopes are 3 to 15 percent. This component is on mountains, mountains, hills. The parent material consists of thick mantle of volcanic ash over colluvim and residuum derived from granite and/or quartz-monzonite. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 75 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Map unit: 5140 - Jacot-Hysing complex, dry, 3 to 15 percent slopes

Component: Hysing, dry (25%)

The Hysing, dry component makes up 25 percent of the map unit. Slopes are 3 to 15 percent. This component is on mountains, hills, mountains. The parent material consists of thick mantle of volcanic ash over residuum derived from granite and/or quartz-monzonite. Depth to a root restrictive layer, bedrock, paralithic, is 42 to 62 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 75 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Map unit: 5142 - Jacot-Hysing complex, 30 to 55 percent slopes

Component: Jacot (50%)

The Jacot component makes up 50 percent of the map unit. Slopes are 30 to 55 percent. This component is on mountains, mountains, hills. The parent material consists of thick mantle of volcanic ash over colluvim and residuum derived from granite and/or quartz-monzonite. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 75 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Component: Hysing (25%)

The Hysing component makes up 25 percent of the map unit. Slopes are 30 to 55 percent. This component is on mountains, mountains, hills. The parent material consists of thick mantle of volcanic ash over residuum derived from granite and/or quartz-monzonite. Depth to a root restrictive layer, bedrock, paralithic, is 42 to 62 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 75 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 5310 - Kramerhill ashy loam, 3 to 15 percent slopes

Component: Kramerhill (70%)

The Kramerhill component makes up 70 percent of the map unit. Slopes are 3 to 15 percent. This component is on foothills, hills. The parent material consists of residuum and colluvium weathered from saprolitic gneiss, quartzite, Latah Formation mixed with loess and volcanic ash in the upper part. Depth to a root restrictive layer, bedrock, paralithic, is 41 to 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 60 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Acreage and Proportionate Extent of the Soils

Stevens County, Washington

Map unit: 5412 - Keeler ashy loam, 8 to 15 percent slopes

Component: Keeler (75%)

The Keeler component makes up 75 percent of the map unit. Slopes are 8 to 15 percent. This component is on mountains, mountains, hills. The parent material consists of loess with an influence of volcanic ash over colluvium and resiuum derived from granite. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 60 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Map unit: 5413 - Keeler-Kruse complex, 15 to 30 percent slopes

Component: Keeler (45%)

The Keeler component makes up 45 percent of the map unit. Slopes are 15 to 30 percent. This component is on hills, mountains, mountains. The parent material consists of loess with an influence of volcanic ash over colluvium and resiuum derived from granite. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 60 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

Component: Kruse (40%)

The Kruse component makes up 40 percent of the map unit. Slopes are 15 to 30 percent. This component is on foothills, hills, mountains. The parent material consists of loess mixed with minor amounts of volcanic ash over residiuum and colluvium weathered form granite, gneiss and schist. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 60 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

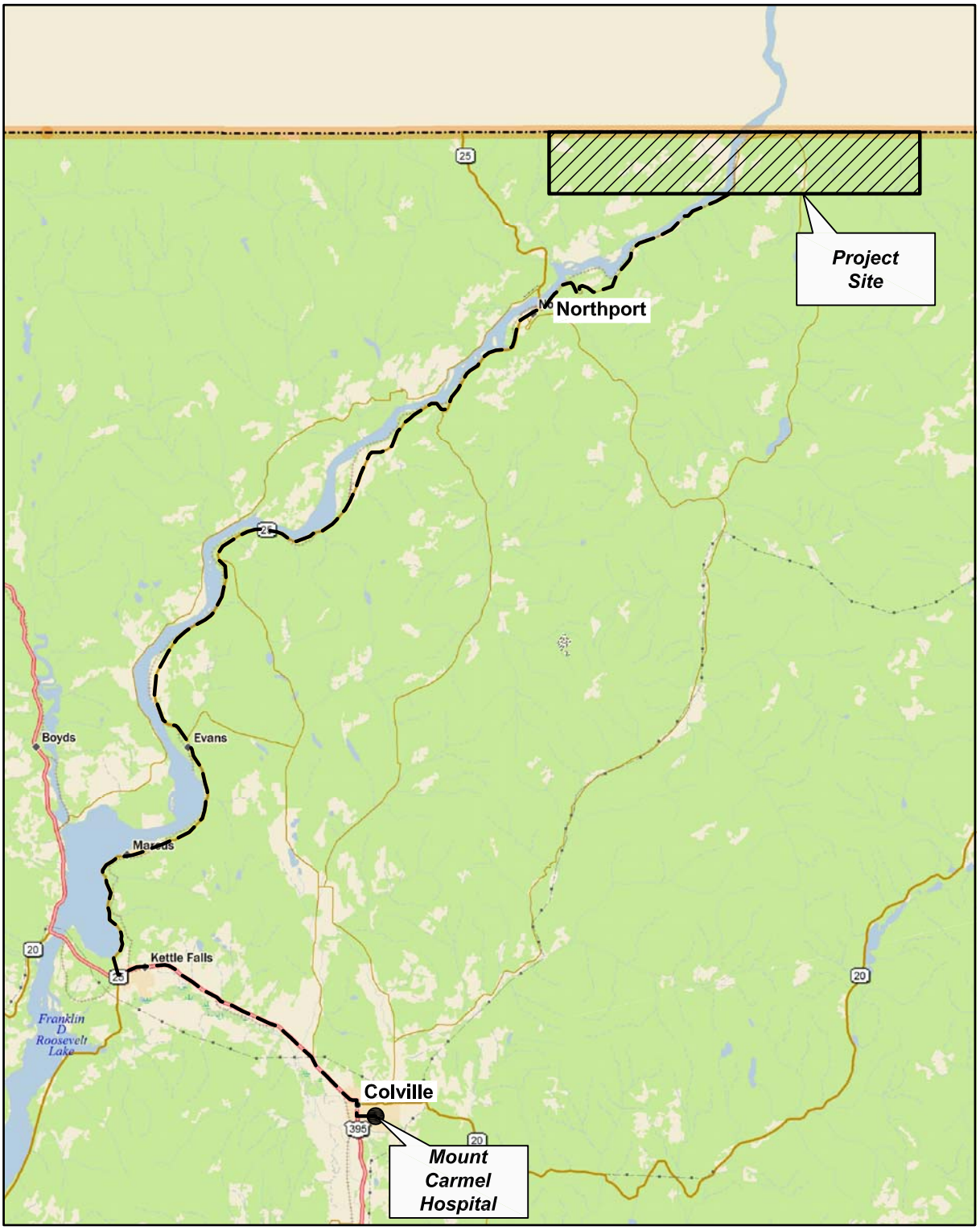
APPENDIX C
HEALTH AND SAFETY PLAN

APPENDIX C
HEALTH AND SAFETY PLAN
UPPER COLUMBIA RIVER UPLAND SOIL SAMPLING STUDY
WASHINGTON STATE
DATE PREPARED: October 30, 2012

EMERGENCY CONTINGENCY INFORMATION

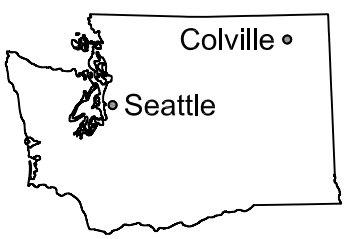
SITE LOCATION	Northern Stevens County
NEAREST HOSPITALS	Mt. Carmel Hospital East Columbia Avenue Colville, WA 99114 (509) 684-2561 The route to the hospital is depicted on Figure C-1
EMERGENCY RESPONDERS	Police Department ....911 Fire Department.....911 Ambulance.....911
EMERGENCY CONTACTS	Hart Crowser, Seattle Office ..... .(206) 324-9530 Steve Hughes ……(206) 719-3478 (cell) Roger McGinnis ..... (206) 612-5732 (cell) Client Emergency Contact (John Rowland) (509) 329-3581 National Response Center..... ...(800) 424-8802 Washington Emergency Management. ..... (800) 258-5990 Ecology Eastern Regional Office ..... (509) 329-3400 EPA Emergency Response Team ..... (908) 321-6660 Poison Control Center..... (800) 222-1222 Chemtrec .....(800) 424-9300
IN EVENT OF EMERGENCY, CALL FOR HELP AS SOON AS POSSIBLE	Give the following information: ➔ **Where You Are**. Address, cross streets, or landmarks ☎ **Phone Number** you are calling from ?? **What Happened**. Type of injury, accident # **How many persons** need help ?? **What is being done** for the victim(s) !! **You hang up last.** Let whomever you called hang up first

Route to Hospital Map



Source: Base map prepared from DeLorme Topo 7.0, 2007.

EAL 10/26/12 1780036-001.dwg



N

0 5 10

Approximate Scale in Miles

HARTCROWSER

17800-36 *10/12*

Figure C-1 *Page 2*

SITE HEALTH AND SAFETY PLAN SUMMARY

LOCATION: Northern Stevens County, Washington State.

PROPOSED DATES OF ACTIVITIES: October 29 – November 5, 2012.

TYPE OF FACILITY: Rural Undeveloped Land.

LAND USE OF AREA SURROUNDING FACILITY: Heavily forested, primarily undeveloped land.

POTENTIAL SITE CONTAMINANTS: Metals; concentrations anticipated to be below MTCA screening criteria or at ambient background levels.

ROUTES OF ENTRY: Not applicable.

OTHER SPECIFIC SAFETY HAZARDS: Forested areas around the site may contain hazardous plants and animals. Work activities may occur during hunting season. Work activities are limited to surface and near-surface soil sampling. Potential safety hazards include wildlife and severe weather.

PROTECTIVE MEASURES: Sturdy hiking boots/safety-toe work boots, work gloves, nitrile gloves, warm and protective clothing, field safety vest, safety glasses, hard hats, bear spray, GPS device, hand-held radios, and cellular phones.

1.0 INTRODUCTION

1.1 Purpose and Regulatory Compliance

This site-specific Health and Safety Plan (H&S Plan) addresses procedures to minimize the risk of physical accidents to on-site workers, as well as environmental contamination. The H&S Plan covers each of the 11 required plan elements as specified in 29 CFR 1910.120 or equivalent state regulations. Table C-1 lists the sections of this plan that apply to each of these required elements. When used together with the Hart Crowser General H&S Plan, this site-specific plan meets all applicable regulatory requirements.

Table C-1 - Location of Required Health and Safety Plan Elements in This Site-Specific H&S Plan

Required H&S Plan Element	Section in this Site-Specific H&S Plan
Decontamination	7.0 Decontamination
Emergency response plan	11.0 Emergency Response Plan
Medical surveillance	12.0 Medical Surveillance
Monitoring program	2.3 Air Monitoring and Action Levels
Names of key personnel	1.3 Chain of Command
Personal protective equipment	3.0 Protective Equipment, 4.0 Safety Equipment List
Safety and hazard analysis	2.0 Hazard Evaluation and Control Measures
Site control	5.0 Exclusion Areas, 9.0 Site Security and Control
Spill containment	10.0 Spill Containment
Training	13.0 Training Requirements

1.2 Distribution and Approval

This H&S Plan will be made available to all Hart Crowser personnel involved in field work on this project. It will also be made available to subcontractors and other non-employees who may need to work on the site under Hart Crowser's direction. For non-employees, it must be made clear that the plan represents minimum safety procedures and that they are responsible for their own safety while present on site. The plan has been approved by the Hart Crowser Corporate Health and Safety (H&S) Manager. By signing the documentation form provided with this plan (Table C-4 located at the end of plan), project workers also certify their acknowledgement and agreement to comply with the plan.

1.3 Chain of Command

The Hart Crowser chain of command for health and safety on this project involves the following individuals:

Corporate Health and Safety Manager: Anne Conrad

The Hart Crowser Corporate Health and Safety Manager has overall responsibility for preparation and modification of this H&S Plan. In the event that health and safety issues arise during site operations, he will attempt to resolve them with the appropriate members of the project team.

Project Manager: Steve Hughes

The Project Manager has overall responsibility for the successful outcome of the project. The Project Manager, in consultation with the Corporate H&S Manager, makes final decisions regarding questions concerning the implementation of the site-specific H&S Plan. The Project Manager may delegate this authority and responsibility to the Project and/or Field H&S Managers.

Project Health and Safety Manager: Roger McGinnis

The Project Health and Safety Manager has overall responsibility for health and safety on this project. This individual ensures that everyone working on the project understands this H&S Plan. This individual will serve as liaison with the Hart Crowser Project Manager so that all relevant health and safety issues are communicated effectively to project workers.

Field Health and Safety Manager: Phil Cordell

The Field Health and Safety Manager is responsible for implementing this H&S Plan in the field. This individual also observes subcontractors to verify that they are following these procedures, at a minimum. The Field H&S Manager will also assure that proper personal protective equipment (PPE) is available and used in the correct manner; decontamination activities are carried out properly; and that employees have knowledge of the local emergency medical system should it be necessary.

1.4 Site Work Activities

The following work tasks will be accomplished:

- Collection of soil samples.

The expected duration of this project is October 29 – November 5, 2012.

1.5 Site Description

Upland soil sampling will be conducted in Northern Stevens County, Washington. The study area is defined as a 12-mile-wide corridor extending 6 miles on either side of the Columbia River and south from the U.S./Canada border for 2 miles. The site consists of forested and unforested land, lakes, streams, and rocky terrain.

2.0 HAZARD EVALUATION AND CONTROL MEASURES

2.1 Toxicity of Chemicals of Concern

Based on previous site information and knowledge of the types of activities conducted at this location, the areas to be sampled are not expected to contain significant levels of chemicals of concern. Metal concentrations are anticipated to be below MTCA screening criteria or at ambient background levels.

2.2 Potential Exposure Routes

As there are no known or suspected chemicals of concern at the rural parks, this section is Not Applicable.

2.3 Air Monitoring and Action Levels

Air monitoring will not be conducted since there are no known or suspected chemicals of concern at the rural state parks.

2.4 Fire and Explosion Hazard

Fire danger is low due to recent rain.

2.5 Heat and Cold Stress

Wearing impermeable clothing reduces the cooling ability of the body due to evaporation reduction. This may lead to heat stress. Cold stress, or hypothermia, can result from abnormal cooling of the core body temperature.

Heat Stress

Signs of Heat Stress

Heat stress is a term that is used to describe progressively more serious symptoms, as follows:

- An initial rise in skin temperature due to increased blood flow to the skin (skin redness);
- Increase in heart rate, to more than 30 beats/minute above the resting level;
- Collapse, or heat exhaustion, due to inadequate blood flow to the brain;
- Dehydration, due to excessive sweating;
- Hyperventilation, resulting in a reduction of the normal blood carbon dioxide concentrations;

- Tingling around the lips, dizziness, cramping of muscles of hands and feet, and blackout; and finally
- Heat stroke, characterized by unconsciousness, hot dry skin, and absence of sweating.

Control of Heat Stress

On hot, sunny days (high radiant heat load), if using impermeable work clothing, maintain appropriate work-rest cycles (progressively longer rest breaks in a cool location or the shade as temperature and work tasks increase) and drink water or electrolyte-rich fluids (Gatorade or equivalent) to minimize heat stress effects. Impermeable clothing will only be worn when absolutely necessary for control of hazardous chemicals.

Also, when ambient temperatures exceed 70° F, employees will conduct monitoring of their heart (pulse) rates, as follows:

- Each employee will check his or her own pulse rate at the beginning of each break period;
- Take the pulse at the wrist for 6 seconds, and multiply by 10; and
- If the pulse rate exceeds 110 beats per minute, then reduce the length of the next work period by one-third.

Example: After a one-hour work period at 80 degrees, a worker has a pulse rate of 120 beats per minute. The worker must therefore shorten the next work period by one-third, resulting in a work period of 40 minutes until the next break.

Treatment of Heat Stress

Individuals affected by mild forms of heat stress (heat exhaustion, dehydration, or cramping) should take a break in a cool or shaded location, drink liquids, and sit or lay down until they feel better. Work periods should be shortened until the temperature cools off.

Individuals affected by heat stroke are in critical condition. Summon emergency aid immediately, remove clothing, and continually bathe the individual in cool water to bring down the core body temperature.

Hypothermia

Signs of Hypothermia

Hypothermia can result from abnormal cooling of the core body temperature. It is caused by exposure to a cold environment and wind-chill. Wetness or water immersion can play a significant role in causing hypothermia. The following discusses signs and symptoms as well as treatment for hypothermia.

Typical warning signs of hypothermia include fatigue, weakness, lack of coordination, apathy, and drowsiness. A confused state is a key symptom of hypothermia. Shivering and pallor are usually absent, and the face may appear puffy and pink. Body temperatures below 90° F require immediate treatment to restore temperature to normal.

Treatment of Hypothermia

Current medical practice recommends slow rewarming as treatment for hypothermia, followed by professional medical care. This can be accomplished by moving the person into a sheltered area and wrapping them with blankets in a warm room. In emergency situations where core body temperature falls below 90° F and heated shelter is not available, use a sleeping bag, blankets and/or body heat from another individual to help restore normal body temperature.

2.6 Other Physical Hazards

Staff is reminded to have work boots, a safety vest, and other appropriate safety equipment when working at a job site.

2.6.1 Stream Safety

Working in and around streams poses human health and safety risks which can be prevented through proper training, risk awareness, and detailed safety guidelines. These threats to human safety can be obvious, such as fast-moving water, inclement weather, or working in remote locations. Not so obvious safety hazards can include slippery surfaces, potential of glass or metal debris out of sight on the stream bed, presence of toxic substances, or pathogens. This section of the Health and Safety Plan is intended to provide a guideline for properly conducting stream work in any capacity but is by no means comprehensive. Additional resources on this subject can be obtained through the Environmental Protection Agency (EPA) Environmental Monitoring and Assessment Program (EMAP).

Considerations

Field investigations conducted near rivers, streams, and creeks should always be approached with caution. Human health and safety is the highest priority. Each individual should come to the project site with prior knowledge of obvious and potential threats to human health. Team members working in remote locations or for extended periods of time should be in good physical condition and participate in regular physical exams. It is a good idea for the project team to be aware of every member's health issues (allergies, medications, pre-existing conditions etc.,) and abilities (can they swim?). Also, team members should be familiar with field equipment, instruments, and sampling methods, as distractions caused by uncertainty can be a tremendous threat to human health and safety. Just as dangerous to human health is fatigue, poor environmental conditions, and malfunctioning equipment. Knowledge of potential weather conditions and having proper field clothing are important considerations when preparing for any field effort. See section 2.5 above for heat and cold stress hazards.

Equipment

2.6.2 Wildlife

General

Do not approach, attempt to touch, or assist any wild animal. Remember that all wild animals are more dangerous if their young are nearby. Do not hesitate to retreat from any situation that seems dangerous. You can always come back later to finish your work.

Bears

All bears are considered potentially dangerous. Sow bears with cubs are considered an **IMMINENT THREAT**; retreat to a safe distance immediately (see below for retreat methods). Black bears are common in the Cascades and will be very active in the lower elevations foraging for fish and berries.

Avoidance Tactics

Avoid bear contact by warning them of your presence. Surprising a bear is very dangerous. **BE NOISY!** Blowing a whistle, wearing bells, blowing an air horn, or talking and singing are all effective ways of giving warning.

Keep yourself clean (wash after meals or snacks) and clear your work area of food waste or open food containers. Avoid foods such as dried or smoked fish and other foods with a strong odor that could entice bears.

When working in black bear habitat, each team member will carry a whistle, a spray can of bear repellant, and any other PPE that may be warranted. Transportation of bear repellant is controlled by regulations controlling the shipment of hazardous materials. Bear repellant is prohibited on passenger aircraft. Fill out proper shipping documents prior to shipment or, if possible, obtain bear repellant upon arrival at your destination. Chemical bear repellents and bear sprays contain a derivative of cayenne pepper. When sprayed directly into an animal's face, these products cause eye and upper respiratory tract irritation. Although such sprays can be effective when used properly, wind and other conditions may alter their effect on the animal. Therefore, use them with caution and always follow the manufacturer's directions. Bear sprays do not guarantee your safety.

Surviving Bear Encounters

Never run from a bear! Back away slowly while maintaining eye contact.

Defensive Attack: If you are attacked by a bear, drop to the ground, curl into a fetal position, and interlock your fingers behind your neck to protect yourself. Do not fight or scream once you have been attacked; play dead. After the attack stops, do not move until you are sure that the bear has left the area. Bear attacks are rarely fatal if these guidelines are followed.

Offensive Attack: (From website for Parks Canada (http://www.pc.gc.ca/docs/v-g/oursnoir-blackbear/page4_E.asp) This is the most serious and potentially deadly attack a black bear might make. It occurs when a bear appears to stalk or follow you and then chooses to attack, or the bear attacks you at night. **In this situation, playing dead is not appropriate.** Try to escape to a secure place such as a vehicle or hard-sided camper.

Climbing a tree is an option, but remember that **black bears can climb trees easily**. If you cannot escape and if a bear continues its pursuit, react aggressively and try to intimidate the bear. If this fails, fight back with anything at hand such as bear spray, rocks, sticks, knives or other possible weapons to let the bear know that you are not easy prey. Act as a group if you are part of one. Don't forget to yell; help may be close by.

Rabies

Foxes are the primary carriers of rabies. Avoid any fox that appears sick, aggressive, or unusually tame (i.e., fearlessly approaches humans). If you suffer any bite or scratch by a wild animal, no matter how minor the wound, seek medical treatment IMMEDIATELY.

Bee Stings

Bee stings can produce life-threatening allergic reactions. Symptoms include pain, swelling of the throat, redness or discoloration of the wound, itching, hives, decreased consciousness, and labored or noisy breathing. If you know you are allergic to bee stings, carry an anaphylactic shock kit, which can be obtained from your physician.

Ticks

Ticks are small blood-feeding parasites that can transmit diseases to people. Some types of ticks perch on the edge of low-lying vegetation and grab onto animals, and people, as they brush past. When working, camping, or walking in a tick habitat - wooded, brushy, or grassy places - a few simple precautions can reduce your chance of being bitten.

- Wear long pants and a long-sleeved shirt. Tuck your pant legs into socks or boots and shirt into pants. This can help keep ticks on the outside of your clothing where they can be more easily spotted and removed.

- Wear light colored, tightly woven clothing which will allow the dark tick to be seen more easily. The tight weave makes it harder for the tick to attach itself.

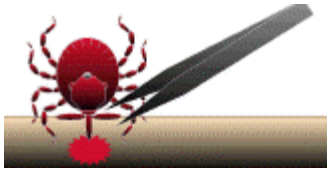
- Use tick repellent when necessary, and carefully follow instructions on the label. Products containing DEET or permethrin are very effective in repelling ticks.

- Check yourself thoroughly for ticks. Carefully inspect areas around the head, neck, ears, under arms, between legs, and back of knees. Look for what may appear like a new freckle or speck of dirt.

To remove a tick:

- Promptly remove the tick using fine-tipped tweezers. Grasp the tick as close to the skin surface as possible and pull upward with steady, even

pressure. Avoid removing the tick with bare hands. Don't twist or jerk the tick — this may cause the mouthparts to break off and remain in the skin. If this happens, remove the mouthparts with tweezers.



- After removing the tick, disinfect the bite site and wash your hands.

Note the date that you found the tick attached to you, just in case you become ill. If a fever, rash, or flu-like illness occurs within a month, let your health care provider know that you were bitten by a tick. This information may assist your health care provider in diagnosing your illness. For further information, see:

http://www.doh.wa.gov/ehp/ts/Zoo/watickdiseases.htm

Rattlesnakes

Rattlesnakes are the largest of the venomous snakes in the United States. They can accurately strike at up to one-third their body length. Rattlesnakes use their rattles or tails as a warning when they feel threatened. Rattlesnakes may be found sunning themselves near logs, boulders, or open areas. These snakes may be found in most work habitats including the mountains, prairies, deserts, and beaches. The Western Rattlesnake is the only snake in Washington with a rattle and facial pits.

Rattlesnakes occur east of the Cascade Mountains, and have been found in the Colville National Forest. Western Rattlesnakes primarily occur in shrub-steppe habitats but are also found in Oregon white oak, ponderosa pine and other open forest types. Talus and basalt rock outcroppings are used for overwintering.

Rattlesnakes are active during the day when temperatures are moderate but switch to nocturnal activity during the hottest months of the year. When not active, they shelter under shrubs and rocks.

In most of the Columbia Basin, rattlesnakes emerge from their overwintering sites (hibernacula or dens) in April. Activity is limited to the vicinity of the

overwintering site for 2 to 3 weeks and then they disperse to their summer foraging areas. Reproduction takes place in the spring near the den site. Young start to appear in late August. Adults return to the overwintering sites starting in late September, although activity may continue until late October depending on location and temperatures.

Preventing Snake Bites

Workers should take the following steps to prevent a snake bite:

- Do not try to handle any snake.
- Stay away from tall grass and piles of leaves when possible.
- Avoid climbing on rocks or piles of wood where a snake may be hiding.
- Be aware that snakes tend to be active at night and in warm weather.
- Wear boots and long pants when working outdoors.
- Wear leather gloves when handling brush and debris.

First Aid

Workers should take the following steps if they are bitten by a snake:

- Seek medical attention as soon as possible (dial 911 or call local Emergency Medical Services.)
- Try to remember the color and shape of the snake, which can help with treatment of the snake bite.
- Keep still and calm. This can slow down the spread of venom.
- Inform your supervisor.
- Apply first aid if you cannot get to the hospital right away.
- Lay or sit down with the bite below the level of the heart.
- Wash the bite with soap and water.
- Cover the bite with a clean, dry dressing.

Do NOT do any of the following:

- Do not pick up the snake or try to trap it.
- Do not wait for symptoms to appear if bitten, seek immediate medical attention.
- Do not apply a tourniquet.
- Do not slash the wound with a knife.
- Do not suck out the venom.
- Do not apply ice or immerse the wound in water.
- Do not drink alcohol as a painkiller.
- Do not drink caffeinated beverages.

For further information, see:

http://www.cdc.gov/niosh/topics/snakes/

http://www1.dnr.wa.gov/nhp/refdesk/herp/html/4crvi.html

2.6.3 Poisonous Plants

Poison Oak and Poison Ivy

Poison oak is common in western Washington, and poison ivy is found in eastern Washington. See Attachment A for identification, prevention, and treatment.

2.6.4 Vehicle Safety

Seat belts will be worn at all times when driving and rules of the road will be obeyed while engaged in company business. Drivers must be legally licensed to drive.

2.6.5 Trips/Falls

As with all field work sites, caution will be exercised to prevent slips on rain-slick surfaces, snow-covered ground, stepping on sharp objects, etc. Work will not be

performed on excessively steep slopes (>75%) or in the vicinity of vertical drop-offs without fall protection.

2.6.7 Hunting Season Safety

Some field work may occur on forest service land during hunting season. For protection of workers, high visibility clothing will be required during sampling and investigation events. Blaze/fluorescent orange clothing is preferred. Make yourself heard. You needn't be excessively loud, but keep up a steady conversation with a partner. If you're alone, whistle, sing, or talk to make yourself heard.

Hunting season dates for the Van Stone Mine site are provided in Attachment B.

2.6.8 Lightning and Forest Fire Safety

Lightning strikes and associated forest fires are a possible safety hazard during field work at this site. The following safety measures should be followed and implemented if thunderstorms are observed during field activities (derived from National Lightning Safety Institute website).

- ***PLAN*** *in advance your evacuation and safety measures.* When you first see lightning or hear thunder, activate your emergency plan. Now is the time to go to a building or a vehicle. Lightning often precedes rain, so don't wait for the rain to begin before suspending activities. A rule of thumb to determine the distance of a thunderstorm: Count the seconds between when you see the lightning and hear the thunder, and divide by five to get an estimate of the number of miles to the storm.

- ***IF OUTDOORS...****Avoid water. Avoid the high ground. Avoid open spaces.* Avoid all metal objects including electric wires, fences, machinery, motors, power tools, etc. Unsafe places include underneath canopies, small picnic or rain shelters, or near trees. Where possible, find shelter in a substantial building or in a fully enclosed metal vehicle such as a car, truck or a van with the windows completely shut. If lightning is striking nearby when you are outside, you should:

  - ***Crouch down***. Put feet together. Place hands over ears to minimize hearing damage from thunder.

  - ***Avoid proximity*** (minimum of 15 ft.) to other people.

- ***IF INDOORS...*** *Avoid water. Stay away from doors and windows. Do not use the telephone. Take off head sets.* Turn off, unplug, and stay away from appliances, computers, power tools, & TV sets. Lightning may strike exterior electric and phone lines, inducing shocks to inside equipment.

- ***SUSPEND ACTIVITIES*** for 30 minutes after the last observed lightning or thunder.

- ***INJURED PERSONS*** *do not carry an electrical charge and can be handled safely.* Apply First Aid procedures to a lightning victim if you are qualified to do so. Call 911 or send for help immediately.

If a forest fire occurs during sampling events, evacuate the area. The following is a list of forest fire survival tips:

- Fires generally travel faster in the direction of the wind. In addition, fires travel faster uphill than downhill so take these things into account.

- Try to find a natural fire break such as a river or a large empty clearing.

- Should you be forced to try to break through the fire, cover your face and mouth with a wet cloth (or dry if no water is available) and run as fast as possible through the flames. Should your clothes catch fire, extinguish them by rolling and padding.

- Once you are in safety, notify the proper authorities even if you think someone else might have called in already.

2.8 Hazard Analysis and Applicable Safety Procedures by Task

The work tasks and associated hazards that may be anticipated during the operations described elsewhere in this site-specific H&S Plan, and suitable control measures are presented in Table C-3.

Table C-2 - Hazard Analysis by Task

Work Task	Hazards	Protective Measures[a,b]
Hiking	Trips and falls, wildlife.	Buddy teams, work gloves, exposure protection, climbing helmets, bear spray.
Soil sample collection	Trips and falls, wildlife.	Level D PPE, Nitrile gloves, bear spray.

[a]Protection levels are defined in Table C-4.
[b]Protection levels may require upgrade based on site monitoring or other information.

3.0 PERSONAL PROTECTIVE EQUIPMENT

Table C-3 presents a summary of minimum personal protective equipment requirements based on the potential route of contact and the potential contaminants. These requirements are classified in the designated Level D category as discussed below. Situations requiring Level A, B, or C protection are not anticipated for this project. As noted previously, should they occur, work will stop and this Site-specific H&S Plan will be amended as required prior to resuming work.

Table C-3 - Minimum Personal Protection Level Requirements

Potential Route of Contact: Types of Contaminants	Required Protection Level	Required Equipment								
		Safety Glasses	Hard Hat	Safety Boots	Tyvek	Poly Tyvek	Nitrile Gloves	Neoprene Gloves	Respirator	
									Half-Face	Full-Face
None Anticipated	Level D(a)	b	c	X			X			

Notes:
a. Level D protection required when atmosphere contains no known hazard and work functions preclude splashes, immersion, or the potential for unexpected inhalation of or contact with hazardous levels of any chemicals.
b. Safety glasses are required if dusty or high wind conditions are encountered.
c. Hard hat is required where risk of striking overhead objects exists.

3.1 Level D Activities

Workers performing general site activities where skin contact with free product or contaminated materials is not likely and inhalation risks are not expected will wear regular work clothes with long pants, eye protection (as required), hard hat (as required), nitrile- or neoprene-coated work gloves (as required), and safety boots.

4.0 SAFETY EQUIPMENT LIST

The following Safety Equipment must be available on site:

- First Aid Kit;
- 10-lb ABC Fire Extinguisher;
- Eye and Ear Protection;
- Hand-held Radios;
- Cellular phone;
- Personal safety GPS device;
- Appropriate weather gear;
- DOT-approved helmet for ATV usage;
- Hard hats;
- Bear repellant and bear bells;
- High Visibility Safety Vest;
- Field Boots/Safety boots; and
- Nitrile or Leather Outer Gloves/Nitrile or Latex Inner Gloves

All safety gear and PPE must be cleaned following use and stored in a secure manner to avoid damage. Avoid storing gear in direct sunlight or exposed to weather conditions. Safety equipment and PPE should be checked periodically and damaged or worn out gear should be disposed of and replaced. First Aid kits should be checked on a monthly basis during active field programs to ensure that they are adequately stocked and maintained.

5.0 EXCLUSION AREAS

Field work being performed for this project consists of sampling activities in remote locations that will not result in migration of contaminants or increased exposure to human health or the environment. Establishment of exclusion, contaminant reduction, and support zones is not necessary for this field investigation.

6.0 MINIMIZING CONTAMINATION

Not applicable.

7.0 DECONTAMINATION

Decontamination is not necessary for personnel due to no known or suspected chemicals of concern at the rural state parks. Decontamination of sampling equipment is described in the Sampling and Analysis Plan (SAP).

8.0 DISPOSAL OF CONTAMINATED MATERIALS

Not applicable.

9.0 SITE SECURITY AND CONTROL

Site security and control will be the responsibility of the Project Manager. Any security or control problems will be reported to appropriate authorities.

10.0 SPILL CONTAINMENT

Sources of bulk chemicals subject to spillage are not expected to be encountered in this project. Accordingly, a spill containment plan is not required for this project.

11.0 EMERGENCY RESPONSE PLAN

The Hart Crowser Emergency Response Plan outlines the steps necessary for appropriate response to emergency situations. The following paragraphs summarize the key Emergency Response Plan procedures for this project.

11.1 Plan Content and Review

The principal hazards addressed by the Emergency Response Plan include the following: medical emergencies, wildlife, and hypothermia. However, to help anticipate potential emergency situations, field personnel shall always exercise caution and look for signs of potentially hazardous situations, including the following as examples:

- Visible or odorous chemical contaminants;
- Drums or other containers;
- General physical hazards (traffic, moving equipment, sharp or hot surfaces, slippery or uneven surfaces, etc.,);

- Live electrical wires or equipment;
- Underground pipelines or cables;
- Adverse weather conditions; and
- Poisonous plants or dangerous animals.

These and other potential problems should be anticipated and steps taken to prevent problems before they occur.

The Emergency Response Plan shall be reviewed and rehearsed, as necessary, during the on-site health and safety briefing. This ensures that all personnel will know what their duties are if an actual emergency occurs.

11.2 Plan Implementation

The Field H&S Manager will evaluate the situation and act as the lead individual in the event of an emergency. He or she will determine the need to implement the emergency procedures, in concert with other resource personnel including client representatives, the Project Manager, and the Corporate H&S Manager. Other on-site field personnel will assist the Field H&S Manager as required during an emergency.

In the event the Emergency Response Plan is implemented, the Field H&S Manager or designee is responsible for alerting all personnel at the affected area by use of a signal device (such as a hand-held air horn) or visual or shouted instructions, as appropriate.

Emergency evacuation routes and safe assembly areas shall be identified and discussed in the on-site health and safety briefing, as appropriate. The "buddy system" will be employed during evacuation to ensure safe escape, and the Field H&S Manager shall be responsible for roll call to account for all personnel.

11.3 Emergency Response Contacts

Site personnel must know whom to notify in the event of Emergency Response Plan implementation. The following information will be readily available at the site in a location known to all workers:

- Emergency Telephone Numbers: see list at the beginning of this plan;

- Route to Nearest Hospital: due to the various locations of the rural state parks, the response for an emergency is to call 911;

- Site Descriptions: see the description at the beginning of this plan; and

- If a significant environmental release of contaminants occurs, the federal, state, and local agencies noted in this plan must be immediately notified. If the release to the environment includes navigable waters also notify:

    - National Response Center at (800) 424-8802
    - EPA at (908) 321-6660

In the event of an emergency situation requiring implementation of the Emergency Response Plan (fire or explosion, serious injury, tank leak or other material spill, presence of chemicals above exposure guidelines, inadequate personal protection equipment for the hazards present, etc.), cease all work immediately. Offer whatever assistance is required, but do not enter work areas without proper protective equipment. Workers not needed for immediate assistance will decontaminate per normal procedures (if possible) and leave the work area, pending approval by the Field H&S Manager for restart of work. The following general emergency response safety procedures should be followed.

11.4 Fires

Hart Crowser, Inc., personnel will attempt to control only very small fires. If an explosion appears likely, evacuate the area immediately. If a fire occurs that cannot be controlled with a 10-pound ABC fire extinguisher, immediate intervention by the local fire department or other appropriate agency is imperative. Use these steps:

- Evacuate the area to a previously agreed upon, upwind location;

- Contact the fire agency identified in the site-specific plan; and

- Inform the Project Manager or Field H&S Manager of the situation.

11.5 Medical Emergencies

Contact the agency listed in the site-specific plan if a medical emergency occurs. If a worker leaves the site to seek medical attention, another worker should accompany the patient. When in doubt about the severity of an accident or exposure, always seek medical attention as a conservative approach. Notify the Project Manager of the outcome of the medical evaluation as soon as possible. For minor cuts and bruises, an on-site first aid kit will be available.

- If a worker is seriously injured or becomes ill or unconscious, immediately contact 911.

11.6 Other Emergencies

Depending on the type of project, other emergency scenarios may be important at a specific work site. These scenarios will be considered as part of the site-specific H&S Plan and will be discussed during the on-site safety briefing, as required.

11.7 Plan Documentation and Review

The Field H&S Manager will notify the Project H&S Manager as soon as possible after the emergency situation has been stabilized. The Project Manager or H&S Manager will notify the appropriate client contacts, and regulatory agencies, if applicable. If an individual is injured, the Field H&S Manager or designate will file a detailed Accident Report with the Corporate H&S Manager within 24 hours.

The Project Manager and the Field, Project, and Corporate H&S Managers will critique the emergency response action following the event. The results of the critique will be used in follow-up training exercises to improve the Emergency Response Plan.

12.0 MEDICAL SURVEILLANCE

A medical surveillance program has been instituted for Hart Crowser employees having exposure to hazardous substances. Exams are given before assignment, annually thereafter (biannually for Associates and above), and upon termination. Content of exams is determined by the Occupational Medicine physician in compliance with applicable regulations and is detailed in the General H&S Plan.

Each team member will undergo a physical examination, as noted above, to verify that he or she is physically able to use PPE, work in hot environments, and not be predisposed to occupationally induced disease. Additional exams may be needed to evaluate specific exposures or unexplainable illness, including excessive exposure to lead.

13.0 TRAINING REQUIREMENTS

Hart Crowser employees who perform site work must understand potential health and safety hazards. All employees potentially exposed to hazardous substances, health hazards, or safety hazards will have completed 40 hours of off-site initial hazardous materials health and safety training or will possess

equivalent training by past experience. They will also have a minimum of three days of actual field experience under the direction of a trained supervisor. The Hart Crowser Human Resources Department will maintain employee health and safety training records. Employees will also complete annual refresher, supervisor, and other training as required by applicable regulations.

Prior to the start of each work day, the Field H&S Manager will review applicable health and safety issues with all employees and subcontractors working on the site, as appropriate. These briefings will also review the work to be accomplished, with an opportunity for questions to be asked.

14.0 REPORTING, REPORTS, AND DOCUMENTATION

In the event that accidents or injuries occur during site work, the Project Manager will be informed, and they will notify the client immediately. Hart Crowser personnel and subcontractors on this site will sign the Record of H&S Communication document (Table C-4), which will be kept on site during work activities and recorded in the project files.

Field Health & Safety Report

HARTCROWSER

Job No._____
Date_____
S M T W Th F S
Arrival Time:_____
Departure Time:_____

Field Health & Safety Report

Job_____
Location_____
Client_____
Field Representative_____ Project Manager_____
Field H&S Manager_____ Project H&S Manager_____

Names of personnel on site_____

Site Activities_____

Potential Hazards_____

Hazard Control Used_____

Protective Measures Taken_____

Comments of Observations_____

Sketch position of equipment relative to exploration
Indicate monitoring point(s) and prevailing wind direction

Exploration No._____

Air Monitoring Log

Meter Number 1, Type_____ Calibrated_____ Checked_____
Meter Number 2, Type_____ Calibrated_____ Checked_____
Background Reading: Meter 1_____ Meter 2_____

Time	Meter 1	Meter 2	Comments

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Table C-4 - Record of Health and Safety Communication*

PROJECT NAME: Upper Columbia River Upland Soil Sampling Study	**PROJECT NUMBER:** 17800-36
SITE CONTAMINANTS: None	

PPE REQUIREMENTS (check all that apply):

	Safety glasses	x	**Gloves (specify)**	Work gloves, nitrile
	Safety boots	x	**Clothing (specify)**	Safety vest
	Hard hat		**Respirator (specify)**	
			Other (specify)	

The following personnel have reviewed a copy of the Site-specific Health and Safety Plan. By signing below, these personnel indicate that they have read the plan, including all referenced information, and that they understand the requirements which are detailed for this project.

PRINTED NAME	SIGNATURE	PROJECT DUTIES	DATE

***PROJECT MANAGER: PLEASE ROUTE A COPY OF THIS FORM TO THE JOB FILES WHEN COMPLETED.**

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ATTACHMENT A
POISON OAK AND POISON IVY FACT SHEET

PNW 108 • Revised May 1994

Poison Oak and Poison Ivy

Rhus diversiloba T. & G and Rhus radicans L.

L.C. Burrill, R.H. Callihan, and R. Parker

Poison oak is common in western Oregon and Washington. Its near relative, poison ivy, is found in eastern Oregon and Washington, throughout Idaho, and eastward. Both plants are native to the Pacific Northwest.

They are so similar in their appearance, growth, effects on humans, and responses to control efforts that their common names often are interchanged.

These plants are found in fencerows, waste areas, open forests, hill pastures, cut-over forest lands, stream banks, and rocky canyons in most Pacific Northwest counties. Each autumn, their brilliant red foliage attracts unsuspecting people who gather them for house decoration and then suffer poisoning, sometimes requiring hospitalization.

Poisonings are not limited to autumn, however. Swimmers, boaters, fishermen, hikers, and picnickers are most frequently exposed to and poisoned by these plants. These two plants substantially limit the use and enjoyment of our natural environment.

Figure 1.—Shiny, reddish, three-part leaves should be a warning sign in the early spring.

Figure 2.—Three-part leaves and a fruit that is often shining yellowish or white and ridged are typical of both poison oak and poison ivy.

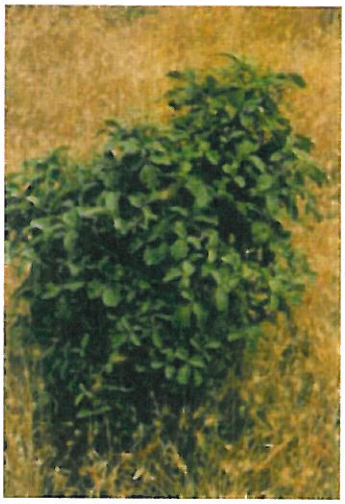


Figure 3.—Poison ivy leaflets are smoother than poison oak, and ivy's two lateral leaflets have short stalks.

Larry C. Burrill, Extension weed specialist, Oregon State University; Robert H. Callihan, Extension weed specialist, University of Idaho; and Robert Parker, Extension seed scientist, Washington State University.

Value and Use

Poison oak and poison ivy are eaten by goats and sheep as well as deer and other wildlife. Animals do not appear to be sensitive to the poison. Bees make a popular honey from their pollen, the only part of the plant that does not contain the toxic substance. Birds feed on the fruits during the winter and are largely responsible for the number of plants, especially near trees and fences.

These values generally are not considered significant virtues, however, since many nonpoisonous and desirable plant species, both native and introduced, provide equal or better animal forage and erosion control. The colorful autumn foliage adds to the scenic beauty of the countryside, but is a deceptively sinister attraction.

Identification

Poison oak and poison ivy are in the Sumac (*Anacardiaceae*) family. The major taxonomic authority in this region, *Vascular Plants of the Pacific Northwest* (by Hitchcock, et al.), assigns the name *Rhus diversiloba* T. & G to poison oak and *Rhus radicans* L. to poison ivy. The names *Toxicodendron diversilobum* for poison oak and *T. radicans* L. or *T. rydbergii* for poison ivy also have been used.

Poison ivy and poison oak normally grow as shrubs from 3 to 10 feet tall, but they also grow as woody vines that twine around trees and larger shrubs. They reproduce both by seed and by lateral underground rootstocks. The vine develops rootlets on the stems, enabling the vines to adhere to tree trunks and other surfaces.

Poison ivy and poison oak are readily identified by their leaves. Young leaves are shiny red, turning to shiny green. Leaflets are from ½ to nearly 2 inches long. They grow in groups of three on a common stem and resemble oak or ivy leaves. Each of the three leaflets of poison ivy has a stalk, whereas only the terminal leaflets of poison oak have stalks. The tips of poison ivy leaflets are acutely pointed, while poison oak leaflets are more rounded. The leaf surface is glossy and may have a blistered appearance. Flowers are greenish-white, about ¼ inch across, and are borne in clusters on a slender stem. The fruits are white, berrylike, glossy and dry when ripe, with a striped stone inside the papery shell. Berries of poison ivy are about ⅛ inch in diameter, whereas those of poison oak are slightly larger.

Poisoning

Caution: If you know or suspect that you are susceptible and you intend to work near poison ivy or poison oak, avoid both direct and indirect contact with the plants. Wear rubber gloves and other protective clothing.

All parts of poison ivy and poison oak plants except the pollen contain an extremely poisonous oily substance, urushiol, during the entire year. This toxin causes painful irritation and blistering of the skin. Poison ivy and poison oak dermatitis is apparently an anaphylactic reaction; that is, it occurs only after sensitization by previous exposure. Human reactions vary from extreme susceptibility to near immunity. Many people are immune when young, but suddenly or gradually become sensitive with age, possibly due to sensitization through repeated exposure.

A few cases have resulted in death because the poison affected large areas of the body or was severe internally. Such cases are rare, but doctors should be consulted in moderate to extreme cases.

To cause poisoning, the oil usually must contact the skin, either directly by touching the plant, or indirectly by touching things that have touched the plant such as gloves or other clothing, tools, animals, water, or firewood. The toxin may move systemically within the body after penetrating the skin. Broken blisters will not spread the poison because their content is solely body fluid. The harmful oil infiltrates the inner skin almost immediately. The exact time depends upon the amount of oil the skin has come in contact with.

Symptoms can begin within a few hours after contact, or can arise 3 to 5 days later. Washing is important to remove excess poison which might be transmitted to other parts of the body or to another person.

People who are exposed to poison ivy or poison oak should thoroughly wash the exposed skin with soap and cold water, followed with rubbing alcohol or a solution of water and alcohol in equal proportions to dissolve the unabsorbed poison. This solution must be used liberally to remove the poison, because the solution only flushes away the poison—it does not inactivate it. Bathing only spreads the toxic liquid to contaminate other body parts because the oil is transported by water.

Contaminated clothing and bedding can carry the poisonous oil for years. If poisoning occurs even after laundering, dry cleaning may be necessary. Do not wash contaminated clothes with other clothes. Take care to rinse the washing machine thoroughly.

Smoke from burning poison ivy and poison oak has poisoned people who were otherwise immune. Inhalation of such smoke results in lung poisoning that can require hospitalization and intensive care. The oil is not volatile at bonfire temperatures. Any transmission from smoke is by droplets on particles of dust and ash in the smoke, rather than from vapors.

Control

Mechanical Control

Poison ivy and poison oak plants can be removed by grubbing or hand pulling in areas that contain valuable ornamentals. All precautions discussed above should be followed. Persons who are sensitive to poison ivy and poison oak probably should not attempt hand methods of control. Roots and rootstocks can be removed most easily when the soil is thoroughly wet. Grubbing or pulling when the soil is dry and hard is almost futile because roots break off in the ground, leaving large pieces that can sprout vigorously later.

Poison ivy and poison oak vines climbing on trees should be cut at the base, and as much of the vine as possible should be pulled away from the tree. Often, tree roots and poison ivy roots are so intertwined that grubbing is impossible without injuring the tree.

Remember that the roots and stems removed during grubbing are poisonous.

A poison ivy or poison oak seedling 2 months old usually has a root system that a single mowing will not kill. Seedling plants at the end of the first year have well established rootstocks that only grubbing or herbicides will kill. Seedlings will recur as long as seedbearing plants are in the general area.

Mowing with a scythe or sickle is not an efficient means of controlling poison ivy and poison oak. It has little effect on roots unless it is repeated frequently. Cutting plants and allowing the sap to be exposed can present considerable risk to those who might come into contact with it.

A single plowing is of little value in combating poison ivy and poison oak, but good seedbed preparation and planting cultivated crops for 1 or 2 years will control them.

Weed burners are not practical or efficient for controlling poison ivy and poison oak.

Biological Control

Though some animals graze poison ivy and poison oak and may limit abundance of those plants, grazing will not eliminate the weeds or stop their spread unless it continues intensively for several years. No parasitic insects or microorganisms have been found to suppress poison oak or poison ivy.

Caution: Poisonous oils may be transferred from animals grazing in or moving through poison ivy or poison oak to people who handle those animals.

Chemical Control

Several commonly used brush killers control poison ivy or poison oak. Foliage spraying should be done in the late spring or early summer (June in most areas) after poison ivy or poison oak are in full leaf. Regrowth and missed plants should be resprayed the same year. Herbicides may drift if sprayed during breezy conditions and must be applied carefully in areas where susceptible plants are growing.

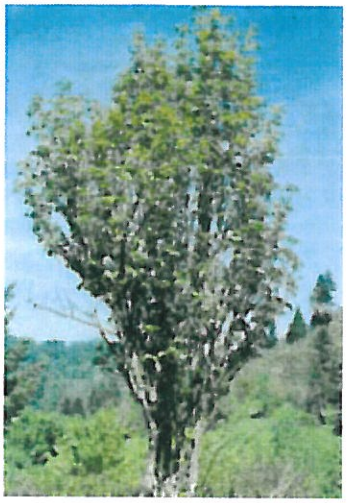
Selective herbicides can remove poison oak and poison ivy without destroying grass. Those herbicides can damage valuable plants such as ornamentals, however, so herbicides must be carefully applied. Some of these herbicides can be obtained in pre-mixed, ready-to-use forms in small consumer packages in garden and lawn stores.

Poison oak and poison ivy can be effectively controlled by treating the lower stems with herbicides registered for such a method in the winter when the plants are leafless and dormant.

Winter application is relatively safer than in other times of the year because there are fewer ornamental and other valuable plants nearby that may be injured by carelessness or accidental spraying. Also, leafless stems provide less exposure of the operator to the poisonous plants.

The purchase and use of some of these herbicides requires an applicator's license.

Soil-applied herbicides of some types are appropriate for control of poison oak and poison ivy in certain cases, but such herbicides are less selective and should not be used where susceptible plants are growing. If used at high rates, such herbicides may kill



Figures 4-6.—Poison oak and poison ivy can grow as shrubs, vines, or trees.

Figure 7.—In the winter, the leafless branches of poison oak or poison ivy still hold the harmful oils.

plants of all kinds on the site, leaving the soil bare for several years. Be sure that the long-range effects are desired on the site before using soil herbicides.

As with most perennial weeds, repeat applications over several years should be anticipated for complete control.

For suggested herbicides, refer to the *Pacific Northwest Weed Control Handbook*, an annually revised Extension publication available from the Extension Services of Oregon State University, Washington State University, and the University of Idaho.

Carefully read and follow label directions when using any herbicide.

Photographs provided by Larry Burrill, Extension weed specialist, Oregon State University.

Pacific Northwest Extension publications are jointly produced by the three Pacific Northwest states—Oregon, Washington, and Idaho. Similar crops, climate, and topography create a natural geographic unit that crosses state lines. Since 1949 the PNW program has published more than 450 titles. Joint writing, editing, and production have prevented duplication of effort, broadened the availability of faculty specialists, and substantially reduced the costs for participating states.

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ATTACHMENT B
HUNTING SEASON DATES

ATTACHMENT B

Below are the hunting seasons in Stevens County near Van Stone Mine during the months of September, October, November, and December.

Sept 1 to March 15: Small game (modern firearm, archery)
Sept 1 to Sept 23: Deer season (archery)
Oct 15 to Oct 28: Deer season (modern firearm)
Sept 6 to Set 18: Elk (archery)
Oct 29 to Nov 6: Elk season (modern firearm)
Nov 23 to Dec 28: Elk season (muzzleloaders)

For more information on hunting, please contact the WDFW Wildlife Program.
Phone: 360-902-2515
wildthing@dfw.wa.gov