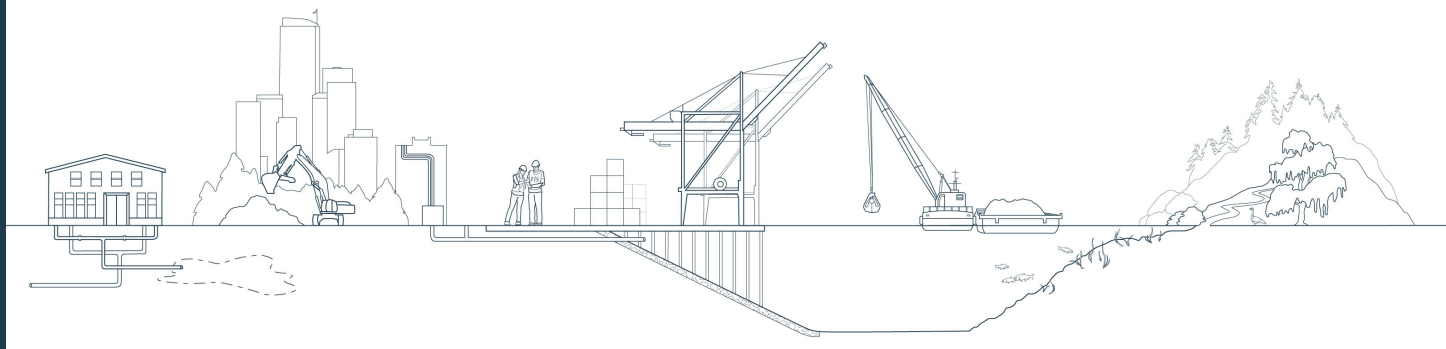
Pre-Remedial Design Investigation Work Plan

Smith-Kem Site

Prepared for
Smith-Kem and Shell Oil Products US

June 2023



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List of Abbreviations

Abbreviation	Definition
AO	Agreed Order
AOC	Area of concern
bgs	Below ground surface
BNSF	BNSF Railway Company
CD	Consent Decree
COC	Contaminant of concern
CUL	Cleanup level
CAP	Cleanup Action Plan
DQO	Data quality objectives
Ecology	Washington State Department of Ecology
FS	Feasibility Study
McGregor	The McGregor Company
PDI	Pre-Remedial Design Investigation
PFM	Passive flux meter

Abbreviation	Definition
property	Smith-Kem property
QA	Quality assurance
QAPP	Quality Assurance Project Plan
QC	Quality control
REL	Remediation level
RI/FS	Remedial Investigation and Feasibility Study
RIWP	Remedial Investigation Work Plan
ROW	Right-of-way
SAP	Sampling Analysis Plan
Shell	Shell Oil Products US
Site	Smith-Kem site
Smith-Kem	Smith-Kem Ellensburg, Inc
TPH	Total petroleum hydrocarbons
USEPA	U.S. Environmental Protection Agency
VOC	Volatile organic compound

1.0 Introduction

This Pre-Remedial Design Investigation (PDI) Work Plan has been prepared for Smith-Kem Ellensburg, Inc (Smith-Kem) and Shell Oil Products US (Shell) for the Smith-Kem site (Site) located at 200 South Railroad Avenue in Ellensburg, Washington (Figure 1.1). This work plan describes sample and field data collection activities to fill data needs identified in the Feasibility Study (FS) and to inform the design of the cleanup action for certain portions of the Site, in accordance with the Washington State Department of Ecology (Ecology) Cleanup Action Plan (CAP; Ecology 2023) and Consent Decree (CD).

1.1 BACKGROUND

The Smith-Kem property (property) is located in Kittitas County (parcel no. 226833) on approximately 2 acres. The property is leased by The McGregor Company (McGregor) for their fertilizer blending and pesticide storage business. The Site is bounded to the north by vacant properties and to the south by various light-industrial and other commercial businesses. To the east is the BNSF Railway Company (BNSF) rail yard and the rail spur that comes onto the eastern portion of the property. To the west is South Railroad Avenue, beyond which is a rural residential property that is zoned as "Residential Suburban."

Smith-Kem and Shell satisfied the requirements of Agreed Order (AO) No. DE 12908 in 2023 after preparation and Ecology-approval of the Remedial Investigation and Feasibility Study (RI/FS) Report and Ecology's issuance of the Site CAP. In 2023, Smith-Kem and Shell entered into a CD with Ecology to perform the cleanup action detailed in the CAP. The preferred cleanup action selected by Ecology for the Site consists primarily of excavation of soils from six areas of concern (AOCs) and one additional boring location (FS-01) that are impacted with contaminants of concern (COCs), as shown on Figure 1.2. The COCs include several legacy and active-use pesticides, lead, diesel- and oil-range total petroleum hydrocarbons (TPH), and dioxins/furans, at concentrations greater than Site-specific cleanup standards, which include both cleanup levels (CULs) and remediation levels (RELs). The COCs and CULs are summarized in Table 2 of the CAP and RELs are summarized in Table 3 of the CAP (Ecology 2023).

The following is a summary of the selected cleanup action for the Site, as shown on Figure 1.2:

- Remove soil with COC concentrations greater than leaching RELs for pesticides, RELs for diesel- and oil-range TPH and dioxins/furans, and CULs for other COCs (lead and pesticides without established RELs).1
- Cap areas of the site (portions of AOC 1 and AOC 2) where groundwater exceeds CULs and soil is contaminated with pesticide concentrations greater than leaching CULs. The cap will consist of a geosynthetic clay liner and stormwater conveyance features

[1] If pre-design data show that contamination in AOC 3 extends off-property, then excavation off-property will be designed to meet the CULs.

to direct infiltrated precipitation to respective drainage trenches that will drain to a single collection manhole.

- Perform in situ groundwater treatment of TPH and pesticides with a liquid activated carbon matrix along the downgradient edge of AOC 5.
- Maintain the office and storage building, the aboveground storage tank containment area, and the existing bulk fertilizer building as a cap to underlying TPH and pesticide-contaminated soil.

1.2 PURPOSE AND DATA QUALITY OBJECTIVES

This PDI Work Plan was developed to describe additional data collection required to support the engineering design of the cleanup action prior to remedy implementation. AOCs were developed in the RI based on the nature and extent of COCs in soil and groundwater, and proposed areas of excavation were identified in the CAP for each AOC. Data collected as part of this PDI will be used to supplement existing data to further refine the proposed extents of excavation areas and serve as confirmation sidewall and base samples, where appropriate. The intent of collecting confirmation data prior to excavation is to minimize the disruption that the remediation activities will cause to the operations of the property's tenant. Additionally, the distance between the Site and the analytical laboratory and long standard turnaround times for many of the COCs makes expedient chemical analyses unrealistic for Site-wide confirmation sampling during excavation activities.

The CAP identified the following soil data collection needs to be collected during the PDI:

- **AOC 1**: Additional pre-design data collection will likely be required to define the northern AOC 1 boundary between AOC 1 and the machine shop.
- **AOC 2**: Additional pre-design data collection will likely be required to define the northern and southern edges of AOC 2.
- **AOC 3**: Additional pre-design data collection will likely be required to define the southwestern edge of AOC 3 where shallow dioxins/furans have not been fully delineated.
- **AOC 4**: Additional pre-design data collection will likely be required to define the western AOC 4 boundary.

The pre-design data needs have been summarized into three data quality objectives (DQOs) that will be met prior to finalization of the remedial design:

- DQO 1—Evaluate underground utilities throughout the Site to support remedial design.
- DQO 2—Collect pre-design soil data relative to target RELs to refine the proposed excavation extents in each AOC and fill data needs identified in the CAP.
- DQO 3—Collect pre-design soil and groundwater data to verify the final design parameters of the in situ treatment barrier in AOC 5.

The data collection activities proposed to fulfill these DQOs are described by AOC in Section 2.0. Samples will be collected in accordance with the Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP) provided in the Remedial Investigation Work Plan (RIWP, Floyd|Snider 2016) and RIWP Addendum (Floyd|Snider 2017). Supplemental SAP and QAPP details are included as Section 3.0 of this PDI Work Plan to provide details specific to the PDI that were not previously included in the RIWP SAP/QAPP or RIWP Addendum.

2.0 Pre-Remedial Design Investigation

The PDI data collection activities will be implemented in up to two phases (Phase 1 and Phase 2) of data collection to fulfill the DQOs. Phase 1 will include an evaluation of underground utilities within each AOC and advancement of soil borings to fill data needs identified in the CAP to further refine the excavation extents (lateral and vertical) in each AOC. Phase 2 is contingent upon the data results of Phase 1, as described in Section 2.3.

2.1 UNDERGROUND UTILITY EVALUATION

Underground utilities, including gas, water, sewer, and power have been confirmed in four of the six AOCs that will involve soil excavation (Figure 1.1). A desktop review of the utility details (e.g., usage, construction details, and precise location) will be conducted prior to implementation of Phase 1 soil collection activities to support pre-design planning and fulfill DQO 1.

Prior to any drilling or soil collection activities, a private utility locate will also be conducted throughout all anticipated excavation areas to mark all buried conductive and nonconductive utility lines. Any utility lines that fall within or potentially within the boundaries of proposed excavation areas will be exposed via trenching or air knifing and surveyed so that the precise locations can be documented for the engineering design plans.

2.2 PHASE 1 SOIL DATA COLLECTION

This section summarizes the Phase 1 soil sample collection activities proposed to fulfill DQO 2 within each AOC. A total of 41 soil borings will be advanced between 3 and 15 feet below ground surface (bgs) using sonic drilling methodologies. Sonic drilling provides continuous soil cores and better recovery than smaller diameter drilling methods (e.g., direct-push) when drilling in coarser grained gravels, which are present at the Site. Approximately 55 samples will be collected across the Site with up to 3 samples collected from each boring, depending on location. The proposed soil borings for Phase 1 will be placed around the proposed excavation limits for each AOC to provide sufficient data density to increase the confidence in excavation boundaries in the engineering design plans. Proposed boring locations are presented by AOC on Figures 2.1 through 2.5.

Existing Site soil data from the RI were reviewed to determine if additional data are needed for confirmation samples at the sidewall and bottom of excavation. A summary of RI soil data is included in Appendix A. In general, the vertical extent of soil impacts in each AOC is well defined, so the PDI soil collection activities are primarily focused on lateral delineation of the excavation boundaries.

A two-tiered approach will be used for analysis of soil samples to delineate the extent of COCs in soil that exceed target RELs in each AOC. The first-tier soil samples will be analyzed to fill data needs and pre-excavation confirmation samples, which will be collected from the midpoint and/or base of the proposed depth of excavation in each AOC, depending on data needs. In general, one or more legacy pesticide is ubiquitous in each AOC; therefore, as part of the first

tier, legacy pesticide COCs will be analyzed in all soil samples. For AOCs where TPH is present, first-tier samples may be analyzed for diesel- and oil-range TPH if delineation of known TPH exceedances of RELs is needed, such as the east side of AOC 4. Additional soil samples may also be collected if field indications of TPH are present in any boring (i.e., staining, odor, or elevated photoionization detector). These samples will be archived until the design team can determine if additional TPH data are needed to support the remedial design. AOC-specific COCs, including lead and dioxins/furans, will also be analyzed at select locations to delineate the extent of these COCs.

To reduce the number of mobilizations, second-tier soil samples will be collected at deeper intervals from each boring (e.g., the base of proposed excavations [if not sampled at that depth in first-tier analysis], or from 1 to 2 feet below the proposed base of excavation). These samples will be frozen and archived for potential analyses pending design team review of the first-tier sample results. If the first-tier soil samples meet their respective RELs, then analyses of second-tier samples will not be necessary. The second-tier samples may be analyzed for a more focused list of one or more COCs if first-tier samples exceed respective RELs.

Table 2.1 provides a summary of all soil and groundwater data needs and proposed sample activities for each AOC for Phase 1. AOC-specific data collection activities and analyses are described further below.

2.2.1 AOC 1

Nine soil borings will be advanced to a maximum depth of 10 feet bgs around the perimeter and center of the proposed excavation area in AOC 1, as shown on Figure 2.1. The proposed boring locations on the west side of AOC 1 are located at the edge of a 10-foot buffer from the gas line, which is industry standard for drilling safety. These boring locations may be adjusted closer to the proposed excavation boundary after confirming the location of the underground utilities.

Soil samples will be collected as described in Table 2.1 and analyzed for legacy pesticides. In AOC 1, lead, dioxins/furans, active-use pesticides, and diesel- and oil-range TPH concentrations are all less than RELs, so no additional data are needed for the remedial design.

2.2.2 AOC 2

Eight soil borings will be advanced to a maximum depth of 8 feet bgs around the perimeter of the proposed excavation area in AOC 2, as shown on Figure 2.2.

Soil samples will be collected as described in Table 2.1 and analyzed for legacy pesticides and active-use pesticides. In AOC 2 soils, lead is less than the CUL and diesel- and oil-range TPH concentrations are all less than the leaching RELs, so no additional data are needed for these COCs for the remedial design.

2.2.3 AOC 3

Five shallow soil borings will be advanced to a maximum depth of 3 feet bgs at the western and southern extent of AOC 3, as shown in Figure 2.3.

Pending execution of an access agreement with adjacent property owner to the south (the Wales property, refer to Figure 1.1), seven additional "step out" shallow soil borings will be advanced to the south and southwest of AOC 3 to delineate the lateral extent of legacy pesticides and dioxins/furans exceeding CULs off-property. Depending on when an access agreement is executed, the off-property sampling may be conducted during Phase 1 or Phase 2.

Lead, diesel- and oil-range TPH, and active-use pesticides are less than soil CULs in AOC 3 and no additional data are needed for these COCs for the remedial design.

2.2.4 AOC 4

Eight soil borings will be advanced to a target depth of 8 feet bgs around the perimeter of the proposed excavation area in AOC 4, as shown on Figure 2.4.

Lead is only present in shallow soils greater than CULs at MW-12 and TPH only exceeds RELs on the east side of AOC 4, so focused soil sampling for these COCs will be conducted in those areas. Active-use pesticide concentrations in soil in AOC 4 are all less than the CULs, so no additional data for atrazine or simazine are needed for the remedial design.

2.2.5 AOC 5

Four soil borings will be advanced around the perimeter of the proposed excavation area, as shown on Figure 2.5. Three of the four will be advanced to a depth of 8 feet bgs. The fourth, western-most boring will be advanced to 15 feet bgs to collect additional grain-size analysis data for verifying the PlumeStop design, as described in Section 2.4.1.

Soil sampling in AOC 5 will focus on legacy pesticides as well as grain-size analysis at one location for design verification testing of the PlumeStop barrier. Active-use pesticides and lead concentrations in soil in AOC 5 are less than CULs, and diesel- and oil-range TPH concentrations in soil in AOC 5 are less than leaching RELs, so no additional data for these analytes are needed for the remedial design.

2.3 PHASE 2 CONTINGENCY DATA COLLECTION

Following Phase 1, the design team will review first- and second-tier soil data and determine whether additional data collection is warranted for Phase 2. If determined to be necessary, Phase 2 will include advancement of soil borings around excavation areas that need further refinement in order to continue with the engineering design plans. Based on the data needs, Phase 2 boring locations would be planned as "step outs" (i.e., at least 5 feet away laterally) or "step downs" (i.e., at least 1 foot down vertically) from analyzed Phase 1 samples that exceed the applicable RELs. The design team may position the Phase 2 soil borings further or deeper than these minimum distances based on the magnitude of exceedances for each COC relative to target RELs.

Any data not deemed necessary for remedial design will be collected during construction, including confirmation samples of excavation areas in AOC 6 and FS-01 (refer to Figure 1.2).

2.4 IN SITU GROUNDWATER TREATMENT DATA COLLECTION

In order to verify the final design parameters of the PlumeStop in situ treatment barrier and fulfill DQO 3, a limited soil and groundwater investigation will be performed by Floyd|Snider and Regenesis (the manufacturer of PlumeStop). As part of this sampling event, tests will be conducted to assess grain size, measure the contaminant mass flux through AOC 5, and characterize the groundwater mass, as described in the following sections.

2.4.1 Grain Size Analysis in Soil

To support design and verify how PlumeStop will distribute into the subsurface during the application, one soil boring in AOC 5, located the closest to the in situ treatment zone, will be advanced to 15 feet bgs. Soil samples will be collected from four intervals within the in situ treatment zone (refer to Table 2.1) and analyzed for grain size.

2.4.2 Groundwater Sample Collection

Groundwater samples will be collected from select monitoring wells in the vicinity of AOC 5 and the in situ treatment barrier (refer to Figure 2.6) to evaluate groundwater characteristics that can impact the effectiveness of the PlumeStop materials to adsorb and break down COCs. As part of this assessment, it is important to understand the total organic mass that will flow through the treatment zone to appropriately design the passive treatment zone. A full screen of volatile organic compounds (VOCs) in groundwater is included to understand whether organic compounds other than the target COCs (pesticides and TPH) are present that could be adsorbed to the PlumeStop matrix. In addition, the natural groundwater chemistry impacts the rate at which the PlumeStop polymer transitions from being mobile at the injection point to stabilizing as it adheres to the surrounding soil. Therefore, measurement of groundwater hardness characteristics, including calcium and magnesium concentrations, is also important for design.

The following constituents will be analyzed in groundwater at MW-1 and MW-6:

- Pesticides (aldrin, chlordane, dieldrin, toxaphene) by U.S. Environmental Protection Agency (USEPA) Method 8081B LL and atrazine by USEPA Method 8270D-SIM
- TPH (gas, diesel, and oil) by USEPA NWTPH-Gx and NWTPH-Dx
- VOCs by USEPA 8260D

The following constituents will be analyzed in groundwater at MW-1, MW-2, and MW-10:

- Total aluminum, calcium, and magnesium by USEPA Method 200.8
- Total Hardness as $CaCO_3$ calculated by SM 2340B
- Alkalinity by SM 2320B
- Total organic carbon by USEPA Method 9060

In addition, the following parameters will be measured using a water quality meter and documented prior to sample collection:

- Temperature
- pH
- Oxidation–reduction potential
- Dissolved oxygen
- Specific conductivity
- Turbidity

2.4.3 Passive Flux Meter Installation and Sampling

Passive flux meters (PFMs) are devices installed in monitoring wells to measure the vertical profile of horizontal contaminant flux through the groundwater table. PFMs are constructed from a long outer mesh liner filled with a mixture of sorbent and tracer material that are placed into monitoring wells and later retrieved for analysis after a set amount of time. The tracer chemicals are leached away at a steady rate based on the groundwater flow. After the PFM is retrieved and tested for the concentration of tracer chemical remaining, the Darcy velocity of groundwater through the vertical profile of the groundwater table can be calculated.[2]

PFMs will be installed in monitoring wells MW-2 and MW-10 shown on Figure 2.6 following sampling of the groundwater, as described in Section 2.4.2. These wells were selected based on their location relative to the proposed PlumeStop barrier. Groundwater at these wells is anticipated to be encountered between 3 to 5 feet bgs, and the length of saturated well screen is 10 feet; therefore, two PFMs will be used per location to cover the full groundwater vertical profile within each well. PFMs will be left in these wells for 2 to 3 weeks, and then retrieved and sampled in 1.5-foot intervals according to the PFM Protocol Manual (Appendix B). Samples will be sent to EnviroFlux in Gainesville, Florida, under chain of custody procedures for analysis of tracers and Darcy velocity. Procedures for installing, retrieving, and sampling the PFMs are included in the PFM Protocol Manual (Appendix B).

2.5 OFF-SITE ACCESS AGREEMENTS

The Smith-Kem property is currently owned by Ad Gro and has been leased to McGregor since 2015. McGregor uses the property to conduct its agricultural product distribution business and is responsible for all current operations at the facility. The PDI work and cleanup action implementation will need to be closely coordinated with McGregor (or with the current tenant if McGregor terminates its lease) to minimize disruption to its operations.

As described in Section 2.2.3, because sample collection (and potential future excavation) is planned on the southern adjacent Wales property (currently occupied by Habitat for Humanity),

[2] Measurement of contaminants absorbed to the PFMs will not be necessary for designing the PlumeStop due to low concentrations of contaminants in groundwater.

an access agreement will be required from the property owner prior to any work on that property. To minimize disruption to the Habitat for Humanity operations, all off-property sampling would be conducted during a single phase (including additional step outs and samples collected for archive and tiered analyses).

The pre-design sample collection to define the western boundary of AOC 4 may abut the City of Ellensburg right-of-way (ROW). No sample collection activities are currently planned within the ROW; however, if Phase 1 data indicate step out samples may be needed within the ROW, an application will be submitted to the City of Ellensburg Public Works Department for a ROW permit with a traffic control plan, if necessary. The time for permit processing is anticipated to be at least several weeks.

BNSF property and a rail spur are located along the eastern property boundary. No soil sample collection is planned on BNSF property during Phase 1. If soil sample collection or cleanup activities need to extend onto BNSF property, a permit would be needed from BNSF prior to the work. The permitting process with BNSF, if needed, typically takes at least several months and would include preparation of a separate work plan for data collection activities occurring on BNSF property.

3.0 Supplemental Sampling and Analysis and Quality Assurance Project Plan

Sample collection, analysis, and data validation for the PDI will be performed in accordance with the SAP/QAPP presented in the RIWP and RIWP Addendum (Floyd|Snider 2017), with supplemental information, as described below, for additional data collection procedures and additional and updated analytical methods. The SAP provides details regarding sampling and analysis methods and field procedures, and the QAPP provides details about the organization, objectives, and quality assurance (QA) and quality control (QC) procedures for field and laboratory activities developed for this Site.

3.1 PASSIVE FLUX METER INSTALLATION

Procedures for installing, retrieving, and sampling the PFMs are included in the PFM Protocol Manual (Appendix B).

3.2 SAMPLE IDENTIFICATION AND LABELING

Samples collected as part of this investigation will be identified and labeled as follows:

- Subsurface soil samples: soil boring number with the AOC number prefix–depth interval (in decimal feet). For example, the soil sample collected at pre-design boring 1 in AOC 3 from 0.5- to 1-foot bgs would be labelled as AOC3-01-0.5-1.
- Groundwater samples: Monitoring well (MW)-date (MMDDYY). For example, a groundwater sample collected from MW-6 on April 8, 2023, would be labeled as MW-6-040823.
- PFM samples: Monitoring well (MW)- sample interval (in feet bgs). For example, the full screen length at MW-2 is 3 to 13 feet bgs, so the bottom sample collected from the PFM at 11.5 to 13 feet bgs in MW-2 would be labeled as MW-2-11.5-13.0.

3.3 LABORATORY METHODS, QUALITY ASSURANCE, AND QUALITY CONTROL

Soil samples will be submitted to ALS Kelso for laboratory analyses of legacy pesticides and atrazine; Pacific Agricultural Laboratory for analysis of simazine; Friedman & Bruya, Inc. for laboratory analysis of diesel- and oil-range TPH, lead, and grain size; and Analytical Resources, LLC for analysis of dioxins/furans, as described in Section 2.2. Groundwater samples will be submitted to ALS Kelso for analysis of pesticides and to Friedman & Bruya for laboratory analysis of TPH, VOCs, metals, and conventionals, as described in Section 2.4. All soil and groundwater samples will be transferred to each laboratory under chain-of-custody procedures via shipment or courier services. Supplemental QAPP details, including additional analytes, are included in the following tables:

- Table 3.1 includes sample container and preservation requirements
- Table 3.2 includes analytical methods and quantitation limits
- Table 3.3 presents data QA and QC criteria

Second-tier samples collected for potential pesticide analysis will be submitted to ALS Kelso with a request to keep frozen and archived upon receipt to extend holding times for up to 1 year.

3.4 DATA VALIDATION

Once data are received from the laboratory, a number of QC procedures will be followed to provide an accurate evaluation of the data quality. Data validation will be conducted at the specified levels for each analyte class listed below with specific procedures to assess data precision, accuracy, and completeness. For additional information on data validation/reduction, refer to the RIWP (Floyd|Snider 2016).

- A Stage 2B data validation will be performed on soil and groundwater data resulting from pesticide, herbicide, TPH, metal, and conventional analyses.
- A Stage 4 full validation will be performed on dioxin/furan data.

4.0 Proposed Schedule and Reporting

Phase 1 will be initiated within 45 days of Ecology approval of the final PDI Work Plan. Implementation of the field work is anticipated for the summer season of 2023. Phase 2 (if determined necessary) would be initiated within 30 days of receipt of validated Phase 1 data to accommodate data review by the design team. Results will be used to finalize design for the cleanup action and will be reported in the Engineering Design Report.

5.0 References

Floyd|Snider. 2016. *Remedial Investigation Work Plan*. Prepared for Foster Pepper PLLC and Shell Oil Products US. July.

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Pre-Remedial Design Investigation Work Plan

Smith-Kem Site

Tables

Table 2.1
Summary of Data Needs and Phase 1 Data Collection Activities by AOC

Area of Concern (AOC)	Data Needs	Phase 1 Data Collection Activities (First and Second Tiers)
AOC 1	• Delineate lateral and vertical extent of legacy pesticides (i.e., aldrin, chlordane, dieldrin, and toxaphene) exceeding leaching remediation levels (RELs) in soil between existing soil data and Machine Shop. • Perform pre-excavation confirmation sampling of soil on sidewalls and base of excavation.	**First Tier** • Two soil borings will be advanced to 9 feet below ground surface (bgs) on the north side of AOC 1 to fill data needs between AOC 1 and the machine shop that were identified in the Cleanup Action Plan (CAP). Soil samples will be collected from 2.5 feet bgs and 5 feet bgs and analyzed for legacy pesticides. • Six additional soil borings will be advanced to 10 feet bgs around the perimeter of the proposed excavation area to refine the limits of excavation. Soil samples will be collected from the midpoint of the excavation sidewall at all six locations, and additional samples will be collected at the base of the proposed excavation at two locations and analyzed for legacy pesticides. • One soil boring will be advanced to 10 feet bgs within the center of the excavation area to confirm the bottom of excavation extents. Soil samples will be collected at the base of the proposed excavations (at 5 feet bgs and 8 feet bgs) and analyzed for legacy pesticides. **Second Tier** • Deeper soil samples (e.g., base of proposed excavation or 1 to 2 feet below the base of excavation) will be collected at all soil boring locations and archived.
AOC 2	• Refine the lateral and vertical extent of atrazine and simazine exceedances of leaching RELs in soil around FS-28. • Delineate lateral and vertical extent of legacy pesticides exceeding leaching RELs in soil north/northwest of FS-09 and south extents around FS-27. • Perform pre-excavation confirmation sampling of soil on sidewalls and base of excavation.	**First Tier** • Two soil borings will be advanced to 8 feet bgs on the northwest side of AOC 2 to fill data needs identified in the CAP. Samples will be collected from the midpoint (2 feet bgs) and base of the proposed excavation (4 feet bgs) and analyzed for legacy pesticides. • Three soil borings will be advanced to 8 feet bgs on the southwest and southeast side of AOC 2, around FS-28, to fill data needs identified in the CAP. Samples will be collected from the midpoint of the proposed excavation (2 feet or 3 feet bgs) and analyzed for legacy pesticides and active-use pesticides. An additional base sample (6 feet bgs) will be collected from the boring south of FS-27 and analyzed for legacy pesticides and active-use pesticides. • Three additional soil borings will be advanced to 8 feet bgs around the west and east perimeter of the proposed excavation area to refine the limits of excavation. Soil samples will be collected from the midpoint of the proposed excavation (2 feet bgs) and analyzed for legacy pesticides. An additional base sample (at 4 feet bgs) will be collected from the boring east of MW-5 and analyzed for legacy pesticides. **Second Tier** • Deeper soil samples (e.g., base of proposed excavation or 1 to 2 feet below the base of excavation) will be collected at all soil boring locations and archived.

Table 2.1
Summary of Data Needs and Phase 1 Data Collection Activities by AOC

Area of Concern (AOC)	Data Needs	Phase 1 Data Collection Activities (First and Second Tiers)
AOC 3	• Delineate lateral extent of shallow legacy pesticides exceeding direct contact RELs in soil on west and south side of AOC 3. • Delineate lateral extent of shallow dioxins/furans exceeding direct contact RELs on property or cleanup levels (CULs) off-property in soil on south side of AOC 3.	**First Tier** • Five shallow soil borings will be advanced to 3 feet bgs on the west/south perimeter of the proposed excavation extent to refine the limits of excavation. Soil samples will be collected at the base of the proposed excavation (2 feet bgs) and analyzed for legacy pesticides. **Second Tier** • Pending off-property access, seven shallow soil borings, including step outs, will be advanced to 3 feet bgs on the Habitat for Humanity/ Wales property to fill data needs identified in the CAP. Soil samples will be collected at 0.5 to 1-foot bgs and at 2 feet bgs from each boring and archived for potential analysis of legacy pesticides and/or dioxins/furans pending results of the on-property samples. • Additional soil samples/volume will be collected at the surface (0.5 to 1-foot bgs) and 2-feet bgs intervals from each boring (on- and off-property) and archived for potential dioxin/furan analysis to delineate legacy pesticides before analyzing dioxins/furans. If legacy pesticide concentrations are less than direct contact RELs, dioxins/furans will be analyzed starting with analysis of the surface soils.
AOC 4	• Delineate lateral extent of legacy pesticides (aldrin, beta-hexachlorocyclohexane [beta-BHC], dieldrin, and toxaphene) exceeding leaching RELs in soil on the west side of AOC 4. • Refine extent of lead exceeding CULs in shallow soils on east side of AOC 4. • Refine extent of diesel- and oil-range total petroleum hydrocarbons (TPH) exceeding leaching RELs in soils in vicinity of MW-12, FS-31, and Test Pit #1. • Perform pre-excavation confirmation sampling of soil on sidewalls and base of excavation.	**First Tier** • Three soil borings will be advanced to 8 feet bgs on the west perimeter of the proposed excavation extent to fill data needs identified in the CAP. Soil samples will be analyzed for legacy pesticides at the midpoint of the proposed excavation (2.5 feet bgs). Additional samples will be collected at the base of the proposed excavation (5 feet bgs) from two of the borings on the southwest side of AOC 4 and analyzed for legacy pesticides. • Three soil borings will be advanced to 8 feet bgs on the east perimeter of the proposed excavation extent to refine the limits of excavation. Soil samples collected at the midpoint of the proposed excavation (2.5 feet bgs) will be analyzed for legacy pesticides and total lead. An additional soil sample will be collected at the proposed base of excavation (5 feet bgs) from one of the borings and analyzed for legacy pesticides and, if field indications are present, for diesel- and oil-range TPH. • Two soil borings will be advanced to 8 feet bgs (one each) at the north and south ends of the excavation area, respectively, to refine the limits of excavation. Soil samples will be collected at the midpoint of the proposed excavation (2.5 feet bgs), analyzed for legacy pesticides, and screened for field indications of TPH as described above. **Second Tier** • Deeper soil samples (e.g., base of proposed excavation or 1 to 2 feet below the base of excavation) will be collected at all soil boring locations and archived. • If field indications are present for TPH at the bottom of any boring, the borings will be advanced deeper until field indications are no longer present, and additional soil samples may be collected and analyzed for diesel- and oil-range TPH to further refine the extent of TPH that exceeds leaching RELs around MW-12 and FS-31 near the aboveground storage tank containment area.

Table 2.1
Summary of Data Needs and Phase 1 Data Collection Activities by AOC

Area of Concern (AOC)	Data Needs	Phase 1 Data Collection Activities (First and Second Tiers)
AOC 5	• Refine extent of legacy pesticides (i.e., dieldrin) exceeding leaching RELs in soil around FS-16. • Perform pre-excavation confirmation sampling of soil on sidewalls and base of excavation. • Verify the final design parameters of the in situ groundwater treatment barrier.	**First Tier** • Four borings will be advanced at the perimeter of the proposed excavation extent, one in each cardinal direction from FS-16, to refine the limits of excavation. Three of the borings will be advanced to 8 feet bgs, and the fourth, westernmost boring will be advanced to 15 feet bgs. Soil samples will be collected from the midpoint elevation of the proposed excavation (2 to 3 feet bgs) and analyzed for legacy pesticides from all four borings. Soil samples will be collected at the base elevation of the proposed excavation (5 feet bgs) from 3 of the 4 borings (north, east, and west) and analyzed for legacy pesticides. Refer to Figure 2.5 for the configuration of the borings. • Soil samples from the westernmost boring will also be collected at 5 to 6 feet bgs, 8 to 9 feet bgs, 11 to 12 feet bgs, and 14 to 15 feet bgs and analyzed for grain size to support design verification of how PlumeStop will distribute into the subsurface during the application. • Groundwater samples will be collected from monitoring wells MW-1 and MW-6 and analyzed for contaminant of concern (COC) pesticides (aldrin, chlordane, dieldrin, and toxaphene), TPH, and volatile organic compounds to confirm concentrations of contaminants upgradient of the in situ treatment barrier. • Groundwater samples will be collected from monitoring wells MW-1, MW-2, and MW-10 and analyzed for conventionals (total aluminum, total calcium, total magnesium, total hardness, alkalinity, and total organic carbon) to verify design parameters of the in situ groundwater treatment barrier. • Passive flux meters (PFMs) will be installed for 2 to 3 weeks in monitoring wells MW-2 and MW-10 following collection of groundwater samples, and then retrieved and sampled in 1.5-foot intervals. PFM samples will be analyzed to verify the Darcy velocity vertical profile to support design of the in situ groundwater treatment barrier. **Second Tier** • Deeper soil samples (e.g., base of proposed excavation or 1 to 2 feet below the base of excavation) will be collected at all soil boring locations and archived.

Note:
Pesticide COCs in soil include legacy pesticides (aldrin, alpha-chlordane, beta-BHC, chlordane, dieldrin, total dichlorodiphenyltrichloroethane, and toxaphene) and active-use pesticides (atrazine and simazine).

Table 3.1
Analytical Methods, Bottle Type, Preservation, and Holding Times

Laboratory	Chemical	Analytical Method	Bottle Type	Preservative	Holding Time
Soil					
F&BI	Metals (lead)	USEPA Method 6020B	One 4-oz WMG	None, cool to <6 °C	6 months
	Grain Size	ASTM D422	16-oz WMG or HDPE	None	6 months
	Total petroleum hydrocarbons: diesel- and oil-range	NWTPH-Dx	One 4-oz WMG	None, cool to <6 °C	14 days to extract, then 40 days to analyze
ALS	Atrazine	USEPA 8270D-SIM	One 8-oz WMG	None, Cool <6°C	14 days to extract, then 40 days to analyze
	Legacy Pesticides (Aldrin, b-BHC, Chlordane, Chlordane-alpha, Dieldrin, Total DDT, Toxaphene)	USEPA 8081B LL			
PAL	Simazine	USEPA 8321B Modified	One 8-oz WMG	None, Cool <6°C	14 days to extract, then 40 days to analyze
ARL	Dioxins/Furans	USEPA 1613B	One 8-oz Amber WMG	None, Cool <6°C (or frozen)	1 year
Groundwater					
F&BI	Alkalinity	SM2320B	500 mL HDPE	Cool to <4 °C, no headspace	14 days
	Total organic carbon	USEPA 9060	250 mL Amber	Cool to <4 °C, H2SO4	28 days
	Hardness, Total as CaCO3	SM 2340B	250 mL HDPE	Cool to <4 °C, HNO3 to pH<2	6 months
	Metals (aluminum, calcium, magnesium)	USEPA 200.8			
	Total petroleum hydrocarbons: diesel- and oil-range	NWTPH-Dx	One 500-ml amber glass	Cool to <4 °C, HCl to pH<2	14 days to extract (7 days without HCl), then 40 days to analyze
	Total petroleum hydrocarbons: gasoline-range	NWTPH-Gx	Three 40-mL VOA	Cool to <4 °C, HCl to pH<2, no headspace	14 days
	Volatile organic compounds	USEPA Method 8260D	Three 40-mL VOA	Cool to <4 °C, HCl to pH<2, no headspace	14 days
ALS	Pesticides (Aldrin, Chlordane, Dieldrin, Toxaphene)	USEPA 8081B LL (Extraction method: USEPA 3511)	Two 500-mL glass amber	None, Cool <6°C	7 days; 40 days if extracted
	Atrazine	USEPA 8270D-SIM	Two 500-mL glass amber		

Abbreviations:

°C	Degrees Celsius
CaCO3	Calcium carbonate
ALS	ALS Kelso Laboratory
ARL	Analytical Resources, LLC
b-BHC	Beta-hexachlorocyclohexane
F&BI	Friedman & Bruya, Inc
H2SO4	Sulfuric acid
HCl	Hydrogen chloride
HDPE	High-density polyethylene
HNO3	Nitric acid
mL	Milliliters
oz	Ounces
PAL	Pacific Agricultural Laboratory
USEPA	U.S. Environmental Protection Agency
VOA	Volatile organic analysis
WMG	Wide-mouth glass jar

Table 3.2
Analytical Methods, Detection Limits, and Reporting Limits

Chemical	Units	Analytical Method	Method Detection Limit	Practical Quantitation (Reporting) Limit
Soil				
Metals				
Lead	mg/kg	USEPA 6020B	0.049	1
Total Petroleum Hydrocarbons				
Diesel-range organics	mg/kg	NWTPH-Dx	8.8	50
Oil-range organics	mg/kg	NWTPH-Dx	10	250
Legacy Pesticides				
2,4'-DDT	µg/kg	USEPA 8081B LL	0.14	1.0
4,4'-DDT	µg/kg	USEPA 8081B LL	0.078	1.0
Aldrin	µg/kg	USEPA 8081B LL	0.056	1.0
alpha-Chlordane	µg/kg	USEPA 8081B LL	0.063	1.0
beta-BHC	µg/kg	USEPA 8081B LL	0.18	1.0
Chlordane	µg/kg	USEPA 8081B LL	3.1	10
Dieldrin	µg/kg	USEPA 8081B LL	0.083	1.0
Toxaphene	µg/kg	USEPA 8081B LL	14	50
Active-use Pesticides				
Atrazine	µg/kg	USEPA 8270D-SIM	3.2	10
Simazine	µg/kg	USEPA 8321B Modified	6.7	6.7
Dioxins/Furans				
Dioxins/Furans	ng/kg	USEPA 1613B	0.058 to 4.60	1.00 to 2.50
Groundwater				
Conventionals				
Alkalinity	mg/L	SM 2320B	0.8	2.5
Hardness	mg/L	SM 2340B	0.072	0.80
Total organic carbon	mg/L	USEPA 9060	0.32	0.70
Metals				
Aluminum	µg/L	USEPA 200.8	2.9	10
Calcium	µg/L	USEPA 200.8	21	50
Magnesium	µg/L	USEPA 200.8	0.045	1
Pesticides				
Aldrin	µg/L	USEPA 8081B LL	0.00077	0.001
Atrazine	µg/L	USEPA 8270D-SIM	0.052	0.2
Chlordane	µg/L	USEPA 8081B LL	0.0038	0.02
Dieldrin	µg/L	USEPA 8081B LL	0.00044	0.001
Toxaphene	µg/L	USEPA 8081B LL	0.049	0.1
Total Petroleum Hydrocarbons				
Gasoline-range hydrocarbons	µg/L	NWTPH-Gx	47	100
Diesel-range hydrocarbons	µg/L	NWTPH-Dx	10.9	50
Oil-range hydrocarbons	µg/L	NWTPH-Dx	38	250
Volatile Organic Compounds (VOCs)				
VOCs	µg/L	USEPA 8260D	0.01 to 7.7	0.2 to 20

Abbreviations:

beta-BHC Beta-hexachlorocyclohexane
DDT Dichlorodiphenyltrichloroethane
µg/kg Micrograms per kilogram
µg/L Micrograms per liter
mg/kg Milligrams per kilogram
mg/L Milligrams per liter
ng/kg Nanograms per kilogram

Table 3.3
Data Quality Assurance Criteria

Chemical	Precision [(1)]	Accuracy	Completeness	Reference
Soil				
Pesticides	±40% RPD	30–130%	95%	USEPA 8081B LL
Herbicides (Simazine and Atrazine)	±35% RPD	50–150%	95%	USEPA 8321B Mod/ 8270D SIM
Total petroleum hydrocarbons: diesel- and oil-range	±35% RPD	50–150%	95%	NWTPH-Dx
Metals (Lead)	±20% RPD	80–120%	95%	USEPA 6020B
Total organic carbon	±25% RPD	70–130%	95%	USEPA 9060
Dioxins/furans	±25% RPD	63–164%	95%	USEPA 1613B
Groundwater				
Alkalinity, Total	±30% RPD	80–120%	95%	SM2320B
Hardness, Total	±20% RPD	75–125%	95%	SM 2340B
Herbicides (Atrazine)	±30% RPD	60–140%	95%	USEPA 8027D SIM
Metals (Aluminum, Calcium, Magnesium)	±20% RPD	80–120%	95%	USEPA 200.8
Pesticides	±30% RPD	60–140%	95%	USEPA 8081B LL
Total organic carbon	≤20% RPD	80–120%	95%	USEPA 9060
Total petroleum hydrocarbons: gasoline-range	±20% RPD	65–135%	95%	NWTPH-Gx
Total petroleum hydrocarbons: diesel- and oil-range	±20% RPD	65–135%	95%	NWTPH-Dx
Volatile organic compounds	±20% RPD	65–135%	95%	USEPA 8260D

Note:

1 Precision criteria apply to analytical precision only. Field duplicate precision will be screened against an RPD of 75%.

Abbreviations:

RPD Relative percent difference

USEPA U.S. Environmental Protection Agency

Pre-Remedial Design Investigation Work Plan

Smith-Kem Site

Figures

Legend

- Area of Concern (with ID)
- Monitoring Well

Utilities

- G — Gas Line
- AG — Abandoned Gas Line
- P — Overhead Power Line
- UP — Underground Power Line
- Pole
- W — Potable Water
- S — Sewer Line
- Manhole

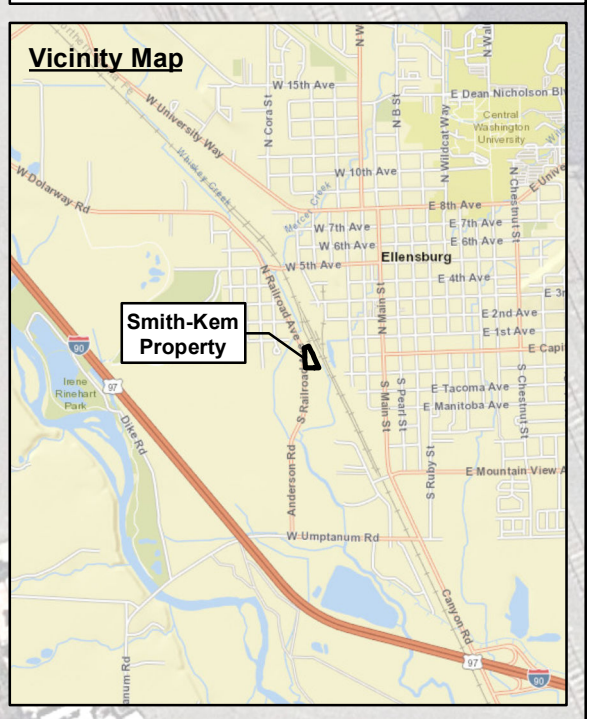
Other Features

- Property Boundary
- AST Containment Area
- Area of Concrete
- Rail Spur

Notes:

- AOCs are defined based on presence of soil contamination.
- All utilities are estimated. Utilities exterior to the site were provided by the City of Ellensburg. Utilities interior to site are based on aboveground utility locates.
- Aerial imagery obtained from Google Earth, 2017.

Abbreviations:
AOC = Area of concern
AST = Aboveground storage tank
bgs = Below ground surface
BNSF = BNSF Railway
ft = Feet



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Pre-Remedial Design Investigation Work Plan
Smith-Kem Site
Ellensburg, Washington

Figure 1.1
Areas of Concern and Site Features

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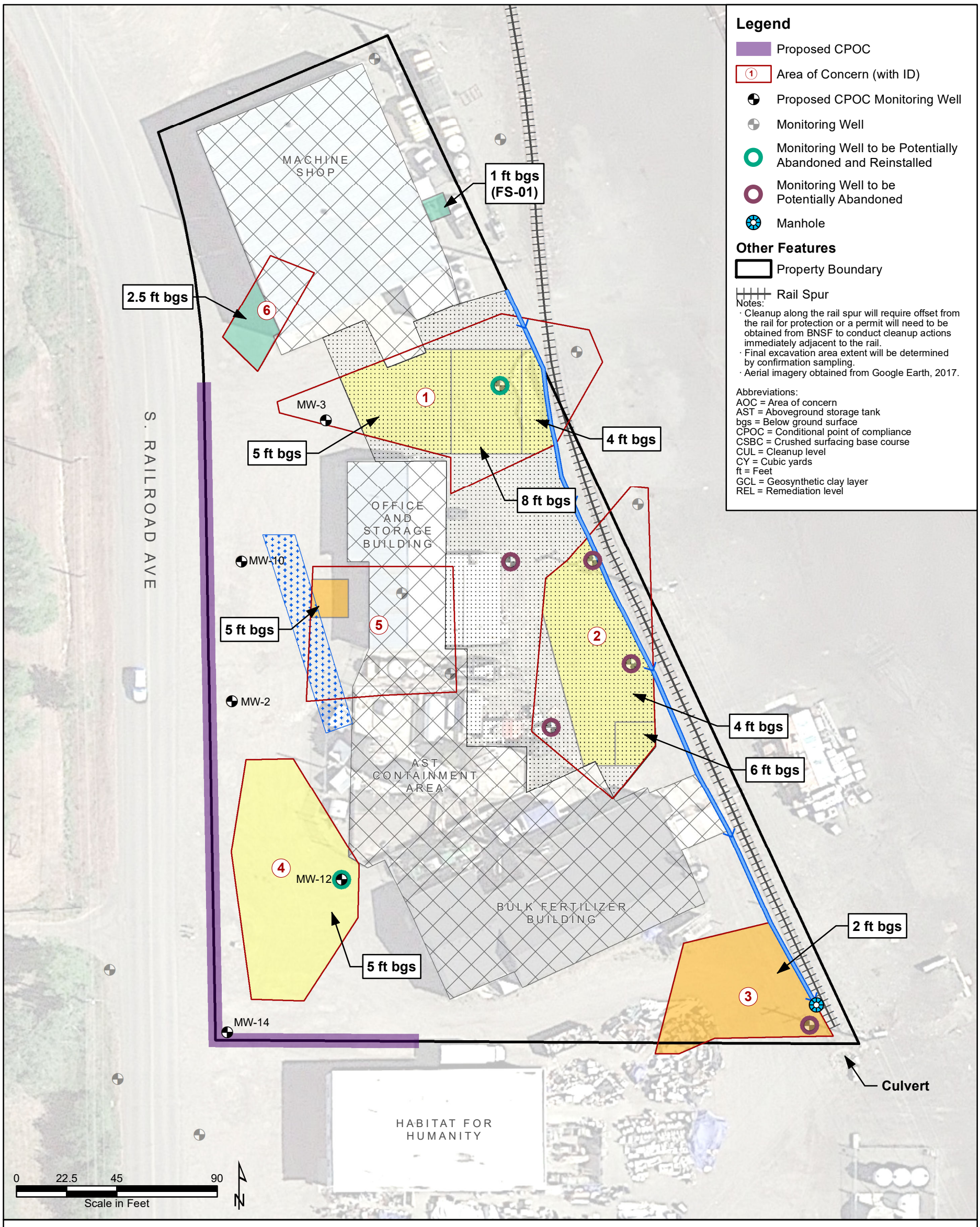
6/23/2023



Alternative 3 (Selected Cleanup Action)

Excavate to CULs

Excavate and dispose of soil at off-site landfill. Backfill with clean fill and gravel surface.

· AOC 6 · FS-01

Excavate to Direct Contact RELs

Excavate and dispose of soil at off-site landfill. Backfill with clean fill and gravel surface.

Note: If pre-design data show that contamination in AOC 3 extends off-property, then excavation off-property will be designed to meet the CULs.

· AOC 3 · AOC 5

Excavate to Leaching RELs

Excavate and dispose of soil at off-site landfill. Backfill with clean fill and gravel surface.

· AOC 1 · AOC 2 · AOC 4

Protect Existing Structures

Existing buildings and concrete pavement to remain as cap.

In Situ Groundwater Treatment

Inject trademarked colloidal activated carbon matrix (PlumeStop™) to create a passive treatment zone.

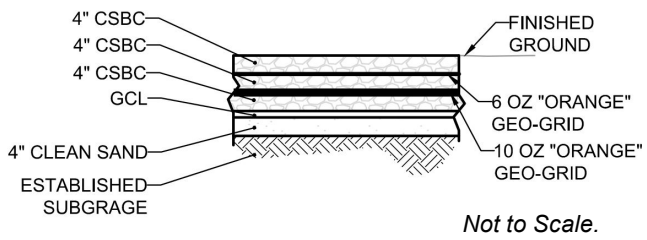
Geosynthetic Clay Liner

Install GCL as barrier for protection of groundwater from residual soil contamination.

Drainage System

Collect infiltrated precipitation drainage from the GCL and convey to a collection manhole at the southeast corner of the property.

GCL Cross-Section



Not to Scale.

Note: GCL cross-section provided by PBS Engineering and Environmental Inc.

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Smith-Kem Site
Ellensburg, Washington

Figure 1.2
Selected Cleanup Action Areas

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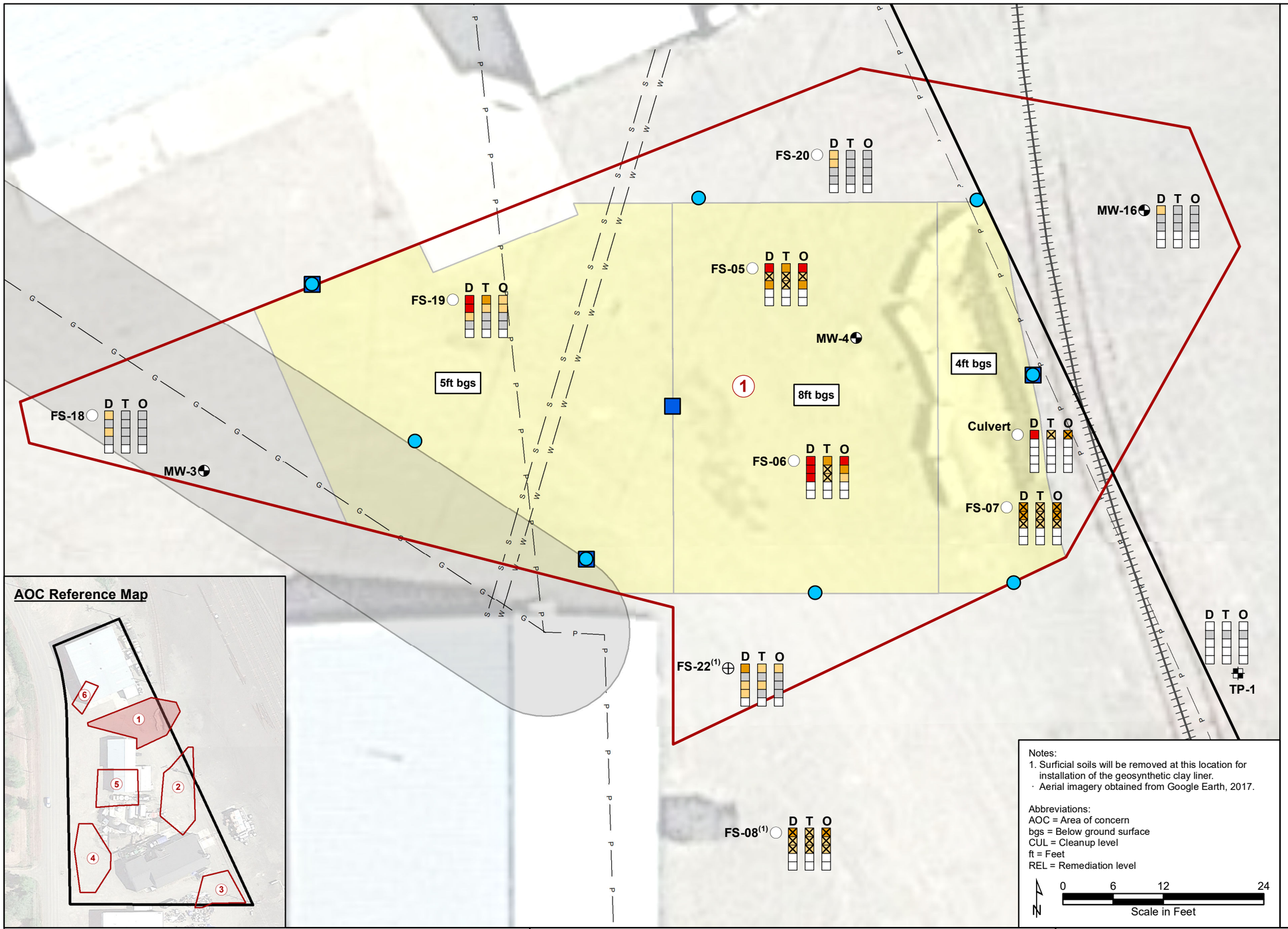
6/23/2023



Legend

- Area of Concern (with ID)

Proposed Sample Locations

- Phase I Sidewall Soil Sample(s)
- Phase I Base Soil Sample

Remedial Investigation Sample Locations

- Monitoring Well
- Soil Boring with Temporary Monitoring Well
- Soil Sample
- Test Pit

Cleanup Action

- Excavate to Leaching RELs

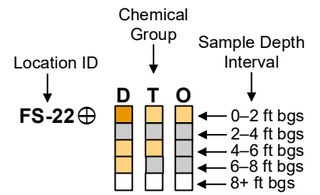
Utilities

- P — Overhead Power Line
- G — Gas Line
- Gas Line 10-foot Buffer

Other Features

- Property Boundary
- Rail Spur

Soil Labels



Chemical Group Key:
D = Dieldrin T = Toxaphene O = Other Pesticides

Compliance Information

- One or More Results Greater Than Direct Contact REL
- One or More Results Greater Than Leaching REL
- One or More Results Greater Than CUL
- Meets CUL
- Nondetect Exceedance
- Not Sampled

Notes:
1. Surficial soils will be removed at this location for installation of the geosynthetic clay liner.
· Aerial imagery obtained from Google Earth, 2017.

Abbreviations:
AOC = Area of concern
bgs = Below ground surface
CUL = Cleanup level
ft = Feet
REL = Remediation level

N

0 6 12 24
Scale in Feet

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Pre-Remedial Design Investigation Work Plan
Smith-Kem Site
Ellensburg, Washington

Figure 2.1
Proposed Pre-Design Soil Sample Locations—AOC 1

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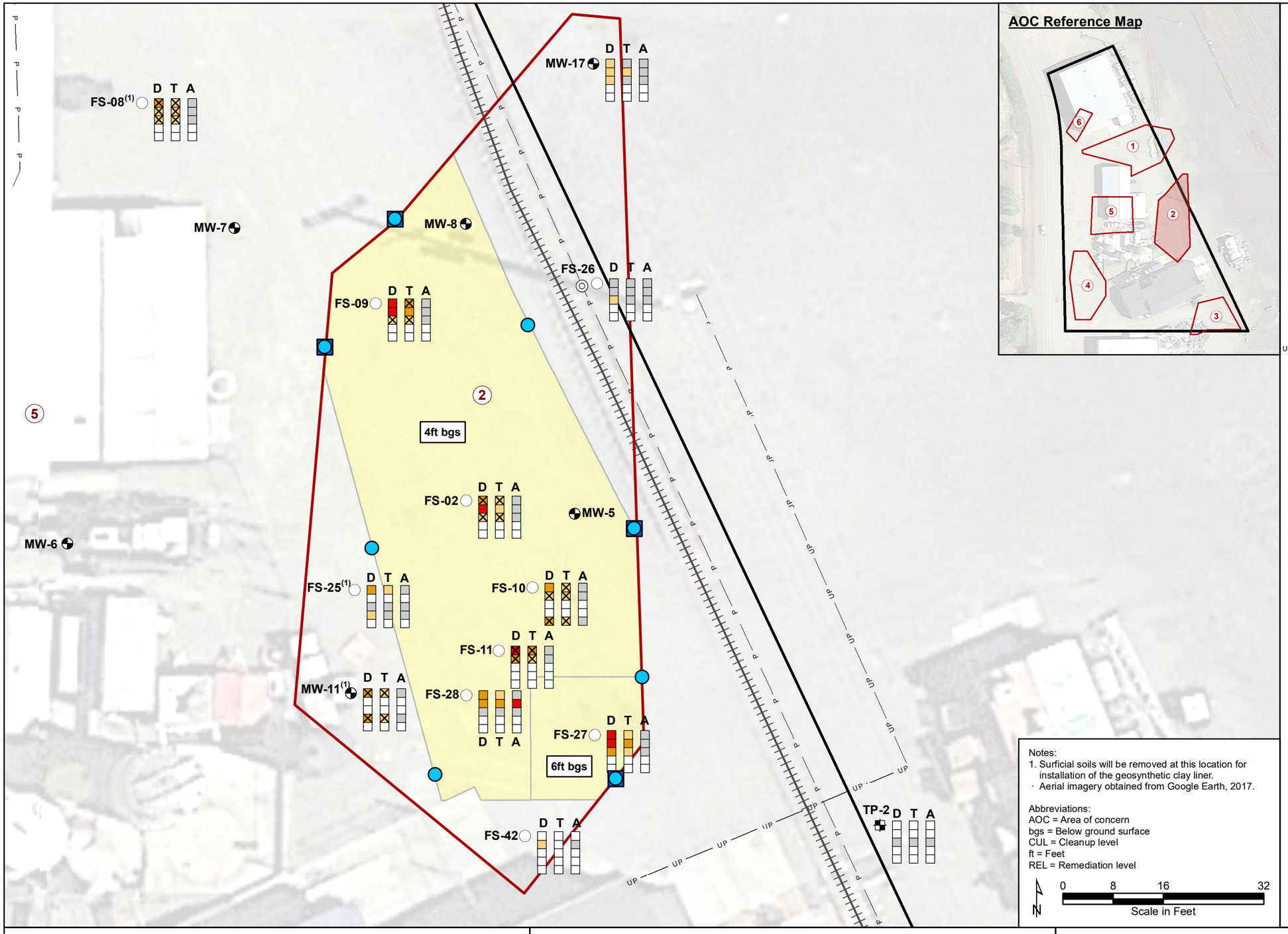

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Pre-Remedial Design Investigation Work Plan
Smith-Kem Site
Ellensburg, Washington

Figure 2.2
Proposed Pre-Design Soil Sample Locations—AOC 2

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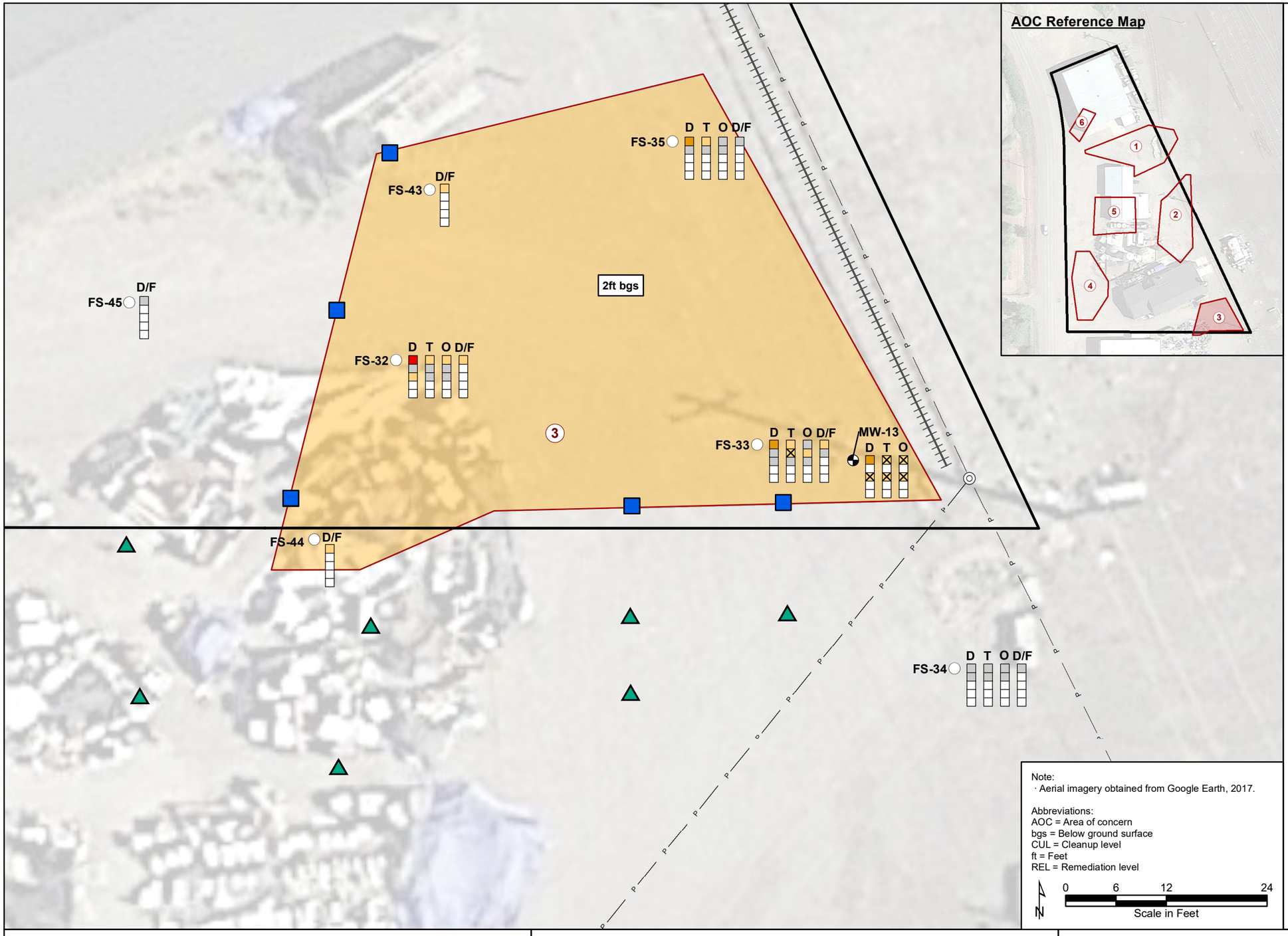
6/23/2023



Legend

- Area of Concern (with ID)

Proposed Sample Locations

- Phase I Base Soil Sample
- Off-property Step-out Soil Sample

Remedial Investigation Sample Locations

- Monitoring Well
- Soil Sample

Cleanup Action

- Excavate to Direct Contact RELs

Utilities

- Overhead Power Line
- Pole

Other Features

- Property Boundary
- Rail Spur

Soil Labels

Location ID → FS-22 ⊕

Chemical Group → D T O D/F

Sample Depth Interval →
- 0–2 ft bgs
- 2–4 ft bgs
- 4–6 ft bgs
- 6–8 ft bgs
- 8+ ft bgs

Chemical Group Key:
D = Dieldrin T = Toxaphene O = Other Pesticides
D/F = Dioxins/Furans

Compliance Information

- One or More Results Greater Than Direct Contact REL
- One or More Results Greater Than Leaching REL
- One or More Results Greater Than CUL
- Meets CUL
- Nondetect Exceedance
- Not Sampled

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Pre-Remedial Design Investigation Work Plan
Smith-Kem Site
Ellensburg, Washington

Figure 2.3
Proposed Pre-Design Soil Sample Locations—AOC 3

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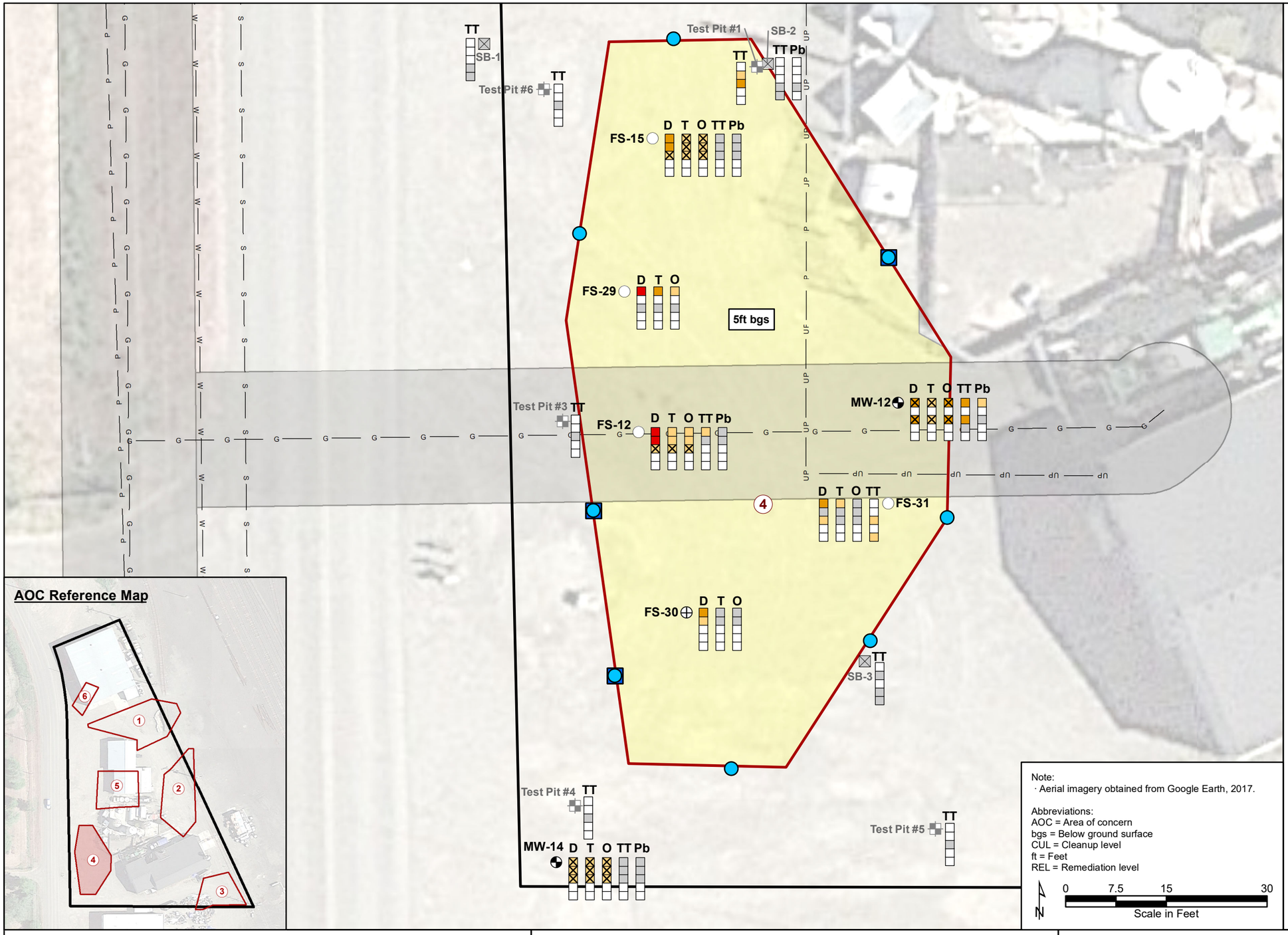

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Smith-Kem Site
Ellensburg, Washington

Figure 2.4
Proposed Pre-Design Soil Sample Locations—AOC 4

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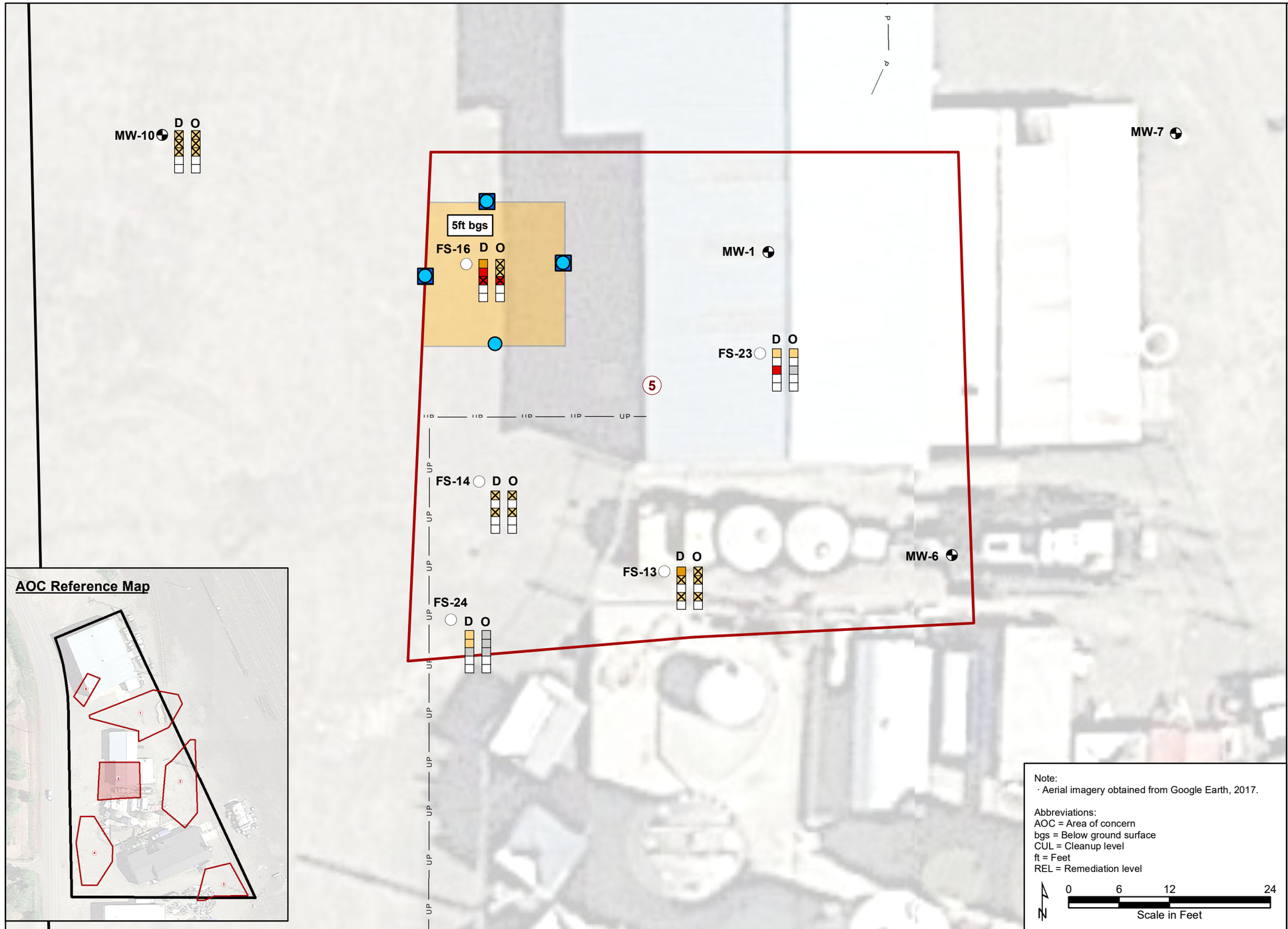
6/23/2023



Legend

- ① Area of Concern (with ID)

Proposed Sample Locations

- Phase I Sidewall Soil Sample(s)
- Phase I Base Soil Sample

Remedial Investigation Sample Locations

- Monitoring Well
- Soil Sample

Cleanup Action

- Excavate to Direct Contact RELs

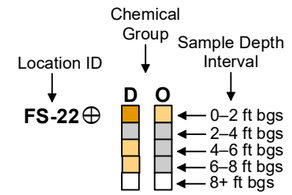
Utilities

- P — Overhead Power Line
- UP — Underground Power Line

Other Features

- Property Boundary

Soil Labels



Chemical Group Key:
D = Dieldrin O = Other Pesticides

Compliance Information

- One or More Results Greater Than Direct Contact REL
- One or More Results Greater Than Leaching REL
- One or More Results Greater Than CUL
- Meets CUL
- Nondetect Exceedance
- Not Sampled

Note:
· Aerial imagery obtained from Google Earth, 2017.

Abbreviations:
AOC = Area of concern
bgs = Below ground surface
CUL = Cleanup level
ft = Feet
REL = Remediation level

N

0 6 12 24
Scale in Feet

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Figure 2.5
Proposed Pre-Design Soil Sample Locations—AOC 5

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6/23/2023

MW-10

MW-7

MW-1

5

MW-6

MW-2

UP UP UP UP UP

UP UP UP P UP UP UP

Legend

① Area of Concern (with ID)

Proposed Sample Locations

Phase I Water Sample

PFM Deployment

Approximate Extent of COCs Exceeding Proposed CUL

Dieldrin >0.0055 µg/L

Toxaphene >0.80 µg/L

Other Pesticides > Proposed CUL

DRO >500 µg/L (dashed where inferred)

Remedial Investigation Sample Locations

Monitoring Well

Cleanup Action

PlumeStop Injection

Utilities

P Overhead Power Line

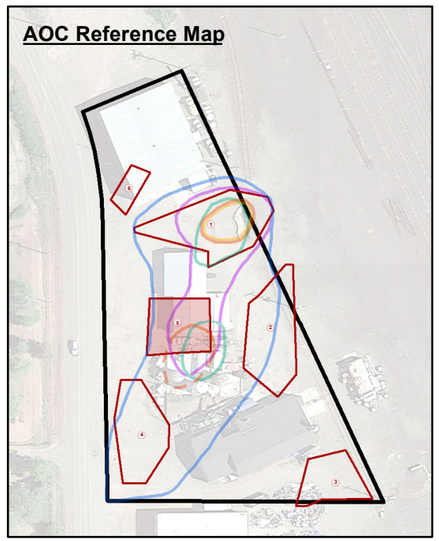
UP Underground Power Line

Other Features

Property Boundary

Approximate Groundwater Flow Direction

AOC Reference Map



Note:
· Aerial imagery obtained from Google Earth, 2017.

Abbreviations:
AOC = Area of concern
COC = Contaminant of concern
CUL = Cleanup level
DRO = Diesel-range organics
µg/L = Micrograms per liter
PFM - Passive Flux Meter

N

0 6 12 24

Scale in Feet

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Pre-Remedial Design Investigation Work Plan
Smith-Kem Site
Ellensburg, Washington

Figure 2.6
Proposed Pre-Design Groundwater Sample Locations—AOC 5

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Pre-Remedial Design Investigation Work Plan

Smith-Kem Site

Appendix A
Remedial Investigation Soil Data Summary Table

Appendix A
Remedial Investigation Soil Data Summary Table

		Chemical Group	Metals	Legacy Pesticides							Active-Use Pesticides		Total Petroleum Hydrocarbons (TPH)	Dioxins/Furans
		Chemical [1]	Lead	Aldrin	HCH-beta (b-BHC)	Chlordane	Chlordane-alpha	Dieldrin	4,4'-DDT / Sum DDT [2]	Toxaphene	Atrazine	Simazine	Sum of diesel- and oil-range TPH	Dioxins/Furans [3]
		Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ng/kg
Cleanup Criteria [4]		Direct Contact CUL	250	0.059	--	2.9	2.9	0.063	2.9	0.91	4.3	8.3	460	13.0
		Leaching CUL	--	0.0067	0.0067	1.1	--	0.0067	--	0.84	--	--	--	--
		Direct Contact REL	--	0.43	--	21	21	0.46	22	6.7	32	61	--	94
		Leaching REL	--	0.13	0.13	22	--	0.13	--	17	--	--	3,800/8,700	--
Event	Location Name	Depth Range (feet bgs)												
AOC 1														
RI Phase 1	Culvert	0–0.25	23	*0.34 UJ*	*0.34 UJ*	*1.6 UJ*	0.34 UJ	**0.72 J**	0.79 J	*17 UJ*	0.11 J	0.02 J	**2,000 JM**	
	FS-05	0.5–1	73	**8.3 J**	*0.13 UJ*	**38 J**	**5.6 J**	**31 J**	**4.2 J**	**18 J**	0.24 J	0.14 J	**570 JM**	
		3–4	2.5	*0.066 UJ*	*0.066 UJ*	0.32 UJ	0.066 UJ	*0.066 UJ*	0.066 UJ	*3.3 UJ*	0.0067 U	0.0067 U	250 U	
		5–6	4.7	**0.14 J**	*0.067 UJ*	0.61 J	0.11 J	**0.44 J**	0.14 J	*3.4 UJ*	0.0073	0.0067 U	250 U	
	FS-06	0–0.5	36	**20 J**	*0.34 UJ*	**84 J**	**9.9 J**	**46 J**	**5.7 J**	**120 J**	0.13 J	0.03 J	**590 JM**	
		2–3	11	**0.24 J**	*0.13 UJ*	**3.1 J**	0.42 J	**1.3 J**	0.35 J	*6.6 UJ*	0.0084	0.0067 U	250 U	
		5–6	4.2	*0.34 UJ*	*0.34 UJ*	**2.6 J**	0.46 J	**1.6 J**	0.34 UJ	*17 UJ*	0.017	0.0067 U	250 U	
	FS-07	0.5–1	6.6	*0.33 UJ*	*0.33 UJ*	*1.6 UJ*	0.33 UJ	*0.33 UJ*	0.33 UJ	*17 UJ*	0.036 J	0.0067 U	250 U	
		3–4	3	*0.33 UJ*	*0.33 UJ*	*1.6 UJ*	0.33 UJ	*0.33 UJ*	0.33 UJ	*17 UJ*	0.032 J	0.0067 U	250 U	
		4–5	1.7	*0.13 UJ*	*0.13 UJ*	0.66 UJ	0.13 UJ	*0.13 UJ*	0.13 UJ	*6.8 UJ*	0.02	0.0067 U	250 U	
RI Phase 2	FS-18	0.5–1		0.0067 U	0.0067 U	0.042		**0.044**	0.098	0.39	0.0067 U	0.0067 U		
		2–3		0.0067 U	0.0067 U	0.032 U		0.0067 U	0.0067 U	0.032 U	0.0067 U	0.0067 U		
		4–5		0.0067 U	0.0067 U	0.033 U		**0.017**	0.031	0.33 U	0.0067 U	0.0067 U		
		6–7		0.0067 U	0.0067 U	0.033 U		0.0067 U	0.0067 U	0.33 U	0.0067 U	0.0067 U		
	FS-19	0.5–1		**0.013**	**0.012**	**2.6**		**1.6**	1.3	**22**	0.029	0.0067 U		
		2.5–3.5		**0.0098**	**0.0084**	**2.1**		**1.4**	1.3	**13**	0.012	0.0067 U		**18.3**
		4.5–5.5		0.0067 U	0.0067 U	0.033 U		**0.024**	0.01	0.33 U	0.0067 U	0.0067 U		
		6–7		0.0067 U	0.0067 U	0.033 U		0.0067 U	0.0067 U	0.33 U	0.0067 U	0.0067 U		
	FS-20	0.5–1		0.0067 U	0.0067 U	0.2		**0.095**	0.035	0.52	0.0067 U	0.0067 U		
		3–4		0.0067 U	0.0067 U	0.033 U		**0.011**	0.19	0.33 U	0.015	0.0067 U		
		4–5		0.0067 U	0.0067 U	0.033 U		0.0067 U	0.0067 U	0.33 U	0.0077	0.0067 U		
		5.5–6.5		0.0067 U	0.0067 U	0.04		0.0067 U	0.0067 U	0.33 U	0.0067 U	0.0067 U		
	FS-22	0.5–1		0.0067 U	**0.011**	**2.6**		**0.35**	0.36	**13**	0.0067 U	0.0067 U		
		3–4		0.0067 U	0.0067 U	0.033 U		0.0067	0.0067 U	0.33 U	0.0089	0.018		
		4–5		0.0067 U	0.0067 U	0.061		**0.031**	0.012	**2**	0.013	0.012		
		4.5–5		0.0067 U	0.0067 U	0.056		**0.0095**	0.0067 U	0.36	0.014	0.012		
		7–8		0.0067 U	0.0067 U	0.033 U		**0.0078**	0.0067 U	0.33 U	0.0067 U	0.0067 U		
	MW-16	0.5–1		0.0067 U	0.0067 U	0.033	0.016	**0.049**	0.039	0.33 U	0.026	0.0067 U		
		3–4		0.0067 U	0.0067 U	0.033 U	0.0067 U	0.0067 U	0.0067 U	0.33 U	0.0067 U	0.0067 U		
		5.5–6		0.0067 U	0.0067 U	0.033 U	0.0067 U	0.0067 U	0.0067 U	0.33 U	0.0091	0.0067 U		
Historical Event	SB-8	3.5											4.9 U	

Appendix A
Remedial Investigation Soil Data Summary Table

		Chemical Group	Metals	Legacy Pesticides							Active-Use Pesticides		Total Petroleum Hydrocarbons (TPH)	Dioxins/Furans
		Chemical [1]	Lead	Aldrin	HCH-beta (b-BHC)	Chlordane	Chlordane-alpha	Dieldrin	4,4'-DDT / Sum DDT [2]	Toxaphene	Atrazine	Simazine	Sum of diesel- and oil-range TPH	Dioxins/Furans [3]
		Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ng/kg
Cleanup Criteria [4]		Direct Contact CUL	250	0.059	--	2.9	2.9	0.063	2.9	0.91	4.3	8.3	460	13.0
		Leaching CUL	--	0.0067	0.0067	1.1	--	0.0067	--	0.84	--	--	--	--
		Direct Contact REL	--	0.43	--	21	21	0.46	22	6.7	32	61	--	94
		Leaching REL	--	0.13	0.13	22	--	0.13	--	17	--	--	3,800/8,700	--
Event	Location Name	Depth Range (feet bgs)												
AOC 2														
RI Phase 1	FS-02	0.5–1	16	*0.34 UJ*	*0.34 UJ*	1.6 UJ	0.34 UJ	*0.34 UJ*	0.34 UJ	*17 UJ*	0.07 J	0.0067 UJ	81 JM	
		2.5–3.5	12	*0.34 UJ*	*0.34 UJ*	**6.6 J**	0.67 J	**2.7 J**	0.34 J	**12 J**	0.012 J	0.02 UJ	250 U	
		4–5	2.2	*0.13 UJ*	*0.13 UJ*	0.64 UJ	0.13 UJ	*0.13 UJ*	0.13 UJ	*6.6 UJ*	0.0067 UJ	0.0067 UJ	250 U	
	FS-09	0.5–1	50	*1.3 UJ*	*1.3 UJ*	**7.6 J**	1.3 UJ	**1.7 J**	1.2 J	*68 UJ*	0.046 J	0.072 J	**550 JM**	
		3–4	24	*0.33 UJ*	*0.33 UJ*	**14 J**	1.4 J	**1.8 J**	2.9 J	**68 J**	0.088 J	0.014 J	250 U	
		4–5	3.7	*0.13 UJ*	*0.13 UJ*	0.66 UJ	0.13 UJ	*0.13 UJ*	0.13 UJ	*6.8 UJ*	0.0078	0.0067 U	250 U	
	FS-10	0.5–1	41	*0.33 UJ*	*0.33 UJ*	1.6 UJ	0.33 UJ	**0.35 J**	0.33 UJ	*17 UJ*	0.034 J	0.022 J	400	
		2–3	5.5	*0.13 UJ*	*0.13 UJ*	0.66 UJ	0.13 UJ	*0.13 UJ*	0.13 UJ	*6.8 UJ*	0.0067 U	0.0067 U	250 U	
		9–10	4	*0.34 UJ*	*0.34 UJ*	1.6 UJ	0.34 UJ	*0.34 UJ*	0.34 UJ	*17 UJ*	0.0067 U	0.0067 U	**3,300**	
	FS-11	0.5–1	35	*1.3 UJ*	*1.3 UJ*	*6.6 UJ*	1.3 UJ	*1.3 UJ*	1.3 UJ	*68 UJ*	0.024 J	0.0067 U	120 JM	
		3–4	21	*0.34 UJ*	*0.34 UJ*	1.6 UJ	0.34 UJ	*0.34 UJ*	0.34 UJ	*17 UJ*	0.018 J	0.0067 U	250 U	
		11.5–12.5	1.7										250 U	
		15–16	1.6										250 U	
		19–20	5.9										250 U	
RI Phase 2	FS-25	0.5–1		**0.0087**	0.0067 U	0.43		**0.22**	0.24	**2.5**	0.13	0.13		
		1.5–2		0.0067 U	0.0067 U	0.033 U		0.0067 U	0.0067 U	0.33 U	0.0093	0.054		
		4.5–5.5		0.0067 U	0.0067 U	0.067		0.0067 U	0.0067 U	0.33 U	0.0067 U	0.0067 U		
		6–7		0.0067 U	0.0067 U	0.033 U		**0.008**	0.0067 U	0.33 U	0.0067 U	0.0067 U		
	FS-26	0.05–1		0.0067 U	0.0067 U	0.032 U	0.0067 U	0.0067 U	0.012	0.32 U	0.011	0.0067 U		
		2.5–3.5		0.0067 U	0.0067 U	0.033 U	0.0067 U	0.0067 U	0.0067 U	0.33 U	0.0067 U	0.0067 U		
		5–6		0.0067 U	0.0067 U	0.04	0.013	**0.048**	0.24	0.45	0.031	0.0067 U		
	FS-27	0.5–1		0.0093	**0.008**	2.1		**1.1**	0.19	**11**	0.0082	0.0068	**500 JM**	
		3–4		**0.029**	**0.052**	**13**		**6.2**	0.86	**70**	0.012	0.012	110 JM	
		4–5		0.0067 U	0.0067 U	0.2		**0.2**	0.022	**1.4**	0.0067 U	0.0067 U	250 U	
		7.5–8											**1,000**	
		9.5–10											250 U	
	FS-28	0.5–1		**0.022**	0.0067 U	0.37		**0.23**	0.053	**1.1**	1.6	0.29	**870 JM**	
		3–4		0.0067 U	**0.0068**	**11**		**0.21**	0.019	**52**	**710**	**110**	**800 JM**	
		5–5.5		0.0067 U	0.0067 U	0.033 U		0.0067 U	0.0067 U	0.33 U	0.46	0.11	**530 JM**	
		7–8											250 U	
	FS-42	3–4		0.0067 U	**0.017**		0.048	**0.11**	0.022		0.17	0.2		
Historical Event	MW-5	2											23	
		5	1.7										4.8 U	
		10											**970**	
RI Phase 1	MW-11	0–0.5	59	*0.34 UJ*	*0.34 UJ*	1.6 UJ	0.34 UJ	*0.34 UJ*	0.34 UJ	*17 UJ*	0.04 J	0.36 J	91 JM	
		1.5–2	41	*0.13 UJ*	*0.13 UJ*	0.66 UJ	0.13 UJ	*0.13 UJ*	0.13 UJ	*6.8 UJ*	0.014 J	4.1 J	250 U	
		7.5–8	1.6	*0.34 UJ*	*0.34 UJ*	1.6 UJ	0.34 UJ	*0.34 UJ*	0.34 UJ	*17 UJ*	0.0067 UJ	0.0067 UJ	**740**	
		9–10											250 U	

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Remedial Investigation Soil Data Summary Table

		Chemical Group	Metals	Legacy Pesticides							Active-Use Pesticides		Total Petroleum Hydrocarbons (TPH)	Dioxins/Furans
		Chemical [1]	Lead	Aldrin	HCH-beta (b-BHC)	Chlordane	Chlordane-alpha	Dieldrin	4,4'-DDT / Sum DDT [2]	Toxaphene	Atrazine	Simazine	Sum of diesel- and oil-range TPH	Dioxins/Furans [3]
		Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ng/kg
Cleanup Criteria [4]		Direct Contact CUL	250	0.059	--	2.9	2.9	0.063	2.9	0.91	4.3	8.3	460	13.0
		Leaching CUL	--	0.0067	0.0067	1.1	--	0.0067	--	0.84	--	--	--	--
		Direct Contact REL	--	0.43	--	21	21	0.46	22	6.7	32	61	--	94
		Leaching REL	--	0.13	0.13	22	--	0.13	--	17	--	--	3,800/8,700	--
Event	Location Name	Depth Range (feet bgs)												
AOC 2 (cont.)														
RI Phase 2	MW-17	0.5–1		0.0067 U	0.0067 U	0.033 U	0.0067 U	**0.013**	0.096	0.33 U	0.0067 U	0.0067 U		
		3.5–4		0.0067 U	0.0067 U	0.19	0.046	**0.065**	0.3	**1.1**	0.0085	0.0067 U		
		5–5.5		0.0067 U	0.0067 U	0.032 U	0.0067 U	**0.011**	0.11	0.32 U	0.0067 U	0.0067 U		
Historical Event	SB-13	2											5 U	
		5											4.9 U	
		10											5 U	
AOC 3														
RI Phase 2	FS-32	0.5–1		0.0067 U	**0.012**	**1.4**		**1.6**	0.51	**11**	0.027	0.019		**23.1 J**
		2–3		0.0067 U	0.0067 U	0.032 U		0.022	0.059	0.32 U	0.0067 U	0.0067 U		
		4–5		0.0067 U	0.0067 U	0.097		**0.098**	0.026	0.63	0.0078	0.0067 U		
	FS-33	0.5–1		0.0067 U	0.0067 U	0.44		**0.31**	0.41	**2.5**	0.12	0.23		**53.4**
		2–3		0.0067 U	0.0067 U	0.15		0.023	**20**	*1.3 U*	0.0067 U	0.0081		1.05 J
		4–5		0.0067 U	0.0067 U	0.033 U		0.0067 U	0.029	0.33 U	0.0067 U	0.0067 U		
	FS-35	0.5–1		0.0067 U	0.0067 U	0.38		**0.18**	0.094	**2.1**	0.0079	0.0071		3.38 J
		2–3		0.0067 U	0.0067 U	0.032 U		0.0067 U	0.0067 U	0.32 U	0.0067 U	0.0067 U		
	FS-43	1–2												**30.6**
	FS-44	0.5–1												**92.4**
RI Phase 1	MW-13	0–0.5	30	*0.13 UJ*	*0.13 UJ*	0.66 UJ	0.13 UJ	**0.16 J**	0.13 UJ	*6.8 UJ*	0.013 J	0.031 J	250 U	
		1–2	32	*0.13 UJ*	*0.13 UJ*	0.5 J	0.067 UJ	**0.28 J**	0.51 J	*6.8 UJ*	0.03 J	0.033 J	250 U	
		3.5–4.5	1.7	*0.13 UJ*	*0.13 UJ*	0.64 UJ	0.13 UJ	*0.13 UJ*	0.13 UJ	*6.6 UJ*	0.0067 UJ	0.0067 UJ	250 U	
AOC 4														
RI Phase 1	FS-12	0.5–1	76	*0.33 UJ*	*0.33 UJ*	**4.7 J**	1.1 J	**1.5 J**	0.41 J	**15 J**	0.024 J	0.015 J	**1,200 JM**	
		3–4	12	*0.13 UJ*	*0.13 UJ*	**4.6 J**	0.74 J	**1.2 J**	0.48 J	**14 J**	0.024 J	0.016 J	280	
		4–5		*0.065 UJ*	*0.065 UJ*	0.32 UJ	0.065 UJ	*0.065 UJ*	0.065 UJ	*3.3 UJ*	0.0067 U	0.0067 U		
	FS-15	0.5–1	20	*0.13 UJ*	*0.13 UJ*	0.66 UJ	0.13 UJ	**0.16 J**	0.13 UJ	*6.8 UJ*	0.0067 U	0.0067 U	250 U	
		3–4	12	*0.067 UJ*	*0.067 UJ*	0.33 UJ	0.067 UJ	**0.31 J**	0.067 UJ	*3.4 UJ*	0.0067 U	0.0093	250 U	
		4–5	7.9	*0.067 UJ*	*0.067 UJ*	0.33 UJ	0.067 UJ	*0.067 UJ*	0.067 UJ	*3.4 UJ*	0.0067 U	0.0067 U	250 U	
RI Phase 2	FS-29	0.5–1		0.007	**0.012**	**6.3**		**1.2**	0.2	**53**	0.048	0.013		
		1–2		0.0067 U	0.0067 U	0.057		**0.031**	0.022	0.67	0.0067 U	0.0067 U		
		4–4.5		0.0067 U	0.0067 U	0.033 U		0.0067 U	0.0067 U	0.33 U	0.0067 U	0.0067 U		
	FS-30	0.5–1		0.0067 U	0.0067 U	0.089		**0.4**	0.1	0.57	0.0067 U	0.0067 U		
		2–3		0.0067 U	0.0067 U	0.033 U		0.0067 U	0.0067 U	0.33 U	0.0067 U	0.0067 U		
		3–4		0.0067 U	0.0067 U	0.033 U		**0.009**	0.0067 U	0.33 U	0.0067 U	0.0067 U		
	FS-31	0.5–1		0.0067 U	0.0067 U	0.39		**0.21**	0.066	**1.8**	0.0067 U	0.012		
		2–3		0.0067 U	0.0067 U	0.033 U		0.0067 U	0.0067 U	0.33 U	0.0067 U	0.0067 U		
		3–5											**1,100 JM**	
		4–5		0.0067 U	0.0067 U	0.033 U		**0.0099**	0.013	0.33 U	0.0067 U	0.0067 U		
		8–9											**7,000 JM**	
		9–10											250 UJ	

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Chemical Group			Metals	Legacy Pesticides							Active-Use Pesticides		Total Petroleum Hydrocarbons (TPH)	Dioxins/Furans
Chemical [1]			Lead	Aldrin	HCH-beta (b-BHC)	Chlordane	Chlordane-alpha	Dieldrin	4,4'-DDT / Sum DDT [2]	Toxaphene	Atrazine	Simazine	Sum of diesel- and oil-range TPH	Dioxins/Furans [3]
Unit			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ng/kg
Cleanup Criteria [4]		Direct Contact CUL	250	0.059	--	2.9	2.9	0.063	2.9	0.91	4.3	8.3	460	13.0
		Leaching CUL	--	0.0067	0.0067	1.1	--	0.0067	--	0.84	--	--	--	--
		Direct Contact REL	--	0.43	--	21	21	0.46	22	6.7	32	61	--	94
		Leaching REL	--	0.13	0.13	22	--	0.13	--	17	--	--	3,800/8,700	--
Event	Location Name	Depth Range (feet bgs)												
AOC 4 (cont.)														
RI Phase 1	MW-12	0–0.5	110	*0.34 UJ*	*0.34 UJ*	1.6 UJ	0.34 UJ	*0.34 UJ*	0.34 UJ	*17 UJ*	0.0067 UJ	0.0067 UJ	**500 JM**	
		1.5–2	**990**	*0.34 UJ*	*0.34 UJ*	1.6 UJ	0.34 UJ	*0.34 UJ*	0.34 UJ	*17 UJ*	0.0067 UJ	0.0067 UJ	**21,000 JM**	
		5–6	4.1	*0.34 UJ*	*0.34 UJ*	1.6 UJ	0.34 UJ	*0.34 UJ*	0.34 UJ	*17 UJ*	0.0067 UJ	0.0067 UJ	**13,000 JM**	
		7–8											250 UJ	
Historical Event	Test Pit #1	3											**1,800**	
		5											**7,400**	
AOC 5														
RI Phase 1	FS-13	0.5–1	80	*0.13 UJ*	*0.13 UJ*	0.82 J	0.21 J	**0.23 J**	0.54 J	*6.6 UJ*	0.053 J	0.022 J	250 U	
		3–4	5.7	*0.067 UJ*	*0.067 UJ*	0.33 UJ	0.067 UJ	*0.067 UJ*	0.067 UJ	*3.4 UJ*	0.0067 U	0.0067 U	230	
		4–5											250 U	
		6–7	2.6	*0.13 UJ*	*0.13 UJ*	0.66 UJ	0.13 UJ	*0.13 UJ*	0.13 UJ	*6.8 UJ*	0.0067 U	0.0067 U	**4,700**	
		13–14	3.2										250 U	
	FS-14	0.5–1	22	*0.13 UJ*	*0.13 UJ*	0.66 UJ	0.13 UJ	*0.13 UJ*	0.13 UJ	*6.8 UJ*	0.0067 U	0.0067 U	250 U	
		4–5	1.7	*0.13 UJ*	*0.13 UJ*	0.64 UJ	0.13 UJ	*0.13 UJ*	0.13 UJ	*6.6 UJ*	0.0067 U	0.0067 U	250 U	
		5–6	4.9	*0.067 UJ*	*0.067 UJ*	0.33 UJ	0.067 UJ	*0.067 UJ*	0.067 UJ	*3.4 UJ*	0.0067 U	0.014	250 U	
	FS-16	0.5–1	47	*0.065 UJ*	*0.065 UJ*	0.99 J	0.18 J	**0.44 J**	0.68 J	*3.3 UJ*	0.014 J	0.01 J	**530 JM**	
		3–4	58	*0.13 UJ*	*0.13 UJ*	0.97 J	0.16 J	**0.55 J**	1.1 J	*6.7 UJ*	0.017 J	0.014 J	400 JM	
		5–6	3	*1.3 UJ*	*1.3 UJ*	*6.6 UJ*	*1.3 UJ*	*1.3 UJ*	1.3 UJ	*68 UJ*	0.12 J	0.025 J	250 U	
		9–10	2.2										63 JM	
RI Phase 2	FS-23	0.5–1		**0.023**	0.0067 U	0.33 U		**0.067**	0.17	**17**	0.012	0.0067 U	**4,900**	
		4–5		0.0067 U	0.0067 U	0.033 U		0.0067 U	0.0067 U	0.45	0.0067 U	0.0067 U	**2,100**	
		5–6		0.0067 U	0.0067 U	0.032 U		**0.99**	0.0067 U	0.32 U	0.0067 U	0.0067 U	460	
		6–7											**4,600**	
		8–9											250 U	
	FS-24	0.5–1		0.0067 U	0.0067 U	0.033 U		**0.0092**	0.0083	0.33 U	0.0067 U	0.0067 U		
		2–3		0.0067 U	0.0067 U	0.046		**0.014**	0.014	0.37	0.0067 U	0.0067 U		
		4–5		0.0067 U	0.0067 U	0.033 U		0.0067 U	0.0067 U	0.33 U	0.0067 U	0.0067 U		
Historical Event	MW-1	2	31										13	
		5	78										4.9 U	
	SB-10	3	3.8										**1,700**	
	SB-11	0.5	250										120	
		1											140	
AOC 6														
RI Phase 1	FS-03	0.5–1	18	*0.13 UJ*	*0.13 UJ*	0.66 UJ	0.13 UJ	**0.35 J**	0.13 UJ	*6.8 UJ*	0.009 J	0.0067 U	250 U	
		2.5–3.5	34	*0.13 UJ*	*0.13 UJ*	0.66 UJ	0.13 UJ	*0.13 UJ*	0.13 UJ	*6.8 UJ*	0.0067 U	0.0067 U	250 U	
		5.5–6.5	3.2	*0.067 UJ*	*0.067 UJ*	0.33 UJ	0.067 UJ	*0.067 UJ*	0.067 UJ	*3.4 UJ*	0.0067 U	0.0067 U	250 U	
RI Phase 2	FS-17	0.5–1		0.0067 U	0.0067 U	0.22		**0.12**	0.11	**1.3**	0.025	0.03		
		2.5–3.5		0.0067 U	0.0067 U	0.033 U		0.0067 U	0.0067 U	0.33 U	0.0067 U	0.0067 U		
		4–5		0.0067 U	0.0067 U	0.033 U		0.0067 U	0.0067 U	0.33 U	0.0067 U	0.0067 U		

Appendix A
Remedial Investigation Soil Data Summary Table

		Chemical Group	Metals	Legacy Pesticides							Active-Use Pesticides		Total Petroleum Hydrocarbons (TPH)	Dioxins/Furans
		Chemical [1]	Lead	Aldrin	HCH-beta (b-BHC)	Chlordane	Chlordane-alpha	Dieldrin	4,4'-DDT / Sum DDT [2]	Toxaphene	Atrazine	Simazine	Sum of diesel- and oil-range TPH	Dioxins/Furans [3]
		Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ng/kg
Cleanup Criteria [4]		Direct Contact CUL	250	0.059	--	2.9	2.9	0.063	2.9	0.91	4.3	8.3	460	13.0
		Leaching CUL	--	0.0067	0.0067	1.1	--	0.0067	--	0.84	--	--	--	--
		Direct Contact REL	--	0.43	--	21	21	0.46	22	6.7	32	61	--	94
		Leaching REL	--	0.13	0.13	22	--	0.13	--	17	--	--	3,800/8,700	--
Event	Location Name	Depth Range (feet bgs)												
None														
RI Phase 1	FS-01	0.5–1	110	*0.34 UJ*	*0.34 UJ*	*1.6 UJ*	0.34 UJ	*0.34 UJ*	0.34 UJ	*17 UJ*	0.025 J	0.048 J	**1,300 JM**	
		2–3	78	*0.34 UJ*	*0.34 UJ*	*1.6 UJ*	0.34 UJ	*0.34 UJ*	0.34 UJ	*17 UJ*	0.0067 UJ	0.0067 UJ	250 U	
		7–8	1.8	*0.13 UJ*	*0.13 UJ*	0.66 UJ	0.13 UJ	*0.13 UJ*	0.13 UJ	*6.8 UJ*	0.0067 UJ	0.0067 UJ	250 U	
	FS-04	0.5–1	4.2	*0.066 UJ*	*0.066 UJ*	0.32 UJ	0.066 UJ	*0.066 UJ*	0.066 UJ	*3.3 UJ*	0.0067 U	0.0067 U	250 U	
		3–4	21	*0.067 UJ*	*0.067 UJ*	0.33 UJ	0.067 UJ	*0.067 UJ*	0.067 UJ	*3.4 UJ*	0.011	0.0067 U	250 U	
		7–8	5	*0.067 UJ*	*0.067 UJ*	0.33 UJ	0.067 UJ	*0.067 UJ*	0.067 UJ	*3.4 UJ*	0.0067 U	0.0067 U	250 U	
	FS-08	0.5–1	**350**	*0.34 UJ*	*0.34 UJ*	*1.6 UJ*	0.34 UJ	*0.34 UJ*	0.77 J	*17 UJ*	0.054 J	0.0067 U	**710 JM**	
		3–4	7.2	*0.13 UJ*	*0.13 UJ*	0.64 UJ	0.13 UJ	*0.13 UJ*	0.13 UJ	*6.6 UJ*	0.0067 U	0.0067 U	250 U	
		4–5	2.7	*0.13 UJ*	*0.13 UJ*	0.66 UJ	0.13 UJ	*0.13 UJ*	0.13 UJ	*6.8 UJ*	0.0067 U	0.0067 U	250 U	
RI Phase 2	FS-21	0.5–1		0.0067 U	0.0067 U	0.033 U		**0.011**	0.021	0.33 U	0.0067 U	0.0067 U		
		2–3		0.0067 U	0.0067 U	0.033 U		0.0067 U	0.0067 U	0.33 U	0.0067 U	0.0067 U		
		4.5–5		0.0067 U	0.0067 U	0.033 U		0.0067 U	0.0067 U	0.33 U	0.0067 U	0.0067 U		
	FS-34	0.5–1		0.0067 U	0.0067 U	0.033 U	0.0067 U	0.0067 U	0.0067 U	0.33 U	0.0067 U	0.0067 U		0.141 J
		2–3		0.0067 U	0.0067 U	0.033 U	0.0067 U	0.0067 U	0.0067 U	0.33 U	0.0067 U	0.0067 U		
		3–4		0.0067 U	0.0067 U	0.033 U	0.0067 U	0.0067 U	0.0067 U	0.33 U	0.0067 U	0.0067 U		
	FS-45	0.5–1												8.28
Historical Event	MW-7	2	9.3										5 U	
		5											4.9 U	
		10											4.8 U	
	MW-8	2											18	
		5	32										16	
		10											5 U	
RI Phase 1	MW-9	0.5–1	16	*0.13 UJ*	*0.13 UJ*	0.64 UJ	0.13 UJ	*0.13 UJ*	0.13 UJ	*6.6 UJ*	0.0067 UJ	0.0067 UJ	250 U	
		4–5	42	*0.13 UJ*	*0.13 UJ*	0.66 UJ	0.13 UJ	*0.13 UJ*	0.13 UJ	*6.8 UJ*	0.014 J	0.0081 J	250 U	
		7–8	6.6	*0.34 UJ*	*0.34 UJ*	*1.6 UJ*	0.34 UJ	*0.34 UJ*	0.34 UJ	*17 UJ*	0.0067 UJ	0.0067 UJ	250 U	
	MW-10	0–0.5	23	*0.13 UJ*	*0.13 UJ*	0.66 UJ	0.13 UJ	*0.13 UJ*	0.13 UJ	*6.8 UJ*	0.0067 UJ	0.0067 UJ	250 U	
		1.5–2.5	12	*0.13 UJ*	*0.13 UJ*	0.66 UJ	0.13 UJ	*0.13 UJ*	0.13 UJ	*6.8 UJ*	0.0067 UJ	0.0067 UJ	250 U	
		4–5	2.9	*0.13 UJ*	*0.13 UJ*	0.66 UJ	0.13 UJ	*0.13 UJ*	0.13 UJ	*6.8 UJ*	0.0067 UJ	0.0067 UJ	250 U	
	MW-14	0–0.5	30	*0.13 UJ*	*0.13 UJ*	0.66 UJ	0.13 UJ	*0.13 UJ*	0.13 UJ	*6.8 UJ*	0.0067 UJ	0.013 UJ	250 U	
		2–3	2.6	*0.13 UJ*	*0.13 UJ*	0.64 UJ	0.13 UJ	*0.13 UJ*	0.13 UJ	*6.6 UJ*	0.0067 UJ	0.0067 UJ	250 U	
		4–5	1.7	*0.13 UJ*	*0.13 UJ*	0.66 UJ	0.13 UJ	*0.13 UJ*	0.13 UJ	*6.8 UJ*	0.0067 UJ	0.0067 UJ	250 U	
RI Phase 2	MW-15	0.5–1		0.0067 U	0.0067 U	0.033 U	0.015	**0.0078**	0.012	0.33 U	0.0067 U	0.0067 U		
		3–4		0.0067 U	0.0067 U	0.033 U	0.0067 U	0.0067 U	0.0067 U	0.33 U	0.0067 U	0.0067 U		
		5–5.5		0.0067 U	0.0067 U	0.033 U	0.0067 U	0.0067 U	0.0067 U	0.33 U	0.0067 U	0.0067 U		

Appendix A
Remedial Investigation Soil Data Summary Table

		Chemical Group	Metals	Legacy Pesticides							Active-Use Pesticides		Total Petroleum Hydrocarbons (TPH)	Dioxins/Furans
		Chemical [1]	Lead	Aldrin	HCH-beta (b-BHC)	Chlordane	Chlordane-alpha	Dieldrin	4,4'-DDT / Sum DDT [2]	Toxaphene	Atrazine	Simazine	Sum of diesel- and oil-range TPH	Dioxins/Furans [3]
		Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ng/kg
Cleanup Criteria [4]		Direct Contact CUL	250	0.059	--	2.9	2.9	0.063	2.9	0.91	4.3	8.3	460	13.0
		Leaching CUL	--	0.0067	0.0067	1.1	--	0.0067	--	0.84	--	--	--	--
		Direct Contact REL	--	0.43	--	21	21	0.46	22	6.7	32	61	--	94
		Leaching REL	--	0.13	0.13	22	--	0.13	--	17	--	--	3,800/8,700	--
Event	Location Name	Depth Range (feet bgs)												
None (cont.)														
Historical Event	SB-1	7											5 U	
		11											4.9 U	
	SB-2	7	3.5										4.9 U	
		11											4.9 U	
	SB-3	3											5.4	
		7											5 U	
		15											5 U	
	SB-4	3											190	
		7											5 U	
		11											5 U	
	SB-5	3											26	
		7											5 U	
		11											4.9 U	
	SB-6	3											4.9 U	
		7											35	
		11											8.4	
		15											5 U	
	SB-7	3											64	
		7											5 U	
	SB-9	3											220	
	SB-12	5											5 U	
		10											5 U	
RI Phase 2	Surface-1	0.5–1	34	0.0067 U	0.0067 U	0.17		**0.094**	0.098	**0.86**	0.14	0.009	250 U	

Appendix A
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		Chemical Group	Metals	Legacy Pesticides							Active-Use Pesticides		Total Petroleum Hydrocarbons (TPH)	Dioxins/Furans
		Chemical [1]	Lead	Aldrin	HCH-beta (b-BHC)	Chlordane	Chlordane-alpha	Dieldrin	4,4'-DDT / Sum DDT [2]	Toxaphene	Atrazine	Simazine	Sum of diesel- and oil-range TPH	Dioxins/Furans [3]
		Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ng/kg
Cleanup Criteria [4]		Direct Contact CUL	250	0.059	--	2.9	2.9	0.063	2.9	0.91	4.3	8.3	460	13.0
		Leaching CUL	--	0.0067	0.0067	1.1	--	0.0067	--	0.84	--	--	--	--
		Direct Contact REL	--	0.43	--	21	21	0.46	22	6.7	32	61	--	94
		Leaching REL	--	0.13	0.13	22	--	0.13	--	17	--	--	3,800/8,700	--
Event	Location Name	Depth Range (feet bgs)												
None (cont.)														
Historical Event	Test Pit #3	4.7											50 U	
	Test Pit #4	4.7											50 U	
	Test Pit #5	5											50 U	
	Test Pit #6	5											50 U	
	Test Pit #7	4.5											50 U	
	Test Pit #11	4.7											50 U	
	Test Pit #13	4.7											50 U	
	Test Pit #14	4.7											50 U	
RI Phase 2	TP-1	3.5		0.0067 U	0.0067 U	0.032 U	0.0067 U	0.0067 U	0.016	0.32 U	0.0067 U	0.0067 U		
	TP-2	4.5–5		0.0067 U	0.0067 U	0.033 U	0.0067 U	0.0067 U	0.0067 U	0.33 U	0.0067 U	0.0067 U		

Notes:

Dioxin/furan results are rounded to three significant figures; all other results are rounded to two significant figures.

Where sample duplicates were collected, the maximum among detected result and the minimum among nondetect results is presented.

-- Not applicable; pathway is not active or proposed CUL listed in this table is protective of other pathways.

RED/BOLD Result exceeds applicable soil proposed CUL for either the direct contact or leaching pathway. Soil proposed CULs are summarized by chemical and AOC in Table 7.1.

RED/BOLD Result exceeds the leaching remediation level.

BLACK/BOLD Result exceeds the direct contact remediation level.

Italics Nondetect result exceeds proposed CUL.

Sample interval desingated for removal by excavation (either within the AOC or for installation of the GCL) during cleanup activities.

1 Only chemicals identified as soil COCs in the DCAP are included in this table (Ecology 2023).

2 Samples were not analyzed for the 2,4' isomer of DDT-family compounds. The result for the 4,4' isomer is compared to relevant criteria developed for total DDT.

3 The dioxin/furan result is equivalent to the total dioxin/furan TEQ summed using toxic equivalent factor values in WAC Table 708-1 and 1/2 of the reported result for nondetect results in each sample.

4 Cleanup levels and remediation levels were established in the DCAP (Ecology 2023).

Abbreviations:

AOC Area of concern
BHC Benzene hexachloride
COC Chemical of concern
CUL Cleanup level
DCAP Draft Cleanup Action Plan
DDT Dichlorodiphenyltrichloroethane
Ecology Washington State Department of Ecology
GCL Geosynthetic clay liner
HCH Hexachlorocyclohexane
mg/kg Milligrams per kilogram
ng/kg Nanograms per kilogram
REL Remediation level
RI Remedial Investigation
TEE Terrestrial Ecological Evaluation
TEQ Toxic equivalent

Qualifiers:

J Analyte was detected, concentration is considered to be an estimate.
JM Analyte was detected, concentration is considered to be an estimate due to poor match to chromatographic standard.
U Analyte was not detected at the given reporting limit.
UJ Analyte was not detected at the given reporting limit, which is considered to be an estimate.

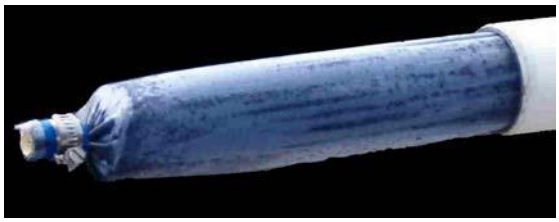
Pre-Remedial Design Investigation Work Plan

Smith-Kem Site

Appendix B
Passive Flux Meter Protocol Manual

Passive Flux Meter Protocol Manual

EnviroFlux, LLC



The following documents current methods for construction, storage, transport, deployment, sampling and analysis of passive flux meters for site assessment.

PFM CONSTRUCTION

PFM Storage: If the PFMs are constructed for transport to the field site, the PFMs will be stored in tubes and cooled. PFM storage tubes are constructed using PVC pipe the same diameter as the packing tube. The bottom of storage tube is sealed by a gas tight mechanical plug. The PFM is then extruded from the packing tube into the storage tube. A section of threaded rod or PVC pipe is used to push the PFM out of the packing tube and into the storage tube. The top of the storage tube is then sealed. The PFM are then placed in cold storage (4 C) until transport.

PFM Transport: The PFMs are transported in cardboard boxes to the site for FedEx shipments.

INSTALLATION PROCEDURES

PFM Deployment: At the field site the PFM in the packing tube or storage tube is prepared for PFM insertion into the well casing. A rope (or in some cased a steel cable) is attached to the top of the PFM using a safety carabineer. The tube is lined up with the top of the well casing and a section of push rod is used to push the PFM from the tube into the top section of well casing. Additional push rods are attached to continue pushing the PFM to the screen interval. If multiple PFMs are deployed on a single line, short sections of cable (about 5.5ft long) are thread through the upper PFM to link the PFMs together well. When inserting the PFM some back pressure may build since the water in the well casing must flow through the center tube as the PFM is inserted. Proceed slowly as pressure builds. The PFM rope (or steel cable) attached to the sock assembly is then secured to the well lid or others to ensure that it will not be lost to the well head.

1) PFMs are shipped to the site via FedEx Overnight.

2) Lay the PFMs for the first well onto saw horse legs.

3) Remove end caps from PVC transport tubes.

4) Remove well lid and cap.

5) Attach retrieval rope (or wires) to the top of each PFM using a carabineer connector.

6) Install PFMs by setting transport tube over monitoring well and using Geoprobe rods to push PFM out of the transport tube and into the well.

ail: info@enviroflux.com

7) Push PFM into position in the well using Geoprobe rods while holding retrieval wire tight.

8) Repeat steps 5 through 7 for each PFM that is to be installed in the well.

9) Replace well lid and cap (wire ropes are cut to a length such that two feet of each retrieval wire will remain outside the well).

10) Repeat steps 2 through 9 for each well.

RETRIEVAL AND SAMPLING PROCEDURES

Preparation of Sampling Vials: 120 ml jars are used for AC sampling. Jars are filled with activated carbon making sure to seal tightly with no carbon grains on the lip of the jar.

PFM Retrieval: PFMs are retrieved using the rope. The top PFM in the well is extracted first by gently pulling up on the rope (heavy work gloves should be worn when pull on rope or stainless wire cable). The PFM should be pulled to the top of the well casing. When the PFM is at the top of the well casing untangle any rope (or wires) that are twisted at the well head. Thread the retrieval cable through a 5ft storage (or transport) PVC pipe and place the pipe over the well to guide and contain the extruded PFM. Move the PFM to the sampling work station.

PFM Sampling: A tarpaulin acts as a 'protective flooring' for the work zone. A portable table is used as a work zone for sampling the PFMs. Nitrile protective gloves and necessary other protective clothing will be worn by all samplers. A lined bucket (5gal) is placed under the work area to capture un-sampled residual activated carbon from the retrieved PFM. The sock is extruded from the PVC pipe to the sampling interval extent. The flexible mesh packing material is cut and the sorbent (activated carbon) captured in plastic or stainless steel mixing bowls for homogenization using a stainless steel spatula. A sub-sample is then transferred into 120 mL jars. The jars are stored in a cooler for transport back to the laboratory for analysis. The center tube and viton washers are measured to obtain the sample interval lengths in the PFM. Sampling materials, spatula, scissors, mixing bowls are wiped clean to remove carbon particles prior to retrieving the next PFM.

Transportation and Storage: Sorbent (GAC) samples are stored on-site in coolers then shipped via overnight air express (e.g., FedEx) to the EnviroFlux laboratory. Samples are stored in a cold storage room or refrigerator at 4^{o}C until extraction and analysis.

1) Retrieve PFM from well by pulling up on the attached rope (or wire). The PFM is pulled from the well pipe directly into a PVC tube of the same diameter.

2) Place tube on table and expose the first segment by pulling on the bottom end of the PFM.

3) Using scissors, cut open the nylon socks and flexible red mesh covering the first segment and pour the exposed sorbent(GAC) mixture into a mixing bowl.

4) Stir the mixture vigorously in the bowl to homogenize

5) Sub-sample the mixture and place into 120mL jar and seal tightly (make sure no carbon particles are on the lip of the jar).

6) Measure the interval length of the PFM segment

7) Repeat for steps 3-8 for remaining segments of PFM

8) After all PFMs are sampled, place 120 mL jars into cooler(s) and ship back for analysis

9) Excess sorbent is collected in a plastic-lined container for proper hazardous waste disposal.