



MEMORANDUM

To: Katie Daugherty, RG Date: January 17, 2025

From: Phil Wiescher, PhD and Project No.: M8012.01.001
Carolyn Wise, RG

RE: Property 4, Yard Investigation Work Plan
Permapost Products, Inc.
Hillsboro, Oregon
ECSI #148

Maul Foster & Alongi, Inc. (MFA) and Permapost Products, Inc. (Permapost) have prepared this investigation work plan (work plan) to delineate the extent of polychlorinated dibenzo-p-dioxin and polychlorinated dibenzofuran (dioxin/furan) and arsenic contamination at Property 4 located at 4171 SE Witch Hazel Road, Hillsboro, Oregon 97123 (Washington County tax parcel 1S209BD00500, Property 4 on Figure 1).

Property 4 is included in the previously defined study area is located to the south of the Permapost property at 4205 SE Witch Hazel Road in Hillsboro, Oregon (the Permapost Property). The study area includes properties immediately adjacent to the Permapost Property with residential zoning in residential use (Washington County tax parcels 1S209BD00800, 1S209BD00700, 1S209BD00600, 1S209BD00500, Properties 1 through 4, respectively)

Previous investigations for Properties 1, 2, and 3 on Figure 1 evaluated the extent of dioxins/furans and arsenic consistent with the scope of work specified in the *Yard Investigation Work Plan, Permapost Products, Inc., Hillsboro, Oregon, ECSI #148 (Yard Investigation Work Plan)* in July 2022 (MFA 2022) and *Yard Pre-Design Work Plan, Permapost Products, Inc. Hillsboro Oregon, ECSI No. 148* in April 2023 (MFA 2023). This work plan follows the general scope and procedures used for the other three properties within the study area and identifies the data to be collected from Property 4 to evaluate the extent of potential soil contamination.

REGULATORY FRAMEWORK

This work plan was developed in accordance with applicable Oregon Administrative Rules 340-122-0010 through -0115, DEQ guidance and, as appropriate, follows the Guidance for Conducting Remedial Investigations and Feasibility Studies under Comprehensive Environmental Response, Compensation, and Liability Act, Office of Solid Waste and Emergency Response Directive 9355.3-01, 1988 and the revised Ecological Risk Assessment Internal Management Directive (DEQ 2020).

OBJECTIVES AND PURPOSE

This work plan is intended to delineate the extent of potential contamination at Property 4 within the study area. The following objectives have been identified for this work plan:

- Gather data evaluating the presence of dioxins/furans and arsenic in soil at Property 4 located at 4171 SE Witch Hazel Road, Hillsboro, Oregon 97123.
- Collect data that will be of sufficient quality and quantity to screen against applicable DEQ risk-based concentrations (RBCs) and inform cleanup planning.

Standard field operating procedures for collecting samples, sample descriptions, and decontaminating nondedicated equipment are described in the Sampling and Analysis Plan (SAP), which was included in the two previously DEQ-approved work plans (MFA 2022, MFA 2023) and is included herein as an Attachment.

BACKGROUND AND PRELIMINARY CONCEPTUAL SITE MODEL

A description of the Permapost Property, study area, and a preliminary conceptual site model are included in Sections 2 and 3 of the *Yard Investigation Work Plan* (MFA 2022).

PRELIMINARY DATA SCREENING

Soil data obtained will be initially screened by comparing detected concentrations to DEQ-approved preliminary remedial goal and/or natural background concentrations (DEQ 2023, MFA 2024).

Soil results from 0 to 3 feet below ground surface (bgs) within Property 4 of the study area will be initially screened relative to the DEQ approved residential remediation goal of 11.8 picograms per gram (pg/g) for dioxins/furans and the natural background concentration of 8.8 milligrams per kilogram (mg/kg) for arsenic, to account for the residential soil exposure scenario (DEQ 2013, 2023). These criteria are also protective of other (e.g., excavation worker) scenarios. For soils between 3 to 15 feet bgs, only the excavation worker exposure scenario applies. Note that no shallow soil data from previous assessment work within the other three residential properties (Properties 1, 2, and 3) exceed the excavation/construction worker RBCs. It is assumed that the construction worker scenario does not apply, since this is typically applied to commercial/industrial sites where workers could be on-site for 250 days a year over the course of a year (DEQ 2018). The small size and nature of the yard does not support construction activities of this duration. In contrast, the excavation scenario represents an appropriate scenario for yard activities that may disturb subsurface soil, such as digging activities to access utilities.

SCOPE OF WORK

This section describes the objectives and scope of work for the Property 4. Field investigations will be completed consistent with the methods and protocol described in the SAP (see Attachment).

Objectives

The following objectives have been identified for this work plan:

- Delineate the extent of dioxin/furan and arsenic concentrations in soil at Property 4 within the study area.
- Confirm the transport mechanism and spatial distribution of dioxin/furan and arsenic concentrations to support the preliminary conceptual site model.
- Collection of data that will be of sufficient quality and quantity to screen against applicable RBCs and background concentrations.
- Collection of data that will inform development of any remedial action measures.

The proposed scope of work is designed to meet these objectives as they relate to the potential hazardous substances (dioxins/furans and arsenic) identified for the study area.

Property 4 Site Characterization

To characterize the extent of dioxin/furan and arsenic impacts to soil, Property 4 was divided into four decision units (DU-4-A, DU-4-B, DU-4-C, and DU-4-D, see Figure 2).

- DU-4-A represents soil conditions along the western portion of the property and immediately east of Property 3. Property 3 contained the highest concentrations of dioxin/furans and arsenic of the other three properties within the study area.
- DU-4-B represents the central portion of Property 4, not likely impacted from adjacent properties.
- DU-4-C represents soil conditions along the northern portion of Property 4, immediately south of the Permapost Property.
- DU-4-D represents soil conditions along the eastern portions of Property 4, immediately west of the vehicle maintenance shop and yard.

ISM sampling will be performed at each decision unit to characterize the dioxin/furan and arsenic concentrations in surface soil (0 to 1 feet bgs). In addition, three-point composite samples will be collected from 1.5 to 2 feet bgs and 2.5 to 3 feet bgs from each decision unit to evaluate the vertical extent of dioxin/furan and arsenic soil concentrations (HA-35, HA-36, HA-37, HA-38). The hand auger samples will be archived pending the results of the surface soil ISM sampling.

Proposed sample locations are shown on Figure 2 and proposed sample types and analyses are summarized on the Table. Except where otherwise noted, all sample collection will be performed consistent with the SAP (see Attachment A). Samples collected from subsurface (1 feet bgs and

deeper) will be collected via hand auger or a small drill rig as determined in coordination with the DEQ and the homeowner.

PROJECT MANAGEMENT PLAN

Key Personnel

Consistent with the *Yard Investigation Work Plan* (MFA 2022), key personnel for execution of this scope of work are as follows:

Tim Browning will be the project director for Permapost. Mr. Browning will be kept informed of the status of the project and of project activities. Mr. Browning will be provided with data, reports, and other project-related documents prepared by MFA before their submittal to DEQ. He will be responsible for communicating with Permapost staff, will participate in discussions with DEQ, and will coordinate onsite activities with MFA.

Phil Wiescher will be the project manager for MFA. Mr. Wiescher will coordinate with project task leaders and will communicate with Mr. Browning. He will be responsible for allocating the resources necessary to ensure that the objectives of the site assessment are met. Mr. Wiescher will be responsible for managing the overall completion of the assessment and for communication of project status to the project director and the DEQ project manager.

Qualified MFA staff personnel will assist in field activities and will write and review reports.

Deliverables

A sampling and data report will summarize the results of all field activities and analytical results for the Study Area. The report will include, at a minimum, the following:

- Descriptions of any deviations from this work plan.
- Maps showing attempted and successful sample locations.
- Data validation and data usability review.
- Table(s) summarizing analytical and data screening results.

Schedule

Task	Start Date	Completion
Prepare draft work plan	January 17, 2024	January 24, 2025
Prepare final work plan	Following receipt of DEQ comments on draft supplemental work plan	February 2025

Fieldwork	Following DEQ approval of the draft supplemental work plan	February-March 2025
Laboratory analysis	Following sample collection	April-May 2025
Prepare report	After completion of fieldwork and receipt of final data packages.	June 2025

REFERENCES

DEQ 2013. *Development of Oregon Background Metals Concentrations in Soil*. Oregon Department of Environmental Quality, Land Quality Division Cleanup Program, Portland, Oregon. March.

DEQ 2018. Risk-Based Concentrations for Individual Chemicals. Oregon Department of Environmental Quality, Land Quality Division Cleanup Program, Portland, Oregon. May. <https://www.oregon.gov/deq/FilterDocs/RBDMTTable.pdf> (accessed February 20, 2023).

DEQ 2020. *Conducting Ecological Risk Assessments*. Oregon Department of Environmental Quality, Land Quality Division Cleanup Program: Portland, OR. September 14.

MFA 2022. *Yard Investigation Work Plan, Permapost Products, Inc., Hillsboro, Oregon, ECSI #148*. Prepared by Maul Foster & Alongi, Inc.: Portland, Oregon. July 7.

MFA 2023. *Yard Pre-Design Investigation Work Plan, Permapost Products Inc., Hillsboro, Oregon, ECSI #148*. Prepared by Maul Foster & Alongi, Portland, Oregon. April 11.

MFA 2024. P. Wiescher, Maul Foster & Alongi, T. Browning, Permapost Products, Inc., *Updated Topsoil Source Evaluation and Proposed Residential Preliminary Remediation Goal for Dioxin/Furans*, Memorandum, K. Daugherty, Oregon Department of Environmental Quality. February 27.

DEQ 2023, *Topsoil Source Evaluation and Proposed Residential Preliminary Remediation Goal for Dioxins/Furans Memo, Permapost Products, ECSI No. 148*. Letter to Permapost from the DEQ, October 17.

ATTACHMENTS

Table

Figures

Attachment—Sampling and Analysis Plan

TABLE



Table
Sampling and Analysis Summary
Property 4, Yard Investigation Work Plan
Permapost Products, Inc., Hillsboro, Oregon



Area of Interest	Sample Matrix	Archived	Location Type	Proposed Location ID ^(a)	Methodology	Approximate Sample Depth ^(b) (ft bgs)	Analytical Suite		
							ISM Laboratory Preparation	Total Arsenic - EPA Method 6020B	Dioxins/Furans - EPA Method 1613B
Property 4	Soil	Y	Hand Auger	HA-35-COMP	3-point composite	1.5 - 2.0	--	O	O
		Y				2.5 - 3.0	--	O	O
		Y	Hand Auger	HA-36-COMP	3-point composite	1.5 - 2.0	--	O	O
		Y				2.5 - 3.0	--	O	O
		Y	Hand Auger	HA-37-COMP	3-point composite	1.5 - 2.0	--	O	O
		Y				2.5 - 3.0	--	O	O
		Y	Hand Auger	HA-38-COMP	3-point composite	1.5 - 2.0	--	O	O
		Y				2.5 - 3.0	--	O	O
		N	ISM	DU-4-A	30-increment ISM	0 - 0.5	X	X	X
		N		DU-4-B	30-increment ISM	0 - 0.5	X	X	X
		N		DU-4-C	30-increment ISM	0 - 0.5	X	X	X
		N		DU-4-D	30-increment ISM	0 - 0.5	X	X	X

Notes

-- = do not analyze.

bgs = below ground surface.

DEQ = Oregon Department of Environmental Quality.

EPA = U.S. Environmental Protection Agency.

ID = identification.

ISM = incremental sampling methodology.

O = archive.

X = analyze.

^(a)Proposed locations will be subject to change based on observed field observations.

^(b)Sample depths are approximate and may change based on observed field conditions.

FIGURES





Figure 1 Study Area

Permapost Products, Inc.
Hillsboro, OR

Legend

- Study Area
- RCRA Containment Cap
- Permapost Property
- Existing Berm
- Former Retail Yard Driving Lane
- Railroad
- Tax Lot

Notes
Permapost = Permapost Products, Inc.
RCRA = Resource Conservation and Recovery Act.

0 110
Feet



Data Sources
Aerial photograph obtained from the City of Portland (2023);
tax lot data obtained from Oregon Metro (2024).

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Project: M8012.01.001 Produced By: jroberts Reviewed By: twiescher Print Date: 1/2/2025 Path: X:\8012.01\Projects\Permapost_YardSamplingWP\Pro\M8012_01_001_A01_5_Sampling.aprx Fig 2 Property 4 Features Proposed Sampling Locations

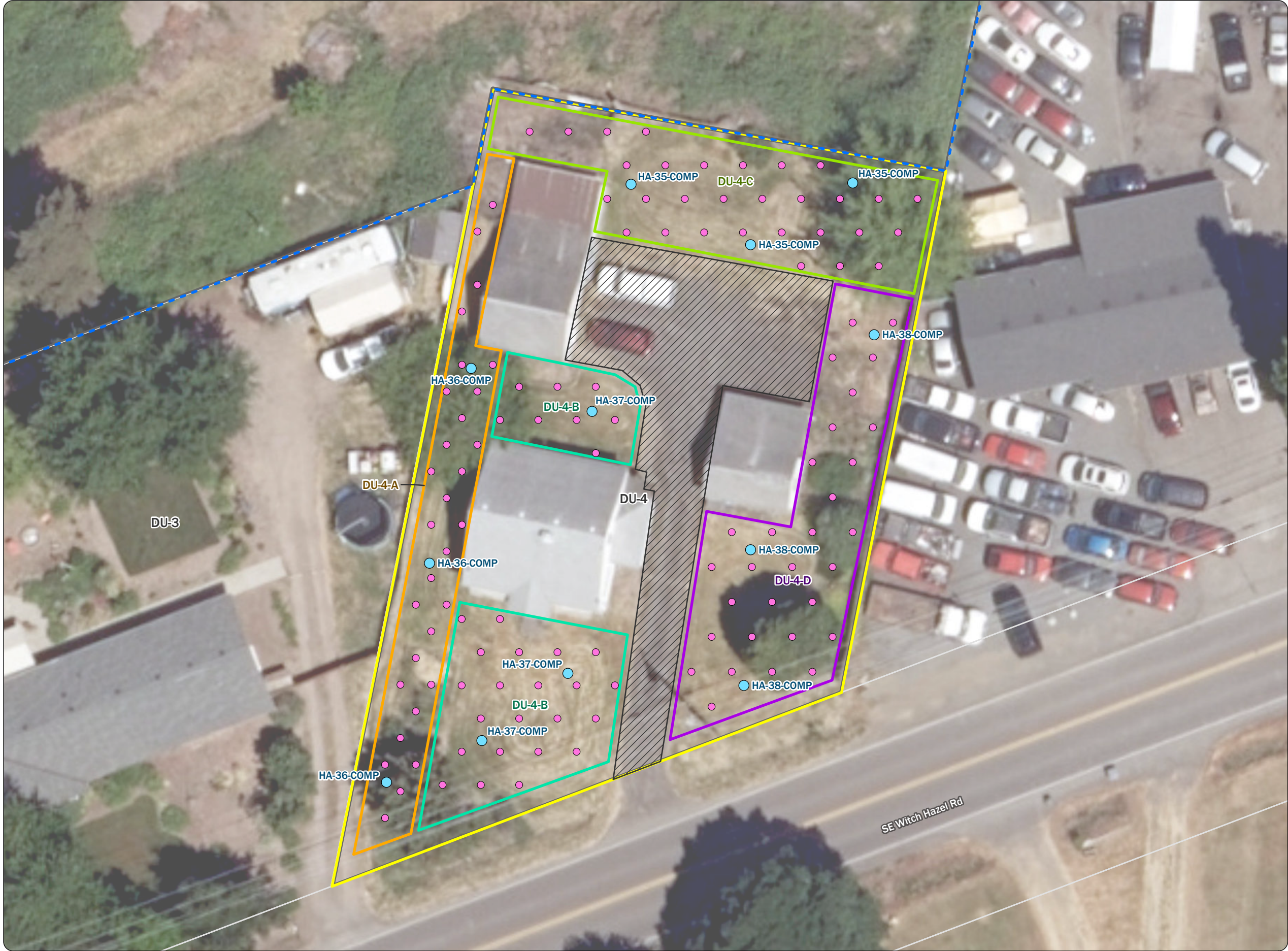


Figure 2
Property 4 Features
and Proposed
Sampling Locations

Permapost Products, Inc.
Hillsboro, OR

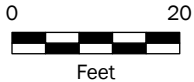
Legend

- Proposed 3-Point Composite Sample
- Proposed ISM Sample Location

Proposed Decision Units

- DU-4-A
- DU-4-B
- DU-4-C
- DU-4-D
- Hardscape / Pavement
- Tax Lot 1S209BD00500
- Permapost Property
- Tax Lot

Notes
ISM = incremental sampling methodology.
Permapost = Permapost Products, Inc.



Data Sources
Aerial photograph obtained from the City of Portland (2023);
tax lot data obtained from Oregon Metro (2024).

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ATTACHMENT

SAMPLING AND ANALYSIS PLAN



SAMPLING AND ANALYSIS PLAN

PERMAPOST PRODUCTS, INC.
HILLSBORO, OREGON
ECSI #148



Prepared for
PERMAPOST PRODUCTS, INC.
HILLSBORO, OREGON
January 17, 2025
Project No. M8012.01.001

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SAMPLING AND ANALYSIS PLAN

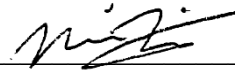
PERMAPOST PRODUCTS, INC.

HILLSBORO, OREGON

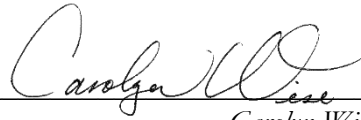
ECSI #148

*The material and data in this report were prepared
under the supervision and direction of the undersigned.*

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FOLLOWING PLAN:

TABLES

- 2-1 CONTAINERS, PRESERVATION, AND HOLDING TIMES
- 2-2 QUALITY CONTROL SAMPLE REQUIREMENT SUMMARY

ACRONYMS AND ABBREVIATIONS

bgs	below ground surface
COC	chain of custody
DEQ	Oregon Department of Environmental Quality
DU	decision unit
EPA	U.S. Environmental Protection Agency
ISM	incremental sampling methodology
LCS	laboratory control sample
LDS	laboratory duplicate sample
MFA	Maul Foster & Alongi, Inc.
MS/MSD	matrix spike and matrix spike duplicate
QA/QC	quality assurance and quality control
Permapost	Permapost Products, Inc.
Property	4205 SE Witch Hazel Road in Hillsboro, Oregon
RPD	relative percent difference
RSD	relative standard deviation
SAP	sampling and analysis plan
SOP	standard operating procedure
study area	Washington County tax parcels 1S209BD00800, 1S209BD00700, 1S209BD00600, 1S209BD00500
work plan	yard investigation work plan

1 INTRODUCTION

Maul Foster & Alongi, Inc. (MFA) and Permapost Products, Inc. (Permapost) have prepared this sampling and analysis plan (SAP) to address comments from the Oregon Department of Environmental Quality (DEQ) in its May 6, 2022, letter for the Permapost property located at 4205 SE Witch Hazel Road in Hillsboro, Oregon (the Property) (DEQ 2022). The *Yard Investigation Work Plan* (work plan) (MFA 2022), describes

Investigation activities proposed within a study area (Washington County tax parcel 1S209BD00800, 1S209BD00700, 1S209BD00600, 1S209BD00500) are described in the *Yard Investigation Work Plan* (work plan) (MFA 2022), *Yard Pre-Design Work Plan, Permapost Products, Inc. Hillsboro Oregon, ECSI No. 148* in April 2023 (MFA 2023), and the memorandum to which this SAP is an attachment.

The procedures described in this SAP will be used to obtain reliable data about physical, environmental, and chemical conditions at the Permapost facility in order to support the goals and objectives outlined in the work plan to which this SAP is an appendix.

This SAP has been prepared consistent with the following requirements:

- Data Quality Objectives Process for Superfund, U.S. Environmental Protection Agency (EPA) 540-R-93-071, September 1993.
- Test Methods for Evaluating Solid Waste, SW-846.
- A Compendium of Superfund Field Operations Methods, EPA/540/P-87/001 (OSWER Directive 9355.0-14), December 1987. The SAP shall address all topics listed in Environmental Cleanup Division Policy #760.000, Quality Assurance Policy.
- EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations, August 1994.

1.1 Purpose and Objectives

The purpose of this SAP is to outline requirements for field sampling and laboratory analytical activities associated with the work plan. This SAP supplements and is provided as an appendix to the work plan, which provides site-specific background information, summarizes areas of interest, discusses proposed risk-based screening criteria, and defines the scope of the investigation to be completed under the DEQ requirements.

This SAP is designed to ensure that:

- The investigation meets goals and produces complete and accurate environmental data sets that have high precision and low bias.

- Environmental data can be shown to be representative of site conditions.
- The quality assurance and quality control (QA/QC) process allows for comparability of environmental data sets so that the site can be characterized and assessed.

2 SAMPLING METHODS

Samples will be collected in containers supplied by the analyzing laboratory in order to ensure that the container has been properly cleaned and sufficient sample material is collected. Sample container and preservation requirements for contaminants are listed in Table 2-1. Additional details regarding sampling are provided in the standard operating procedure documentation in the appendix.

2.1 Soil

Soils may be sampled from the surface (0 to 1 foot below ground surface [bgs]) or subsurface (greater than 1-foot bgs). Anticipated samples, depths, and specific sampling methods are identified in the work plan.

2.1.1 Discrete Borings

Samples will be prepared, handled, and documented as follows:

- Soil sampling equipment will be decontaminated before use at each sampling location.
- Samples will be obtained using new, uncontaminated gloves or decontaminated stainless-steel spoon, trowel, or knife.
- Soil will be documented for visual and olfactory observations in a field notebook or boring log.
- Particles larger than 0.25 inches may be removed before the sample is placed in a laboratory supplied container.
- Soil samples will be transferred directly from the sampling device into laboratory-supplied glass jars by hand, using a new, uncontaminated glove or a decontaminated, stainless-steel spoon, trowel, or knife. Soil samples will be containerized and submitted for laboratory analyses in accordance with the methods and protocols described in Table 2-1.
- Sample containers will be labeled, packed in iced shipping containers with chain-of-custody (COC) documentation (see Section 6), and hand-delivered or shipped to the laboratory.
- Sampling information will be recorded in a field notebook, on a field sampling data sheet (see appendix), and on the laboratory provided COC form.

2.1.2 Incremental Sampling Methodology

Consistent with incremental sampling methodology (ISM) guidance (DEQ 2020), 30 soil increments will be collected from each decision unit (DU), at each targeted depth, and then composited into one sample. 30 soil increments will be collected per DU from below the surface to 6 inches below ground surface.

Incremental samples will be collected randomly within a systematic random grid. This reduces the probability of missing areas with elevated concentrations and provides a more accurate overall concentration of chemicals of interest. Grid locations will be distributed evenly within each DU to ensure that the entire DU population was equally represented in the final multi-increment sample.

Under a systematic random grid approach, DUs are partitioned into a grid pattern (sampling cells) and a random sampling location is identified in the first cell. Samples (increments) are then collected from adjacent cells in the same relative location within each cell. Exact locations may slightly vary because of the presence of vegetation (e.g., blackberries) or other obstructions.

Sampling grids will be generated partition the DUs into evenly spaced (to the extent feasible) cells to allow the collection of incremental samples across the DU. Field staff will attempt to collect 30 samples but may modify locations in the field if dense vegetation, insufficient sample fines (sand or silts) in rock roadways, steep inclines, or other obstructions such as unanticipated asphalt or concrete are encountered during sampling. Sampling grid diagrams can be supplied before starting fieldwork, if requested.

A stainless-steel soil core sampler will be used to collect each incremental soil sample. Areas where significant rock is encountered may require picks or shovels to loosen the material before collecting the sample with a stainless-steel spoon or trowel. Samples/increments will be collected from the finer material (sand size or finer). This finer material represents a potential complete exposure pathway via seasonal fugitive dust conditions. Larger material will be removed by hand or field sieve to selectively separate finer material into a stainless-steel bowl.

An attempt will be made to collect 30 incremental samples from 0 to 6 inches below the surface at each DU. If significant obstructions are encountered during sampling, less samples may be collected if determined acceptable in coordination with DEQ.

Soil will be collected directly from a stainless-steel cylindrical coring device. A minimum of 1 kilogram and no more than 2 kilograms of sample will be collected for each composite sample. Samples will be located, prepared, handled, and documented as follows:

- Soil sampling equipment will be decontaminated before it is used for each sample.
- Each increment in the DU will be sampled using a stainless-steel cylindrical coring device. Once the increment location is identified, the core will be driven up to the specified depths for each sample. New disposable gloves will be used before the collection of each sample.
- Approximately 35 to 70 grams of soil will be collected per increment. If the core brings up primarily coarse-grained particles, an adjacent location may be sampled.

- Soil from each increment will be placed in a laboratory-provided, 1-gallon glass jar, using a gloved hand or a decontaminated stainless-steel spoon, trowel, or knife.
- Coarse-grained particles (larger than 0.25 inch) and surface organic matter (e.g., grass) may be removed before the sample is placed in a laboratory-supplied container.
- Each incremental sample location will be identified using a global positioning system with an accuracy of plus or minus one meter.
- Filled containers will be labeled, packed in iced shipping containers with chain of custody (COC) documentation, and delivered to the contract laboratory.

Sampling information will be recorded in a field notebook or on a field sampling data sheet, and on the COC form.

Samples will be laboratory processed consistent with the standard operating procedure (SOP) provided in the appendix. If appropriate, the laboratory will air dry each DU sample at room temperature and any remaining visible organic matter removed. The entire volume of each sample is then sieved to facilitate obtaining a representative subsample and improving analyte extraction efficiency. The sample is sieved using an ASTM (American Society for Testing and Materials) No. 10 (2 millimeter) sieve for organics and metals. If significant amounts of greater than 2-millimeter material is found, additional grinding and sieving for metals will be requested. Once the sample is dried and sieved, the laboratory performs a “1-dimensional slabcake” subsampling procedure on sub-aliquot sample volume to be used for analysis. The slabcake procedure involves spreading the sample at a consistent depth and collecting a minimum of 20 individual sub-aliquots from random locations. Each sub-aliquot is placed in its own, single sample container consistent with the volume and preservation requirements. The final mass of the sample must be sufficient to run the requested analyses and attain the requested reporting limit.

3 SAMPLE HANDLING AND CUSTODY

Field sampling personnel will be responsible for the collection, labeling, description, documentation, handling, packaging, storage, and shipping of investigative samples obtained in the field. Proper sample handling and custody procedures are required to retain sample integrity from collection in the field through laboratory analysis and data reporting.

3.1 Sample Identification

The field personnel will be responsible for labeling samples and establishing identification. All data will be keyed to the sample’s unique sample designation. The unique sample designation will be used on sample containers and associated field data forms and will be used to key the sample identification in the project database.

The field personnel will clearly label each sample container, using permanent ink on a waterproof sample label, as soon as possible following collection. At a minimum, the following information will be written on the sample label:

- Unique sample identification code
- Time and date of collection
- Project number

In order to maintain sample identification consistency in the project database, the unique sample identification code will be assigned according to the following convention: Unique sample number – matrix type – depth (if applicable). The following codes and information will be included in the sample identification code:

- Matrix type codes include the following:
 - DU = ISM soil decision unit
- The DU identification number (e.g., 01, 02, 03, etc.)
- The sampling matrix
 - S = soil
- Depth bgs: the sample collection endpoint will be used

For example, an ISM soil sample collected from DU02 at 0.5 feet bgs would have the following sample ID: DU02-S-0.5.

3.2 Sample Custody

The field investigation personnel and analytical laboratory contractor will be responsible for following sample custody procedures during sampling and analysis, as well as for providing sample tracking. Sample custody procedures will be used to document the history of samples from the time of sample collection through shipment, analysis, and disposal. Samples and sample documentation will be maintained in the physical possession of authorized field personnel or under control in a secure location.

3.2.1 Sample Custody in the Field

The field investigation contractor personnel will be responsible for completing the COC forms upon sample collection. Each COC form will contain, at a minimum, the following information:

- Project number
- Project name
- Project manager
- Unique sample identification code
- Time and date of collection

- Field personnel sampler's name
- Separate shipping papers
- Signature, printed name, organization name, date and time of transfer of all persons having custody of samples
- Sample matrix
- Quantity of sample containers
- Requested analyses for each sample
- Requested analytical turnaround time
- Any additional information on requested analysis such as holding time, specific matrix spike and matrix spike duplicate (MS/MSD) samples, etc.

3.2.2 Sample Packaging and Shipment

Persons in possession of the samples will be required to sign and date the COC form whenever samples are transferred between individuals or organizations (with the exception of freight carriers).

Samples will be delivered to the laboratory by freight carriers, laboratory courier, or field personnel. The following custody procedures will be followed:

- Samples will be packed in the appropriate shipping containers.
- The top copy of the COC form will accompany the samples.
- If transported by courier, the laboratory courier will retain a second copy of the COC and shipping forms to allow sample tracking.
- The COC form will accompany the samples from point of release from the property to the laboratory.
- If transported to the laboratory by field personnel, COCs will be signed and copies distributed at the time of sample delivery to the laboratory.

The laboratory will implement its in-house custody procedures, which begin when sample custody is transferred to laboratory personnel.

3.2.3 Sample Custody in the Laboratory

The sample custodian of the analytical laboratory contractor will be responsible for handling and documentation of samples received at the laboratory. The designated sample custodian will accept custody of the received samples and will verify that the COC form matches the samples received. The shipping container, or set of containers, will be given a laboratory identification number, and each sample will be assigned a unique sequential identification number.

3.3 Sample Documentation and Records

3.3.1 Field Logbooks and Forms

Field investigation personnel will be responsible for maintaining a daily record of significant events, observations, and measurements during field investigations. Field records may be recorded in a bound logbook or paper or electronic field data sheets. A separate entry will be made for each sample collected. Specific field recording procedures will be identified in the work plan as needed. Field logbooks and forms will be included in the project files at the end of field activities to provide a record of sampling.

3.3.2 Equipment Calibration Log

Field investigation personnel will be responsible for maintaining an equipment calibration log to record the calibration measurements and frequencies of equipment calibration. This log may be incorporated into the field logbook notes for a specific date and activity.

3.4 Management of Investigation-Derived Waste

No investigation-derived waste is anticipated to be generated as part of the scope of work outlined in the work plan. If investigation-derived waste is generated, it will be secured in 55-gallon drums. Drums (tops and sides) will be labeled with their contents, the volume of material, the date of collection, and the origin of the material. At the end of each workday, the drums will be sealed and transferred to a designated secured area on the Permapost facility, where they will be stored pending waste profiling, transport, and off-property disposal at a permitted facility.

4 ANALYTICAL METHODS

All analytical methods used will comply with relevant requirements of applicable state or federal programs, or other EPA-approved methods as outlined in Table 2-1.

5 QUALITY CONTROL

The quality of data will be monitored and verified by maintaining logs, documenting field activities, and collecting and analyzing field and laboratory QC samples. Table 2-2 summarizes the field and laboratory QC samples along with the required collection frequency.

5.1 Field Quality Control Samples

The field QC samples will be used to assess the accuracy and precision of the field sample collection and handling activities.

5.1.1 Trip Blanks

Analysis for volatile organic compounds is not anticipated for this event. Therefore, trip blanks will not be analyzed.

5.1.2 Triplicate Sample

A triplicate sample will be collected from one decision unit per 10 decision units.

5.1.3 Temperature Blank

Temperature blanks are prepared by the laboratory using analyte-free (reagent) water. Temperature blanks are used by the laboratory to record the temperature of each cooler used to transport samples from the field to the laboratory. Each cooler containing samples that require temperature preservation will contain a temperature blank. The laboratory will verify that the temperature blank measurement is within the acceptable range specific to the analytical method.

5.2 Laboratory Quality Control Samples

The laboratory QC samples will be used to assess the accuracy and precision of the field sample collection and handling activities. Laboratory QC samples will be analyzed at the required frequency described in Table 2-2, as applicable, based on analytical method.

5.2.1 Calibration Verification

Instruments will initially be calibrated at the start of the project or sample run, as required, and when any ongoing calibration does not meet control criteria. The number of points used in the initial calibration is defined in the analytical method. Calibration will be continued as specified in the analytical method to track instrument performance. If a continuing calibration does not meet control limits, analysis of project samples will be suspended until the source of the control failure is either eliminated or reduced to within control specifications. Any project samples analyzed while the instrument was outside of control limits will be reanalyzed.

5.2.2 Matrix Spike/Matrix Spike Duplicate

MS samples are analyzed to assess the matrix effects on the accuracy of analytical measurements. MS/MSD samples will be prepared by spiking known amounts of analytes to investigative samples before extraction and preparation and analysis. The recoveries for the MS/MSD samples will be used to assess the accuracy and precision in the analytical method by measuring how well the analytical method recovers the target compounds in the investigative matrices.

5.2.3 Surrogate Spikes

Surrogate spiking consists of adding reference compounds to samples before sample preparation for organic analysis. Surrogate compound spiking is used to assess method accuracy on a sample-specific basis. Surrogate compounds will be added to samples, in accordance with the analytical method requirements. Surrogate spike percent recovery acceptance limits are determined by the analytical method. The surrogate spike percent recovery results will be reported by the laboratory.

5.2.4 Method Blanks

Method blanks are prepared using analyte-free (reagent) water and are processed with the same methodology (e.g., extraction, digestion) as the associated investigative samples. Method blanks are used to document contamination resulting from the analytical process in the laboratory. A method blank shall be prepared and analyzed in every analytical batch.

The method blank results are used to verify that reagents and preparation do not impart unacceptable bias to the investigative sample results. The presence of analytes in the method blank sample will be evaluated against method-specific thresholds. If analytes are present in the method blank above the method-specific threshold, corrective action will be taken to eliminate the source of contamination before proceeding with analysis. Investigative samples of an analytical batch associated with method blank results outside of acceptance limits will be qualified as appropriate.

5.2.5 Laboratory Control Samples

Laboratory control samples (LCSs) are prepared by spiking laboratory-certified, reagent-grade water with the analytes of interest or a certified reference material that is prepared and analyzed. The result for percent recovery of the LCS is a data quality indicator of the accuracy of the analytical method and laboratory performance.

5.2.6 Laboratory Duplicate Samples

Laboratory duplicate samples (LDSs) are prepared by the laboratory by splitting an investigative sample into two separate aliquots and performing separate sample preparation and analysis on each aliquot. The results for the relative percent difference of the primary investigative sample and the respective LDS are used to measure precision in the analytical method and laboratory performance. For nonaqueous matrices, sample heterogeneity may affect the measured precision for the LDS.

5.3 Instrument/Equipment Testing, Inspection, and Maintenance

Instruments for field parameter measurements will follow the sample and analysis plan protocol and manufacturers' recommendations for testing, inspection, and maintenance. Field equipment used for obtaining samples will be decontaminated as required and stored in a clean and secure location.

Laboratory instruments and equipment will comply with the contracted laboratories' QA/QC procedures for testing, inspection, and maintenance. Laboratory instrument and equipment testing, inspection, and maintenance documentation will be provided if requested.

5.4 Instrument and Equipment Calibration and Frequency

Instruments for field parameter measurements will follow the work plan requirements and manufacturers' recommendations for calibration. Calibration will be conducted at the beginning of each sampling event. Calibration checks will be conducted at the beginning of each sampling day. Calibration may be conducted again during a sampling event, as necessary, based on the results of the calibration check. Calibration records will be recorded in the field logbooks.

5.5 Inspection and Acceptance of Supplies and Consumables

The supplies and consumables that will be used during field operations include, though are not limited to, the following: decontamination fluids, preservatives, equipment tubing, and filters. No materials will be used after the manufacturers' expiration dates. Only water certified by the manufacturer will be used to prepare equipment blanks. If contamination is visible in materials, the item will be discarded. Nondedicated field equipment will be decontaminated prior to use in accordance with Section 5.6.

The analytical laboratory will inspect supplies and consumables before their use in analysis. The materials description in the analytical methods will be used as a guideline for establishing acceptance criteria. Purity of reagents will be evaluated through analysis of LCSs and method blank samples. The laboratory shall maintain an inventory of supplies and consumables. No materials will be used after the manufacturers' expiration dates.

5.6 Sample Equipment Decontamination

Sampling equipment and reusable materials that contact sample media will be decontaminated between uses. ISM sampling equipment will be decontaminated between DUs. Decontamination will generally involve the following:

- Non-phosphate detergent wash, consisting of a dilute measure of Liqui-Nox or Simple Green and tap water
- Distilled water rinse
- Methanol solution rinse (1:1 solution with distilled water)
- Final distilled water rinse

5.7 Non-direct Measurements

Non-direct measurements are defined as existing data obtained from non-measurement sources, such as literature files or existing databases. To assess data usability, historical data will be reviewed for accordance with project-specific data quality objectives and QA/QC criteria.

6 DATA REDUCTION, VALIDATION, AND REPORTING

The analytical laboratory will submit analytical data packages that include laboratory QA/QC results to permit independent and conclusive determination of data quality. MFA will determine data quality, using the data evaluation procedures described in this section. The results of the MFA evaluation will be used to determine if the project data quality objectives are met.

6.1 Field Data Reduction

Daily internal QC checks will be performed for field activities. Checks will consist of reviewing field notes and field activity memoranda to confirm that the specified measurements, calibrations, and procedures are being followed. The need for corrective action will be assessed on an ongoing basis, in consultation with the project manager.

6.2 Laboratory Evaluation

Initial data reduction, evaluation, and reporting at the analytical laboratory will be carried out as described in EPA SW-846 manuals for analyses (EPA 2015), as appropriate. Additional laboratory data qualifiers may be defined and reported to further explain the laboratory's QC concerns about a particular sample result. Additional data qualifiers will be defined in the laboratory's case narrative reports.

6.3 Data Deliverables

Laboratory data deliverables are listed below. Electronic deliverables will contain the same data that are presented in the hard-copy report.

- Transmittal cover letter
- Case narrative
- Analytical results
- COC
- Surrogate recoveries
- Method blank results
- MS/MSD results
- Laboratory duplicate results

6.4 Data QA/QC Review

MFA will evaluate the laboratory data for precision, completeness, accuracy, and compliance with the analytical method. MFA will review data according to applicable sections of EPA inorganics and organics procedures (EPA 2017a,b), as well as appropriate laboratory, method-specific guidelines (EPA 2015).

Data qualifiers, as defined by the EPA, are used to classify sample data according to their conformance to QC requirements. Common qualifiers are listed below:

- J—Estimate, qualitatively correct but quantitatively suspect.
- R—Reject, data not suitable for any purpose.
- U—Not detected at a specified reporting limit.

Poor surrogate recovery, blank contamination, or calibration problems, among other things, can require qualification of the sample data. The reasons for sample qualification should be stated in the data evaluation report.

QC criteria not defined in the guidelines for evaluating analytical data will be adopted, where appropriate, from the analytical method.

The following information will be reviewed during data evaluation, as applicable:

- Sampling locations and blind sample numbers
- Sampling dates
- Requested analysis
- COC documentation
- Sample preservation
- Holding times
- Method blanks
- Surrogate recoveries
- MS/MSD results
- Laboratory duplicates (if analyzed)
- Field blanks
- LCSs
- Method reporting limits above requested levels
- Additional comments or difficulties reported by the laboratory
- Overall assessment

The results of the data evaluation review will be summarized for each data package. Data qualifiers will be assigned to sample results on the basis of EPA guidelines, as applicable.

6.5 Data Review, Verification, and Validation

MFA uses a database (e.g., EQuIS™) to manage laboratory data. The laboratory will provide the analytical results in an electronic, EQuIS-compatible format. Following data evaluation, data qualifiers will be entered into the database.

Data may be reduced to summarize particular data sets and to aid interpretation of the results. Statistical analyses may also be applied to results. Data reduction QC checks will be performed on hand-entered data, calculations, and data graphically displayed. Data may be further reduced and managed using one or more of the following computer software applications:

- Microsoft Excel (spreadsheet)
- EQuIS (database)
- Microsoft Access (database)
- AutoCAD and/or ArcGIS (graphics)
- EPA ProUCL (statistical software)

7 DATA QUALITY OBJECTIVES

The DQO are used to establish performance and acceptance criteria, which serve as the basis for designing a plan for collecting data of sufficient quality and quantity to support the goals of the study (EPA 2006). The seven steps of the DQO process outlined by the EPA are as follows:

- State the problem—Define the problem; identify members of the planning team; define the budget and schedule.
- Identify the goal of the study—State how environmental data will be used to meet study objectives and solve the problem; identify study questions; define alternative outcomes.
- Identify information inputs—Identify data and information needed to answer study questions.
- Define the boundaries of the study—Specify target population and characteristics of interest; define spatial and temporal limits; define scale of inference.
- Develop the analytic approach—Define parameters of interest; specify type of inference; develop logic for drawing conclusions from findings.
- Specify performance or acceptance criteria—Specify criteria for new data collection (performance metrics) and decision making (probability limits).
- Develop the plan for obtaining data—Develop the SAP.

This SAP for environmental data collection was developed using the DQO process and presents performance metrics for collection and analysis for soil and water that will be sampled.

Decision criteria will be identified and based on comparison of analytical laboratory results to applicable screening and action levels. Screening and action levels may include MTCA cleanup levels, and EPA maximum contaminant levels or regional background values.

7.1 Data Precision

Precision is the measure of agreement among repeated measurements of the same property under identical or substantially similar conditions, calculated as either the range or the standard deviation (EPA 2002). Precision is measured by making repeated analyses on the same analytical instrument (laboratory duplicates) or replicate collections of samples in the field (field duplicates). Precision criteria are expressed as relative percent difference (RPD) between the primary and duplicate samples. The acceptance limits for RPD are based on the sample matrix and the analytical method used.

The RPD is calculated using the equation:

$$RPD = \frac{2(x_s - x_d)}{x_s + x_d} \times 100\%$$

Where:

x_s = result for primary sample

x_d = result for duplicate sample

If triplicate samples are collected, the relative standard deviation (RSD) of the analytical results for triplicate samples will be calculated to measure data precision. The RSD is calculated using the following equation:

$$RSD\% = \frac{\text{Standard Deviation}}{\text{Average}} \times 100\%$$

Lower RSD values are desirable, as the lower the RSD, the greater confidence there is that the average approximates a normal distribution and that the average contaminant concentrations are adequately representative of the DUs (HDOH 2009). It is assumed that data normally distributed have an RSD of 35 percent or less (ADEC 2009). Acceptability of the calculated RSD percent will be evaluated in the context of such considerations as analytical results at or near the method reporting limit. Analytical results at or near the method reporting limit may exhibit a greater level of variability and, therefore, an elevated RSD (ADEC 2009).

7.2 Data Bias

Bias is defined as the systematic or persistent distortion of a measurement process that causes error in one direction (EPA 2002). Data bias is addressed in the field and the laboratory by calibrating equipment, collecting, and analyzing QC blank samples, and analyzing QC standard samples.

7.3 Data Accuracy

Accuracy is defined as the measure of the overall agreement of a measurement to a known value and includes a combination of random error (precision) and systematic error (bias) components of both sampling and analytical operations (EPA 2002). Inasmuch as the “true” concentration of sampled media is not known, the degree of accuracy in the measurement is inferred from recovery data determined by sample spiking and/or the analyses of reference standards. The criterion for accuracy is expressed as the percent recovery of the sample spiking. The acceptance limits for percent recovery are based on the analytical method used.

Percent recovery is calculated using the equation:

$$\text{Percent Recovery} = \frac{X_{ss} - x_s}{T} \times 100\%$$

Where:

x_{ss} = result for spiked sample

x_s = result for duplicate sample

T = true value of added spike

7.4 Data Completeness

Data completeness is defined as a measure of the amount of valid data needed from a measurement system (EPA 2002). It is measured as the total number of samples collected, for which the valid analytical data are obtained, divided by the total number of samples collected, and multiplied by 100.

7.5 Data Representativeness

Data representativeness is a qualitative term that expresses, “...the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition” (EPA 2002). Data representativeness is evaluated by assessing the accuracy and precision of the sampling program. The criterion for evaluating representativeness will be satisfied by confirming that the sample collection procedures are consistently followed. Sampling procedures are referenced in the work plan.

7.6 Data Comparability

Data comparability is a qualitative term that expresses the measure of confidence with which one data set can be compared to another and can be combined for decision-making purposes (EPA 2002). Data comparability will be achieved by using standard sampling and operating procedures and analytical methods. Data comparability will be assessed through documentation of QA/QC procedures.

7.7 Data Sensitivity

Data sensitivity is defined as the capability of a method or instrument to discriminate between measurement responses representing different levels of the variable of interest (EPA 2002). Results measured between the reporting limits and method detection limits will be reported for all analytes and assigned the appropriate qualifier.

8 REPORTING

After the data are received, MFA will generate a data report, which will summarize and compare the data against applicable screening levels. Environmental data will be submitted to DEQ, as requested.

LIMITATIONS

The services undertaken in completing this report were performed consistent with generally accepted professional consulting principles and practices. No other warranty, express or implied, is made. These services were performed consistent with our agreement with our client. This report is solely for the use and information of our client unless otherwise noted. Any reliance on this report by a third party is at such party's sole risk.

Opinions and recommendations contained in this report apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others, or the use of segregated portions of this report.

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TABLES



Table 2-1
Containers, Preservation, and Holding Times
Permapost Products, Inc.
Hillsboro, Oregon



Sample Type	Method	Analysis	Field Container Preservative	Holding Time (Days)	Sample Container
Discrete Soil	EPA 8290	Dioxin/Furans	≤ 6 deg C	360	8 oz glass jar
	EPA 6020	Arsenic	≤ 6 deg C	180	
ISM Soil	EPA 8290	Dioxin/Furans	≤ 6 deg C	360	1 gallon glass jar
	EPA 6020	Arsenic	≤ 6 deg C	180	
NOTES: deg C = degrees Celsius. EPA = U.S. Environmental Protection Agency. ISM = incremental sampling methodology.					

Table 2-2
Quality Control Sample Requirement Summary
Permapost Products, Inc.
Hillsboro, Oregon

Quality Control Check Sample	Sample Matrix	Frequency
	Soil	
Trip Blanks	No	One per sample cooler (for VOC analysis only)
Field Triplicate Samples	Yes	One per 10 decision units
Temperature Blank	Yes	One per sample cooler
Matrix Spike/Matrix Spike Duplicate	Yes	Each analytical batch of samples for every 20 (or fewer) samples received
Surrogate Spiking	Yes	Added to all project and QC samples (for organic analyses only)
Method Blanks	Yes	Each analytical batch of samples for every 20 (or fewer) samples received
Laboratory Control Sample	Yes	Each analytical batch of samples for every 20 (or fewer) samples received
Laboratory Duplicate Sample	Yes	Each analytical batch of samples for every 20 (or fewer) samples received
NOTES: VOC = volatile organic compound.		

APPENDIX

STANDARD OPERATING PROCEDURES



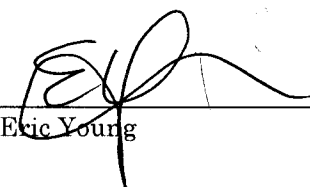
Sample Drying and Sieve Preparation for Multi Increment Soil Sampling

Friedman & Bruya, Inc. Standard Operating Procedure

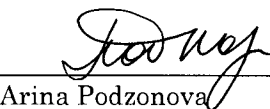
Revision Number 2
September 25, 2019

Approved by

Extraction Manager:


Eric Young

Quality Assurance Manager:


Arina Podzonova

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Document Control Number: 2

1.0 SCOPE, APPLICATION, AND SUMMARY

- 1.1 This Standard Operating Procedure (SOP) is used by Friedman and Bruya, Inc. (F&BI) to prepare soil and solid samples that require sieve and/or drying prior to extraction and analysis, including sub samples collected for soil multi increment sampling.
- 1.2 Deviation from the procedures outlined in this SOP may sometimes be needed, due to specific project requirements, or due to laboratory circumstances. Deviations are documented using the extraction worksheet, analysis logs, and/or other documents such as the non-conformance report form.

2.0 METHOD BASIS

The following regulatory method serves as the basis for this standard operating procedure. Adherence to the minimum criteria set forth in this method is a general data quality objective of this SOP.

- 2.1 State of Alaska Department of Environmental Conservation, "Draft Guidance on Multi Increment Soil Sampling", March 2009.

3.0 DEFINITIONS

- 3.1 A list of definitions for terms used in this SOP may be found in the F&BI Quality Assurance Manual, appendix F.

4.0 SAFETY

- 4.1 The most important safety measure is to handle all samples and equipment in an appropriate manner to ensure a minimum of personal danger and exposure to potentially hazardous chemicals.
- 4.2 When samples are handled, appropriate personal protection equipment (PPE) should be used. Gloves, lab coat, and goggles are all available for use.
- 4.3 Glassware can break at any time, so caution needs to be used at all times when handling it. Cut resistant gloves are available for use.
- 4.4 MSDSs for all chemicals in the lab are available to all employees. They are located in the GC room, and all employees are strongly encouraged to read them.
- 4.5 Analysts are required to complete general safety training prior to performing any analysis. Details of initial and on-going safety training are provided in the F&BI Quality Assurance Manual and "Training" SOP.
- 4.6 If uncertain about the safety of a material or procedure or in the event that a spill or other potentially hazardous situation arises, notify your supervisor or any chemist immediately.

5.0 INTERFERENCES

- 5.1 Certain sample matrices may not be amenable to sieving, such as peat or tundra. Alternate sample processing measures would be required for those media.

6.0 APPARATUS AND EQUIPMENT

- 6.1 #10 Sieve – particle size <2mm
- 6.2 Drying Pans (Aluminum or Pyrex)
- 6.3 Stainless Steel Scoopula
- 6.4 Analytical Balance
- 6.5 4 oz. or 8 oz. Glass Jars with Lid
- 6.6 Steel Baking Sheet or Other Tray
- 6.7 Stainless Steel Bowl

7.0 REAGENTS AND CHEMICALS

- 7.1 Methylene Chloride, pesticide grade or better
- 7.2 Alconox

8.0 SAMPLE HANDLING, PRESERVATION, AND PREPARATION

- 8.1 Before preparing the samples, double check the sample identification on the container to that listed on the Chain of Custody. Document that the sample ID has been checked by initialing the extraction worksheet.
 - 8.1.1 If more than one container exists for the sample, write the corresponding letter of the container used in the extraction on the extraction paperwork.
- 8.2 Note any unexpected sample characteristics on the extraction worksheet under “Observations” heading.
- 8.3 Sample Moisture Determination Procedure
 - 8.3.1 The analyst will perform the following to determine if the sample will require a drying procedure. Drying should only be performed if necessary.
 - 8.3.2 Visually inspect the sample to determine if free liquid is present. Samples containing a visible liquid layer will require drying prior to sieve

preparation.

- 8.3.3 For samples that do not contain free liquid but appear moist, a small amount of sample (~10.0 grams) will be tested in the sieve. The sample will require the drying procedure if sample fines do not pass through the sieve screen.

8.4 Sample Drying Procedure

- 8.4.1 Assign F&B sample ID to a drying pan.
- 8.4.2 Empty the entire contents of the sample container into the drying pan to a depth of ½ to 1 inch in thickness.
- 8.4.3 Place drying pan in fume hood at ambient temperature until processing.
- 8.4.4 Drying at elevated temperatures, i.e. “baking” is not allowed. Turning the soil can be used to facilitate the drying process.
- 8.4.5 Drying is acceptable for less temperature sensitive contaminants such as metals, PCBs, DRO, RRO, etc. Drying may not be appropriate for some contaminants, including volatile constituents or PAHs. If samples are processed for non-appropriate testing, the data will be estimated and qualified appropriately.

8.5 Sieve Procedure

- 8.5.1 Wash sieve with warm water and Alconox and allow to dry.
- 8.5.2 For samples requiring organic analysis, triple rinse sieve screen with methylene chloride and allow to dry.
- 8.5.3 Place entire contents of sampling container or drying pan into the sieve. The minimum amount of sample required for sieve preparation is 30 g.
- 8.5.4 Shake sieve for 2 minutes.
- 8.5.5 Remove sample collection tray from sieve and collect the entire contents into a labeled 4 oz. or 8 oz. glass jar.
- 8.5.6 When multiple sub samples are sieved, the entire contents of each sieved sub sample will be poured into a stainless steel bowl, stirred for a minimum of 30 seconds and collected for sample analysis.

9.0 **SAMPLE ANALYSIS**

- 9.1 Wash a steel baking sheet or other tray with warm water and Alconox and allow to dry.

- 9.2 For samples requiring organic analysis, triple rinse the tray with methylene chloride and allow to dry.
- 9.3 Pour the entire contents of the sample into the tray to a depth of no more than ½ inch.
- 9.4 Individual aliquots of sample will be randomly scooped from a minimum of 20 distinctly different areas of the tray and added to the extraction vessel until the required sample amount is reached.

10.0 QUALITY CONTROL AND CORRECTIVE ACTIONS

General quality control procedures are outlined in the corresponding F&B analytical method SOPs. F&BI QC procedures are described in sections 12 and 13 of the QA Manual. If, following corrective actions, quality control results still fail, or if corrective actions are not possible, then affected results are reported with appropriate qualifying flags.

The minimum requirements for QC samples analyzed with each preparation batch (within 24 hours) of up to 20 samples are:

1 sample duplicate

11.0 DATA ARCHIVAL

- 11.1 The hardcopy of the QA paperwork is filed in the extraction room on the paperwork desk.
- 11.2 The extraction paperwork for each project is filed in the downstairs filing cabinets with the hardcopies of the final reports.

12.0 HAZARDOUS WASTE MANAGEMENT AND POLLUTION PREVENTION

- 12.1 Hazardous waste managements procedures are found in the F&BI QA Manual section 10, and the "Disposal" SOP.
- 12.2 Actions that can result in the reduction or elimination of chemical wastes and chemical pollutants associated with this SOP are strongly encouraged. Such actions should be discussed with the Executive Committee for approval prior to implementation.

END OF DOCUMENT



STANDARD OPERATING PROCEDURE

Decontamination of Field Equipment

SOP Number: 1

Date: 3/9/2021

Revision Number: 0.1

SCOPE AND APPLICATION

This standard operating procedure (SOP) describes the decontamination procedure for field equipment that may come in contact with contaminated media and that Maul Foster & Alongi, Inc. (MFA) staff may reuse at multiple sample locations or sites. Decontamination is performed to reduce the potential for cross-contamination of samples that will be collected with multiuse equipment and that will undergo physical or chemical analyses. Other equipment that is multiuse—not used specifically for sample collection (e.g., water level meter, pump used for well development)—also requires decontamination. Finally, decontamination is necessary to minimize the potential for MFA staff's exposure to chemicals.

Typically, decontamination is not necessary for field equipment that is disposable and intended to be used only once (e.g., disposable bailer). Additionally, this SOP does not apply to equipment used by subcontractors, such as drilling equipment. However, MFA staff should confirm that subcontractors are implementing appropriate decontamination procedures to minimize the potential for cross-contamination of samples or MFA staff's exposure to chemicals.

EQUIPMENT AND MATERIALS REQUIRED

The following materials are necessary for this procedure:

- Nonphosphate detergent solution (e.g., Alconox, Liquinox)
- Distilled and potable water
- Personal protective equipment (as specified in the site-specific health and safety plan)
- Buckets to contain rinsate, brushes, paper towels

Depending on the site conditions and the types of contaminants that may be present, the use of other decontamination materials, such as deionized water, methanol, hexane, or isopropyl alcohol, may be necessary. The need for other materials should be determined prior to fieldwork. The decontamination procedures using other materials should be described in a site-specific sampling and analysis plan (SAP).

METHODOLOGY

When the site-specific SAP specifies additional or different requirements for decontamination, it takes precedence over this SOP. In the absence of a SAP, the following procedures shall be used.

General Sampling Procedure:

1. Rinse the equipment with potable water to remove visible soil, petroleum sheen, or contamination.
2. Scrub the equipment with a brush and solution of distilled water and nonphosphate detergent.
3. Rinse the equipment with distilled water.
4. Allow equipment to air dry, or dry it with paper towels.
5. At all times, ensure that the decontaminated equipment is stored so as to prevent it from becoming contaminated while not in use. Depending on the size of the equipment, it can be wrapped with new aluminum foil or placed in a new plastic bag.

Rinsate Storage:

All fluids resulting from equipment decontamination shall initially be contained in a bucket and then transferred to a Department of Transportation-approved container (e.g., 55-gallon drum) stored on site at a location that

does not interfere with on-site activities (e.g., vehicle traffic, pedestrian areas). Place a label on each container and include the following information:

- The date on which fluids were placed in the container
- Contents (e.g., “water from equipment decontamination”)
- Contact information, including MFA staff or client phone number

Note that labels on containers exposed to sunlight or precipitation are prone to fading. Use a waterproof, indelible ink pen (e.g., Sharpie®) whenever possible. In the field notebook, keep a detailed inventory of all containers, including the number of containers, the approximate quantity of liquids generated, and a description of the source of the fluids. Provide this information to the MFA project manager. For future reference, take photographs of (1) each drum label, (2) the drum(s), and (3) the drum storage vicinity on site.

Note that some clients and site owners have specific requirements for labeling and storage of containers. The requirements should be determined in advance of the fieldwork.



STANDARD OPERATING PROCEDURE

Surface and Subsurface Soil Sampling Using Hand Tools

SOP Number: 4

Date: 3/9/2021

Revision Number: 0.1

SCOPE AND APPLICATION

This standard operating procedure (SOP) describes the use of hand tools for obtaining surface and subsurface soil samples for physical and/or chemical analysis. For other projects where mechanical equipment is used (e.g., drill rig or excavator), it may be possible to obtain the sample manually, for example by grabbing soil directly from a drilled soil core or excavator bucket, thereby precluding the need for hand tools.

EQUIPMENT AND MATERIALS REQUIRED

The following materials are necessary for this procedure:

- Personal protective equipment (as specified in the Health and Safety Plan)
- Tools appropriate for the conditions that may be encountered (e.g., spoon, trowel, shovel, hand auger); tools constructed of stainless steel are preferred.
- Stainless steel bowls
- Tape measure with increments in feet and tenths of a foot.
- Laboratory-supplied sample containers
- Laboratory chain-of-custody form and cooler with ice.
- Equipment decontamination supplies if sampling equipment will be reused between sample locations (see SOP 1 for equipment decontamination procedures).
- Field forms or notebook for documenting the sampling procedures.

METHODOLOGY

When the project-specific sampling and analysis plan (SAP) specifies additional or other requirements for soil sampling, it takes precedence over this SOP. In the absence of a SAP, the procedures in this SOP shall be used.

General Procedure:

- Don gloves as specified in the Health and Safety Plan; replace gloves with new gloves after each sample is collected.
- Clear the ground surface of brush, root mat, grass, leaves, and other debris.
- Use the selected hand tool to remove soil to the targeted sample depth. Use a measuring tape to verify that the sample depth is correct and record the depth in the field notebook or boring log.
- Describe and document the soil lithology in accordance with SOP 2.
- If the sample volume requirement is small (generally one or two 8-ounce jars), the soil can be placed directly into the sample container. This can be done manually; however, if the gloves have become soiled during excavation, don new gloves before collecting the sample.
- If the sample volume requirement is large, or composite sample collection is required, collect the soil and homogenize in a decontaminated stainless-steel bowl or a dedicated Ziploc® bag and then manually transfer the sample to the sample container. If the gloves have become soiled during excavation, don new gloves before collecting the samples.

- Before sample collection, and to the extent possible, remove organic debris, anthropogenic material (e.g., brick, metal, glass), and gravels larger than 4 millimeters, unless a project-specific SAP directs otherwise.
- When sampling for gasoline-range total petroleum hydrocarbons (gasoline) or volatile organic compounds (VOCs), a subsample will be obtained from a discrete portion of the collected sample. To minimize the potential loss of volatiles during sampling, the subsample shall not be composited or homogenized. The sample container for gasoline and/or VOC analysis will be filled first if additional containers are necessary for other analysis. Specific procedures for collecting samples for gasoline and/or VOC analysis using the U.S. Environmental Protection Agency Method 5035 are specified in SOP 5.
- The sampling device and field equipment will be decontaminated between sample locations in accordance with SOP 1. Alternatively, new, disposable equipment can be used to collect each sample to preclude the need for equipment decontamination.

Backfilling Sample Locations:

Backfill in accordance with federal and state regulations (e.g., Oregon bentonite requirements per OAR 690-240-0035). Otherwise, manual excavations can be backfilled with excess soil remaining after sample collection, unless the project-specific SAP requires a different backfill procedure.

STANDARD OPERATING PROCEDURE

Underground Utility Locates

SOP Number: 18
Date: 3/9/2021
Revision Number: 0.1

SCOPE AND APPLICATION

This standard operating procedure (SOP) describes the practices for locating underground utilities. Refer to the MFA health and safety plan (HASP) for additional information regarding communication procedures to be followed when an inadvertent utility strike occurs, as well as regarding methods for mitigating hazards during a utility strike.

EQUIPMENT AND MATERIALS REQUIRED

The following materials are necessary for this procedure:

- Personal protective equipment (as specified in the HASP)
- Marking materials (e.g., marking paint, stakes, flags)
- Field documentation materials

METHODOLOGY

When the project-specific sampling and analysis plan (SAP) specifies additional or different requirements for underground utility locates, it takes precedence over this SOP. In the absence of a SAP, the procedures in this SOP shall be used.

Before Conducting Utility Locates:

- Ensure that the locate will be conducted reasonably soon before the excavation work begins, e.g., within 48 hours. There may be project-specific conditions, e.g., weather and/or ground features that could cause markings to fade, which would require scheduling of the excavation work sooner than 48 hours after the locate.
- Clearly define the boundary of the work and the locations of all proposed excavations. Prepare a map of the project area showing the excavation locations.
- Interview site managers/property owners and obtain plans or drawings, if available, showing on-site utilities.
- For project work that will not take place in the public right-of-way, ensure that the public rights-of-way nearest to the project are identified and communicated during the one-call notification.
- Identify the township and range of the project area. This information can be easily attained by a quick email to MFA's GIS Exchange.
- If feasible, conduct a site visit to identify site conditions that could cause fading or disruption of marking paint. Such conditions could include gravel or ground sensitive to erosion and high traffic.
- Check the weather forecast to assess the potential for snow or rain to make marking utilities difficult or cause the markings to fade.

One-Call Utility Notification:

- If possible, initiate the one-call utility notification at least one week before the proposed work begins.
- Include a map or GPS coordinates when submitting the notification.
- Before conducting any excavation activities, confirm with each public utility that the utility locate has been completed.

- On remote or complicated sites, consider meeting public locators on site.
- Document the one-call ticket number and results in the project files.
- Provide the one-call ticket number to subcontractors who will be doing the excavations.

Private Utility Locate:

- Conduct the private utility locate only after confirmation that the public utility locate has been completed and all public utilities have been marked and the results reviewed by MFA staff who will be overseeing the excavations.
- Meet the private locator on site and participate in the entire private utility locate. Be engaged in the process, ask questions, and take time to walk the site thoroughly with the locator.
- Bring a copy of the one-call utility ticket and results of the one-call utility locator to check against the utility markings on the ground.
- If possible, have a site/property representative knowledgeable of on-site utilities participate in the private utility locate.
- If paint alone may not suffice to ensure clear marking of utilities, add vertical markers such as stakes or flags.
- Visually assess the area of the proposed excavation(s) to identify features potentially indicative of buried utilities. Have the private utility locator examine each feature identified below to assess the presence of buried utilities.
 - Examine adjacent public rights-of-way where public utilities have been marked for evidence of utilities that may extend onto the project site.
 - Identify nearby light poles, telephone poles, electrical utility poles, or other overhead utility poles with wires or conductors that run from the overhead utility, down the pole, and into the ground.
 - Identify the location of gas meters, water meters, or other aboveground junction boxes for evidence of utilities extending from these features into the ground.
 - Examine asphalt and concrete ground surfaces for discontinuities in the surface indicative of utility installations. Discontinuities may include recent patches of asphalt or concrete inlaid within older concrete or asphalt surfaces.
 - Identify manholes and catch basins indicative of buried storm or sanitary sewer pipes. Open manholes to examine the orientation of associated pipes to assess whether the utilities may be present near proposed excavations.
 - Identify tank ports and vent pipes.
 - Identify irrigation systems and associated features such as valve boxes and controllers.
 - Identify any other signs indicating the presence of buried utilities.
 - Be wary of utility marks that suddenly begin or dead end.

Preparing to Perform Subsurface Activities after a Locate:

- Ensure that the markings are still visible when the work begins.
- Adjust locations, as needed, to avoid identified utilities, or use alternative methods such as nonmechanical excavation means (i.e., manual excavation or air-knifing) to a minimum depth of 5 feet.

Table
APWA UNIFORM COLOR CODE

	WHITE—Proposed Excavation
	PINK—Temporary Survey Markings
	RED—Electric Power Lines, Cables, Conduit and Lighting Cables
	YELLOW—Gas, Oil, Steam, Petroleum or Gaseous Materials
	ORANGE—Communication, Alarm or Signal Lines, Cables or Conduit
	BLUE—Potable Water
	PURPLE—Reclaimed Water, Irrigation and Slurry Lines
	GREEN—Sewers and Drain Lines
Source: Uniform Color Codes, ANSI Standard Z535.1. American Public Works Association. Revised 1999.	