APPENDIX A
SAMPLING AND ANALYSIS PLAN

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This appendix presents the Sampling and Analysis Plan (SAP), which describes the field methods that will be used to collect the soil samples at the West Discharge Ravine (WDR). This appendix includes information for collecting additional characterization samples from below the diversion structure and transect samples in the upper and lower WDR (Pre-Interim Action sampling), verification samples after excavation, and stockpile samples for waste designation.

Disposable equipment will be used to sample surface and subsurface soils. Miscellaneous tools, which may be used to break up dense soil, will be decontaminated before collection of each sample. The decontamination procedure will consist of the following:

- Scrub with a phosphate detergent (Alconox) solution;
- Rinse with potable water; and
- Rinse by thoroughly spraying with deionized/distilled water.

A.1 Pre-Interim Action Sampling

A.1.1 Soil Sampling

Surface soil samples will be collected from beneath the surface using a disposable plastic sampling spoon or trowel. Surface vegetation will be removed before samples are collected. Soil samples will be collected from 0 to 1 foot below ground surface. Each sample will be collected so as to be representative of the conditions. Debris, vegetation, and gravel larger than 0.25 inch in diameter will be removed prior to homogenizing the sample. Soil samples will be homogenized in a decontaminated stainless steel mixing bowl and placed in an 8-ounce glass jar. Samples will be submitted for laboratory analysis of PCBs by EPA Method 8082 and Petroleum Hydrocarbons by NWTPH-Dx.

Soil samples will be visually classified in the field in accordance with ASTM D 2488. Other relevant details, such as staining, odor, and presence of debris will also be noted.

A.1.2 Sample Locations and Designations

Soil sampling locations will be located by measuring from known features so they can be placed on site maps. Each location will also be marked with a stake labeled with the sample identification number. Please refer to Figure A-1 to aid in understanding the planned sampling scheme.

- The ravine below the spillway is approximately 125 feet long and has not been sampled previously. Samples will be collected from the concrete diversion structure along the centerline of the ravine to the Spokane River on 25-foot intervals (samples WDR-PIA-1 through WDR-PIA-5). In addition, one transect perpendicular to the centerline of the ravine will be collected at about 10-foot intervals to help determine the lateral extent of PCB contamination in a north/south direction (samples WDR-PIA-6 through WDR-PIA-9).

- A north/south transect will be established at the location for previously collected sample WDR-SS-13 in the lower Ravine, which had the highest PCB concentration is surface soil samples collected during the Phase I investigation. Samples will be collected at about 10-foot intervals perpendicular to the centerline of the ravine to help determine the lateral extent of PCB contamination in a north/south direction (samples WDR-PIA-10 through WDR-PIA-13).

- A north/south transect will be established at the midpoint of the upper WDR in the vicinity of Phase I surface soil sampling location WDR-SS-3. Samples will be collected at about 10-foot intervals perpendicular to the centerline of the ravine to help determine the lateral extent of PCB contamination in a north/south direction (samples WDR-PIA-14 through WDR-PIA-17).

Sample nomenclature is as follows:

- Soil sample numbers for this sampling will begin with WDR, followed by a dash and PIA (Pre-Interim Action), followed by a dash and a sequential number (WDR-PIA--XX).

- Numbering for the samples will begin with the sample adjacent to the river and proceed up the lower WDR and continuing in the upper WDR.

In summary, it is anticipated that 17 soil samples will be collected and analyzed to characterize the ravine below the spillway and estimate the width of contamination in the lower and upper WDR.

A.2 Field Sampling, Excavation, and Soil Logging of WDR

A.2.1 Excavation and Soil Logging

Excavation of the impacted soils will start in the lower WDR in the area immediately adjacent to the Spokane River. The intent is to address the near-river areas during the seasonal low flow period of mid- to late summer. This will enable the removal of the maximum amount of impacted soil in the lower WDR and reduce the potential for erosion during higher river flow periods. Subsequent excavations will proceed up the lower WDR to the road and then into the upper WDR.

Prior to the start of excavation, Hart Crowser field representatives will mark the areas to be excavated. The excavation areas in the upper and lower WDR will be divided into 23 individual cells. The number of cells reflects the number of characterization samples collected from the base of the ravine (i.e., 18 Phase I samples and 5 Pre-Interim Action ravine bottom samples, see Figure A-2). Cells will be centered on individual characterization sample locations and extend along the ravine bottom half the distance to the adjacent characterization samples. The base of the ravine characterization samples are spaced at 25-foot intervals. The Pre-Interim Action sampling transect results along with field screening for PCBs will be used to determine the width of each cell. The working assumption for this Work Plan is that PCBs contamination above the CULs extends 10 feet from the ravine centerline for total cell width of 20 feet. This will provide excavation cells with approximate dimensions of 25 by 20 feet.

Field screening for PCBs will be conducted with the Ensys PCB test system manufactured by Strategic Diagnostics. The Ensys system will be calibrated to Aroclor 1248. Using EPA Method 4020, this will give field indication of the extent of soil with PCB concentrations greater than about 1.0 mg/kg.

With the boundaries of a cell field marked, excavation will proceed in that cell in 12-inch lifts until clean soil is reached based on field screening results. Refer to Section A.2.2 for a discussion of the methods to be used to determine that sufficient excavation in each cell has occurred and that CULs have been achieved. Cells will be designated numerically with the cell adjacent to the river being Cell Number 1.

Excavation will be conducted under the direction of a Hart Crowser field representative, who will prepare a detailed field log of the excavation. Soil samples will be visually classified in the field in accordance with ASTM D 2488. Other relevant details, such as staining, odor, presence of debris, and results of the field screening analysis will also be noted.

A.2.2 Verification Sample Locations and Sample Designations

Following excavation of a 12-inch lift from a cell, a square-based sampling grid will be overlaid on the cell per the procedures defined in Subpart O of TSCA (40 CFR 761.283). The grid system origin will be at the center of each cell, which corresponds to the characterization sample location. A grid axis will be oriented on the centerline of the ravine with an axis, also centered in the cell, perpendicular to the centerline of the ravine. From the grid origin, grid lines will be spaced at 5-foot intervals from the center axes to the edge of the excavation cell as shown in schematic on Figure A-2.

Following the layout of the grid system in a cell, individual soil samples will be collected at the intersection of grid lines that fall within the excavation cell. Samples from each grid point will be individually field screened for PCBs using the Ensys PCB test system. If the individual field screened samples indicate that the entire cell is below CULs, excavation in that cell can be terminated, and verification samples will be collected for laboratory analysis. If individual field screened samples, or groups of samples, indicate that areas within the cell are still above CULs, the TSCA area of inference for these samples will be used to mark areas within the cell for further excavation. TSCA specifies that the area of inference for an individual sample extends one half grid interval distance from the sample point in four directions. Therefore, with grid spacing at 5-foot intervals, this will establish a 25-square-foot area centered on the sample for further excavation. An additional 12-inch lift will be excavated from these areas. Field screening will be used to determine whether the additional 12-inch lift was sufficient to meet CULs in the area.

When field screening indicates that an excavation cell meets the CULs, verification sampling for laboratory analysis will proceed. The field compositing techniques specified in TSCA 40 CFR 761.289(b)(i) will be used to collect verification samples within each excavation cell. Using these procedures, a maximum of nine adjacent grid point can be composited. The maximum dimensions of the area enclosing the nine grid point composite is two grid intervals bounded by three collinear grid points. This establishes an area of 10 by 10 feet or 100 square feet.

Some latitude in determining compositing schemes within an individual excavation cell will be given to the field personnel and will be based on the actual area of excavation for each cell. Efforts will be made to include up to nine grid points in a sample, but based on cell dimensions, composites with fewer than nine samples and discrete samples will likely be necessary. Regardless of the actual compositing scheme used in each cell, field personnel will ensure that the sample areas completely overlay the entire excavation cell. Additionally, field personnel will ensure that grid layout and compositing procedures are consistent for each excavation cell and accurately detailed in field notes.

With the simplifying assumption that excavation cells will have approximate dimensions of 25 by 20 feet, only one nine-point composite can be collected from each cell based on the TSCA criteria for composite sampling (see Detail on Figure A-2). The remainder of the samples will consist of a collection of two-point, four-point, and six-point composites to completely overlay the excavation cell. In reality, the collection of discrete samples will likely be necessary to completely overlay non-uniform dimensioned excavation cells. It is understood that discrete samples collected and submitted for laboratory analysis will provide a better correlation between the discrete field screening techniques and the analytical results as compared with the analytical results from composited samples. Therefore, to assess the accuracy of the Ensys field screening system a minimum of one discrete sample will be collected from each excavation cell and submitted for laboratory analysis. If an individual excavation cell can be covered entirely with composite samples, one two-point composite will be broken out to create two discrete samples to be submitted for laboratory analysis.

Each sample will be collected so as to be representative of the conditions of the excavation. All samples in a composite will be collected at the same depth. Samples will be homogenized in a decontaminated stainless steel mixing bowl. If applicable, samples will be composited and placed in an 8-ounce glass jar.

Verification sample nomenclature is as follows:

- Soil sample names from the ravine will begin with WDR (West Discharge Ravine), followed by a dash and ECX (excavation cell number), followed by a dash and either a C (composite sample) or a D (discrete sample), followed by a dash and sequential number. For example WDR-EC1-C-1 will be the first composite sample from Cell 1.

Again, latitude will be given to field personnel in determining the sequential sample numbering within each cell, but these procedures will remain consistent for subsequent cells and will be adequately documented.

In summary, based on simplifying assumptions made for cell dimensions, it is estimated that approximately six composite samples will be obtained in each 20- by 25-foot cell. With 23 cells designated for excavation in the WDR, approximately 140 composite soil verification samples will be collected and analyzed to confirm cleanup goals have been met.

Samples will be analyzed for PCBs by EPA Method 8082. One 9-point composite from each of the 23 excavation cells will be analyzed for petroleum hydrocarbons by NWTPH-Dx.

A.2.3 Contingencies

With the removal of the top 1 to 2 feet of soil from each excavation cell, it is expected that this area will achieve the cleanup goals. Verification samples will be collected from each excavation cell using the above-described procedures. In the event that laboratory analysis indicates that an area (defined by either a discrete or composite sample) exceeds cleanup goals, the area will be flagged for additional characterization and excavation. If the exceedance is a discrete sample, the TSCA-defined area of inference for this sample will be assumed to exceed CULs and an additional 1-foot lift will be removed from this 25-square-foot area. Field screening and collection of a verification sample will confirm that CULs have been met following additional excavation.

Under TSCA, the area of inference for a composite sample is defined as the total of the areas of the individual samples included in the composite. A nine-point composite, at 225 square feet, would represent the largest area that would be affected by an exceedance of the CULs. If laboratory analytical results indicate a composite sample exceedance, field screening will be employed within the composite area to better define the area of exceedance. With a defined area of exceedance, an additional 1-foot lift will be excavated and further field screening and collection of a verification sample(s) will confirm that CULs have been met. Backfilling of the ravine will proceed following receipt of laboratory analytical data indicating CULs have been achieved.

The first excavation cell adjacent to the river will be handled differently from the other 22 upland cells. This is because of the time constraints of the allowable work window and the higher ecological sensitivity of this cell, as this area will be inundated with water during certain times of the year. Following initial excavation from this cell and field screening indication that CULs have been met, an additional 6 to 12 inches of soil will be removed where practicable. One likely constraint that may prohibit additional excavation in the near-river portion of this cell would be the high groundwater table expected in this area. Verification samples collected from this cell will likely be requested for the fastest turnaround from the lab to ensure backfilling is completed before the end of the work window.

A.3 Soil Sampling of Stockpiles

Using the characterization samples, including both the Phase I samples and the Pre-Interim Action samples, an attempt will be made to segregate soils in the ravine containing PCBs <50 mg/kg from soils containing >50 mg/kg PCBs. Referring to Table 2-2 and Figure 2-1, soil excavated from cells centered around characterization samples that were greater than 50 mg/kg PCBs will be assumed to be contaminated at greater than 50 mg/kg PCBs and disposed of at a TSCA-permitted landfill. No further characterization of the soil from these cells will occur. Based on the Phase I data, this would include cells centered around samples WDR-SS-3, WDR-SS-5, WDR-SS-6, and WDR-SS-12 through WDR-SS-17. Additional cells assumed to contain soil with PCBs greater that 50 mg/kg may be added below the spillway based on the Pre-Interim Action sampling and analysis that will occur prior to the start of construction.

Soil from excavation cells centered around Phase I samples and Pre-Interim Action samples, which are <50 mg/kg PCBs, will be segregated from soil with >50 mg/kg PCBs. All soil from these cells will be presumed to be <50 mg/kg PCBs pending further characterization.

Excavated soil will be removed from the ravines and taken to the screening/ stockpile area using the methods described in Section 2.5. Referring to Figure 2-7, two offload ramps will be constructed outside the bermed screening/ stockpile area. This will facilitate segregation of soil above and below 50 mg/kg PCB inside the screening/stockpile area.

Soil from the various cells with >50 mg/kg PCBs will be allowed to accumulate in one stockpile and can be screened and prepared for off-site disposal at the contractor's discretion, as no further characterization will occur.

Attempts will be made to process soil from cells with <50 mg/kg PCBs soil as it is delivered from individual cells to facilitate finer characterization. Based on the simplified excavation cell dimensions described above, it is estimated that approximately 20 cubic yards of soil will be removed from each 12-inch lift in a cell. If feasible, soil from excavation cells with <50 mg/kg PCBs will be processed through the screening plant individually.

As described in Section 2.5, soil removed from the ravines will be screened to separate the >2-inch fraction from the finer-grained material. To further characterize soil from grids with <50 mg/kg PCBs, five-point composite samples will be collected from the <2-inch soil stockpile as is it being processed through the screening plant. Depending on the soil processing rate through the screen plant, equal volume aliquots will be collected from the <2-inch stockpile at consistently spaced intervals. Five consecutively collected aliquots will be homogenized in a decontaminated stainless steel mixing bowl and placed in an 8-ounce glass jar and sent to the laboratory for analysis. Each stockpile composite sample will be analyzed for PCBs by EPA Method 8082 and Petroleum Hydrocarbons by NWTPH-Dx. The <2-inch material will be managed separately from other screened stockpiles and no further material will be added to it. Upon receipt of the analytical data, this segregated soil can be added to either the >50 mg/kg or <50 mg/kg stockpiles adjacent to the disposal load-out area as shown on Figure 2-7. Refer to Section 2.8 for details on soil disposal.

Kaiser will work with Waste Management personnel to ensure that the above defined stockpile sampling and analysis plan will meet the waste profiling criteria.