Commonwealth of Virginia

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

1111 E. Main Street, Suite 1400, Richmond, Virginia 23219
P.O. Box 1105, Richmond, Virginia 23218
(800) 592-5482 FAX (804) 698-4178
www.deq.virginia.gov

Travis A. Voyles
Acting Secretary of Natural and Historic Resources

Michael S. Rolband, PE, PWD, PWS Emeritus
Director
(804) 698-4020

April 4, 2022

Mr. Michael Liberati
Corteva Environmental Remediation
974 Centre Road, Building 735
Wilmington, DE 19805

VIA ELECTONIC MAIL

Re: Preliminary Phase 2 Bank Management Area Investigation Work Plan:
RRM 3 to RRM 4
Former DuPont Waynesboro Site AOC 4
Waynesboro, Virginia
EPA ID# VAD003114832

Dear Mr. Liberati:

This letter acknowledges the receipt and review of the *Preliminary Phase 2 Bank Management Area Investigation Work Plan: RRM 3 to RRM 4* dated April 2022, submitted to the Virginia Department of Environmental Quality, Office of Remediation Programs (VDEQ) by AECOM on behalf of Corteva Agriscience. The work plan details sampling methods, quality assurance/quality control, reporting requirements and health and safety procedures for investigating bank soil mercury concentrations from RRM 3 to RRM 4 of South River.

VDEQ has no comments. If you have any questions, you may contact me at 540-209-3663 or by email at William.jordan@deq.virginia.gov.

Sincerely,

W. Calvin Jordan
Corrective Action Project Manager
Office of Remediation Programs

cc: DuPont Waynesboro Correspondence File
Josh Collins, AECOM
Graham Simmerman, VRO VDEQ
Jacqueline Morrison, US EPA

AECOM

Preliminary Phase 2 Bank Management Area Investigation Work Plan: RRM 3 to RRM 4

Former DuPont Waynesboro Site
Area of Concern (AOC) 4
Waynesboro, Virginia

Submitted on behalf of:
E.I. DuPont de Nemours and Company, a wholly-owned subsidiary of Corteva Agriscience LLC

Submitted by:
AECOM
625 West Ridge Pike
Suite E-100
Conshohocken, PA 19428

Project Number: 60674645
Date: April 2022

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1.0 Introduction

Phase 1 Interim Measures (IM) have been implemented by E.I. DuPont de Nemours and Company (DuPont), a wholly-owned subsidiary of Corteva Agriscience LLC (Corteva)[1] to address historical releases of mercury to the South River from the former DuPont facility in Waynesboro, Virginia, in accordance with the United States Environmental Protection Agency (EPA) Resource Conservation and Recovery Act (RCRA) Corrective Action Permit No. VAD003114832. Legacy mercury releases were transported by the South River and deposited on riverbanks and the floodplain through storm events during the period of mercury use at the site. Although mercury use at the site ceased in the early 1950's, legacy mercury deposits continue to be reintroduced into the South River by erosion of riverbanks with elevated mercury concentrations.

The approved Interim Measures Design, Implementation, and Monitoring Work Plan (IM Work Plan; Anchor QEA et al., 2015) identified a series of riverbanks within the first two relative river miles (RRM) that contributed disproportionally higher amounts of mercury loading to the South River. These banks, referred to as bank management areas (BMAs) accounted for approximately 90% of mercury loading from eroding riverbanks in the first two river miles. The objective of the Phase 1 IMs was to reduce or eliminate bank erosion and subsequent mercury loading to the South River within this reach.

Following the completion of the Phase 1 IMs, riverbanks downstream of RRM 2 are now being considered for potential remediation. Bank soil data to support remedial decision-making in RRM 2 to RRM 5 are limited; however, elevated mercury concentrations have been documented in some areas. Similar to the phased sampling approach conducted to identify and refine the Phase 1 BMAs, the sampling efforts outlined below will focus on characterizing the nature and extent of mercury present in bank soil and potential for mercury loading to the South River from eroding banks within RRM 3 to RRM 4 (see Figure 1); RRM 2 to RRM 3 bank soils have already been evaluated as part of the Phase 2 BMA Investigation. RRM 3 to RRM 4 bank soil data will be considered, along with bank erosion rates and monitoring data in an Adaptive Management framework to identify the potential need for remedial action within this reach, while considering the efficacy of the Phase 1 remedy.

The following sections detail the sampling methods (Section 2.0), quality assurance/quality control (Section 3.0), reporting requirements (Section 4.0), and health and safety procedures (Section 5.0). References used in the development of this work plan are provided in Section 6.0.

[1] In December 2015, Dow and DuPont announced a merger for the purpose of creating three new companies. In June 2019, the three companies completed their separation and are now known as Dow, DuPont Specialty Products, and Corteva. The original legal entity of E.I. DuPont de Nemours and Company is a subsidiary of Corteva, so any reference to DuPont in this document refers to the historical business name used by E.I. DuPont de Nemours and Company and does not refer to the new business entity named DuPont Specialty Products.

2.0 Sampling Methodology

2.1 Locations

This scope of work includes surficial (i.e., 0-5 cm) soil sampling at targeted locations in RRMs 3 to 4 to better characterize the extent of total mercury (THg) in bank soils within this reach (see Figure 2). Sample locations were selected to obtain THg bank soil data on approximately 100-foot intervals along each bank when combined with historical data, (see Figure 1). This sampling interval is consistent with the data density used to identify and refine the Phase 1 BMAs. A complete analytical schedule is provided in Table 1.

2.2 Sample Collection

Sample transects will be located in the field using a global positioning system (GPS) capable of sub-meter accuracy (i.e., Trimble Geo XH6000 or similar). Detailed procedures for collecting surficial bank soil samples are provided in Protocol SRSO-1 in Appendix A and summarized below.

A minimum of three samples will be collected from the 0 to 5-centimeter (cm) depth interval at each surficial bank soil transect; locations will be evenly spaced vertically along the bank face. Additional samples will be collected along banks greater than 3 feet high; all samples will be spaced at least 1 foot apart, and not more than 2 feet apart vertically (see Figure 2). For banks higher than approximately 15 feet, all samples will be collected below the bank-full elevation. Leaf litter, twigs, vegetation, and rocks shall be removed from the sampling location prior to collecting the sample. Soil from each discrete sampling interval will be thoroughly homogenized, with large rocks and sticks removed prior to being placed into laboratory provided sample containers. Soil samples will be packed and shipped on wet ice at 4˚C to Eurofins/Lancaster Laboratories (Lancaster, Pennsylvania) for further processing and analysis.

2.3 Sample Processing and Analysis

Upon sample receipt, the analytical laboratory will log samples into their laboratory information management system. The laboratory will prepare a single composite sample for each bank transect location using equal aliquots of soil from the discrete surficial soil sample intervals. The composite sample will be thoroughly homogenized and analyzed for THg using EPA Method SW 846 7471A and moisture content using Method 2540 B. Remaining sample mass from the discrete sample intervals will be held at the analytical laboratory to enable finer resolution analysis at targeted locations upon receipt and review of the composite data in order to better inform remedial design, if necessary. Summaries of analyte reporting limits and analyte quality assurance limits are provided in Table 2 and Table 3, respectively.

2.4 Documentation

Sampling activities will be documented in field notebooks and sample specific data will be collected electronically using the Locus Mobile App. Data recorded will include sample collection techniques, extent of sampling, date and time of sampling, weather conditions, and soil description. Any deviations from the work plan or additional information pertinent to sample collection will be recorded in the field notebook. Photo-documentation will be maintained with digital pictures.

The following information will be collected at each sampling location and recorded with the Locus Mobile App and/or in the field notebook:

- GPS position of the sample points
- Sample ID
- Bank height and approximate bank angle
- Limit of persistent woody vegetation/bank full elevation
- Ordinary high water
- Site description, including apparent land use, vegetation, and soil description

Soil descriptions will be documented using the Unified Soil Classification System (USCS) methodology, and will include observations on grain size, roundness of grains and sorting. Soil color will be documented using a Munsell color chart.

Consistent sampling techniques will be used at all locations to the extent practical, to maintain data comparability. Every attempt will be made to maintain data quality and comparability where physical or other conditions require any deviation from the work plan. When necessary, a specific sampling location may be moved either upstream or downstream to the nearest suitable sampling location where a boring can be retrieved. GPS coordinates will be collected at the new sample location, and a note will be made in the field notebook indicating the location was moved, and why.

3.0 Field Quality Assurance/Quality Control

Field quality assurance/quality control (QA/QC) samples are designed to help identify and minimize potential sources of contamination due to field procedures. Data from these samples can also be used to evaluate potential error introduced by sample collection and handling. This plan will follow the QA/QC guidelines outlined in the AOC 4 Quality Assurance Project Plan (AECOM, 2016).

3.1 Duplicate Samples

Duplicate samples will be collected at 5% of the sampling locations. They will be homogenized in the field prior to being placed in sample jars. Analysis for THg will be performed by the laboratory on both samples for confirmation of THg analysis.

3.2 Matrix Spikes and Matrix Spike Duplicates

Matrix spikes and spike duplicates for THg will be performed by the laboratory on 5% of the analytical samples for the confirmation of THg analysis.

3.3 Field/Equipment Blank Samples

A rinsate of sampling equipment will be sampled and analyzed to determine whether decontamination procedures have been effective. A rinsate sample (also referred to as a “field blank”) will be collected from the decontaminated sampling equipment before sampling. Organic-free deionized water will be poured over the decontaminated sampling apparatus and the rinsate will be transferred to the sample bottles. The same parameters to be analyzed in the test samples, will be analyzed for in the rinsate samples. The rinsate sample will be assigned a QA/QC sample identification number, stored in an iced cooler, and shipped to the laboratory along with the actual samples collected that day.

3.4 Identification, Handling, and Chain-of-Custody (COC)

Samples will be identified, handled, and recorded as described in this work plan. Each sample container will have a label affixed to the outside. All documentation and labels will be marked using waterproof ink with a unique sample identification number. The sample identification number will be recorded in the project notebook/field logbook using the following labeling convention:

EVENT/DATE CODE - BANK SEGMENT - TRANSECT ID – BORING ID - DEPTH

The SAMPLE ID will consist of up to 25 alphanumeric characters and contain the following details:

- Event/Date Code –SS for surficial soils
- Bank Segment ID – RBH or LBH
- Transect ID – 100

- Sample Elevation – top and bottom of the interval with 0 being the top of bank or highest elevation sampled
  For example:
  - SS042519-RB11-100-(1-2) for discrete sample intervals
  - SS042519-RB11-100-COMP for lab composite

Sample containers will be packed to minimize breakage or damage to samples and placed in shipping containers that meet or exceed Department of Transportation requirements. Cushioning material will be added to the container as needed. COC and other relevant forms will be sealed in Ziploc® bags and placed inside of the shipping container, on top of the sample containers to ensure their availability when the container is opened at the receiving laboratory. The shipping container will be taped closed, and a signed custody seal will be affixed to the side of the container. Laboratory address labels will be placed outside, and on top of the shipping container.

All samples are assumed to contain low levels of contamination and will be packaged and shipped as environmental samples in accordance with applicable federal and state regulations. Standard procedures to be followed for shipping environmental samples to the analytical laboratory are outlined below:

- Transported to the laboratory by personnel, shipped by Federal Express or equivalent overnight service, or picked up by a lab courier.
- Shipments from the field will be scheduled for overnight delivery, with the exception of weekends or holidays, if possible.

The laboratory will be notified so they are prepared to receive a shipment of samples. The laboratory will be informed if the number, type, or date of shipment changes due to site constraints or program changes.

An established program of sample COC will be followed during sample handling activities for both field and laboratory operations. The primary purpose of COC procedures is to document the possession of the samples from collection through shipping, storage, and analysis to data reporting and disposal.

Tracing sample possession will be accomplished by using the COC record. A COC entry will be recorded for every sample and a COC record will accompany every sample shipment to the laboratory. At a minimum, the COC record will contain the following information for each sample:

- Sample number and identification of sampling point
- Date and time of collection
- Sample collection description
- Sample type
- Number, type, and volume of sample container(s)
- Sample preservative
- Analysis requested
- Name, address, and phone number of laboratory or laboratory contact
- Signature, dates and times of persons in possession
- Any necessary remarks or special instructions

Once the COC form is complete and the samples are ready for shipment, it will be placed inside the shipping container, and the container will be sealed. Samples are considered to be in custody if they are within sight of the individual responsible for their security or locked in a secure location. Each person who takes possession of the samples, except the shipping courier, is responsible for sample integrity and safekeeping.

4.0 Reporting

Data collected as part of this effort will be used to inform remedial decision-making and the design process. A brief technical memorandum will be provided within 45 days after final data have been received from the laboratory and validated, summarizing sampling activities, analytical results and any deviations from the proposed sampling plan. Data collected in this program will be incorporated into the broader South River Science Team (SRST) database and used to further the understanding of mercury concentration and distribution within the focus reach.

5.0 Health and Safety

The SRST Safety Program, along with the AOC-4 Health and Safety Plan for 2022, will be reviewed to ensure that site-specific health and safety protocols are followed for this investigation. In addition, prior to the initiation of any work, a safety meeting will be held each morning by field team members to discuss health and safety issues that may be encountered during fieldwork on that day.

Potential health and safety threats encountered during sampling may include, but are not limited to, inclement weather, biological hazards (e.g., poison ivy, tick exposure), uneven terrain, pinch points and work over/adjacent to water. No field sampling or other activity that poses an unacceptable risk to personal safety will be undertaken.

6.0 References

AECOM. 2015. *RCRA Quality Assurance Project Plan, Former DuPont Waynesboro Site Area of Concern (AOC) 4: South River and a Segment of the South Fork Shenandoah River, Virginia.* Initial QAPP prepared by URS Corporation in August 2014; revised February 2016.

Anchor QEA, URS Corporation, E.I. du Pont de Nemours and Company. 2015. *Final Interim Measures Design, Implementation, and Monitoring Work Plan. Phase I - South River Area of Concern 4*.

Tables

Table 1
Analytical Schedule
Preliminary Phase 2 BMA Investigation – RRM 3 to RRM 4
Former DuPont Waynesboro Site – Area of Concern 4
Waynesboro, Virginia

Sample Purpose	Number of Transects	Number of Composite Samples (1 per Transect)[1]	Analysis	
			THg (SW 846 7471A)	Moisture (2540 B)
Characterization	77	77	X	X
Field Duplicate	5%	4	X	X
MS/MSD	5%	4	X	
Equipment Blank	1 per day (~8)	1 per day (~8)	X	

Notes:
THg: Total Mercury
MS: Matrix Spike
MSD: Matrix Spike Duplicate
1. Discrete interval samples will be held, to be analyzed pending composite sample results.

Table 2
Analyte Reporting Limits
Preliminary Phase 2 BMA Investigation – RRM 3 to RRM 4
Former DuPont Waynesboro Site – Area of Concern 4
Waynesboro, Virginia

Analyte	Matrix	Analytical Method	CAS Number	Laboratory MDL	Laboratory RL	Units
Total Mercury	Sed/Soil	SW-846 7471A	7439-97-6	0.01	0.10	mg/kg
Moisture	Sed/Soil	SM20 2540G-1997	EVS0198	0.5	0.5	%
Total Mercury	Water (blank)	SW-846 7470A	7439-97-6	0.0081	0.0002	mg/L

Notes:
MDL: Method Detection Limit
RL: Reporting Limit
mg/kg: milligram per kilogram
mg/L: milligram per liter

Table 3
Analyte Quality Assurance Limits
Preliminary Phase 2 BMA Investigation – RRM 3 to RRM 4
Former DuPont Waynesboro Site - Area of Concern 4
Waynesboro, Virginia

Parameter	Test Method	Matrix	Field Precision % RPD (Field Dup)	Laboratory Precision % RPD (LCSD)	Laboratory Accuracy % Recovery (LCS)	Laboratory Precision % RPD (MSD or Lab Dup)	Laboratory Accuracy % Recovery (MSD)	Data Completeness Goal %
Mercury	SW-846 7471A	Sed/Soil	50	20	80-120	20	80-120	90
Mercury	SW-846 7470A	Water	N/A	20	80-120	20	80-120	90
Moisture	SM20 2540G-1997	Sed/Soil	50	N/A	99-101	15	N/A	90

Notes:
N/A: Not Applicable
RPD: Relative percent difference
Dup: Duplicate
LCSD: Laboratory Control Spike Duplicate
MSD: Matrix Spike Duplicate

Figures

Legend

- Proposed Sample Location
- RRM Intervals Whole Mile

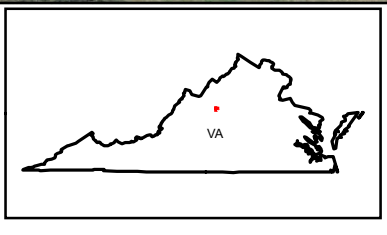
Substrate Class

- 1.) Clays and Silts
- 2.) Fine Sands

Soil THg (mg/kg)	XRF Soil THg (mg/kg)
< 18	< 18
18 - 55	18 - 55
55 - 150	55 - 150
> 150	> 150

Reference:
World Imagery (Waynesboro)

Coordinate System: NAD 1983 StatePlane
Virginia North FIPS 4501 Feet
Projection: Lambert Conformal Conic
Datum: North American 1983
Units: Foot US



AECOM
625 West Ridge Pike, Suite E-100
Conshohocken, PA 19428
Phone: (610) 832-3500 Fax: (610) 832-3501

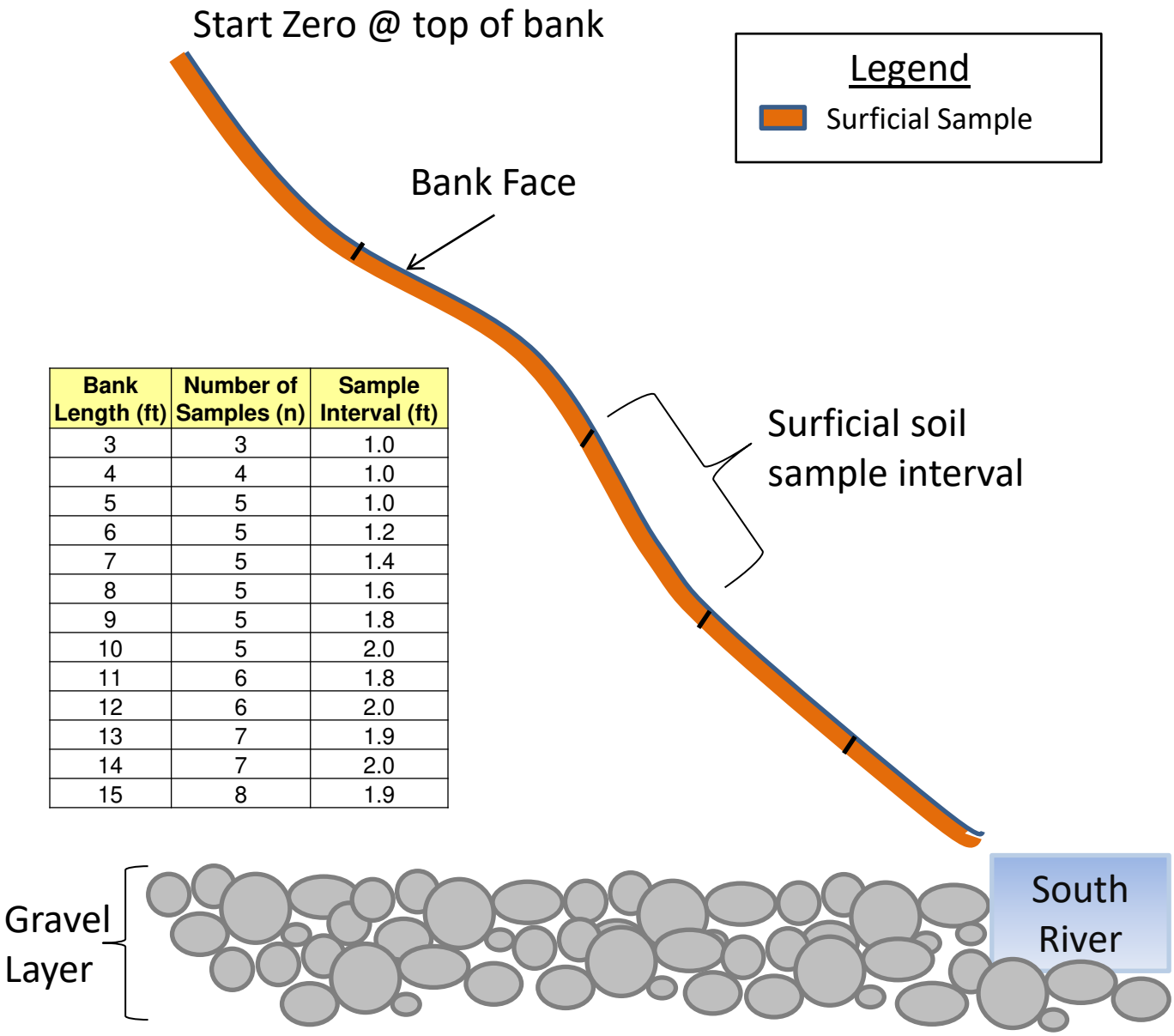
Job: 60594242
Prepared by: BSF
Checked by:
Date: 4/4/2022

Figure 1
Proposed Sample Locations
Phase 2 BMA Identification

Former Dupont Waynesboro Plant - Area of Concern 4
Waynesboro, Virginia

Path: S:\Projects\IMS\DUPONT\STHRIVER\Projects\BankConcAndLoading\2013RemediationWorkPlan\Figure 1 - Proposed Sample Locations_20220211.mxd

Figure 2
Example Bank Soil Sampling Cross Section
Preliminary Phase 2 BMA Investigation: RRM 3 to 4
Former DuPont Waynesboro Site - AOC 4
Waynesboro, Virginia



Bank Length (ft)	Number of Samples (n)	Sample Interval (ft)
3	3	1.0
4	4	1.0
5	5	1.0
6	5	1.2
7	5	1.4
8	5	1.6
9	5	1.8
10	5	2.0
11	6	1.8
12	6	2.0
13	7	1.9
14	7	2.0
15	8	1.9

Appendix A

Protocol SRSO-1: Guidelines for Sampling Bank Soils

Protocol SRSO-1:
Guidelines for Sampling Bank Soils

The purpose of this document is to provide guidance for the collection of soil samples for chemical or geotechnical analysis using a variety of methods.

Equipment

- Shovels, spade or hand trowel
- Stainless steel auger bucket
- Extension shafts
- Hand lens
- USCS grain size, sorting, angularity chart
- Munsel color chart
- Cross handle
- Tape measure
- Stainless steel sampling tools
- Stainless steel bowl
- Spade or shovel/stainless steel trowel(s)
- Appropriate sample containers
- Sample container labels
- Pencils and waterproof /permanent marking pens
- Ice chest and ice
- Field Data Sheets
- Chain-of-custody (COC) forms
- Custody seals
- Powder-free Nitrile gloves
- Decontamination supplies
    - Brushes
    - Wash tubs
    - Buckets
    - Sponges or paper towels
    - Formula 409
    - Potable tap water
    - DI or distilled water

    - Hand-held sprayers or spray bottles
    - Trash bags
    - Plastic sheeting
- Organic free deionized (DI) water or distilled water
- Sampling location maps
- Global Positioning System (GPS) unit
- Camera
- Appropriate health and safety equipment
- Label tape (clear)
- Paper towels
- Plastic bags

Decontamination Procedures

Before sampling begins, the soil sampling device, stainless steel bowls, and spoons will be decontaminated. The equipment will be decontaminated between sampling locations. All non-disposable equipment used for the collection, preparation, preservation, and storage of environmental samples must be cleaned prior to use and after each subsequent use. Unless the equipment and materials used are disposable or of sufficient number so as not to be reused during any one sampling period, decontamination will have to be performed in the field.

Decontaminating Hand Augers

Upon completion of hand-auger boring, equipment used will be decontaminated by the following procedures:

- Be aware of safety. Don appropriate personal protective equipment (PPE).
- Disconnect the hand auger parts such as auger head and auger extensions.
- Place the hand auger parts into a container holding Formula 409 tap water mixture (1:10). Ensure that the entire surface of the hand auger that was in contact with soil is submersed in the Formula 409 solution.
- Thoroughly rinse with distilled or DI water.
- Reconnect the hand auger parts. Dry the parts with paper towels.
- If the hand auger is not going to be used soon, place it in a clean bag or container.

Decontaminating Shovels, Spades, and Trowels

Upon completion of the soil sample collection, miscellaneous equipment used to collect the sample will be decontaminated. Equipment that comes into contact with soil will be decontaminated using the following procedure:

- Be aware of safety. Don appropriate personal protective equipment (PPE).
- Remove excess soil by scraping.
- Wash using a brush in the plastic container holding Formula 409 and tap water (1:10). Equipment should be brushed until all soil is removed from the item being decontaminated.
- Remove the item from the plastic container and rinse thoroughly with DI or distilled water.
- Dry the item with a clean paper towel.

Following decontamination, the sampling equipment will be placed in a clean area and covered to prevent contact with the ground surface or other unclean surfaces. If the equipment is not to be used immediately, the equipment will be covered or wrapped in plastic sheeting or heavy-duty trash bags to minimize potential contamination.

Soil Collection and Handling Procedures

Grab Surface Soil Sampling

This method involves the collection of soil from at or near the ground surface using tools such as spades, shovels, trowels, and scoops. The surface material is removed to the required depth and a stainless steel trowel is used to collect the sample. The following procedure describes the methodology for collecting surface soil samples:

- Be aware of safety. Don appropriate PPE.
- Lay a tape measure from the top of the bank to the water surface and record the distance on field data sheets.
- Divide the bank into equal sampling increments and collect surficial (approximately 5-10 cm) soil samples from each of these increments. Bank samples will be spaced no less than one foot apart and no greater than two feet apart.
- Remove and discard sticks, rocks, vegetation and other debris from the sampling area using a pre-cleaned sampling tool.
- Place an appropriate amount of soil, based on the analyses to be performed, into a stainless steel bowl or other appropriate container.
- Soil descriptions will be documented using the Unified Soil Classification System (USCS) methodology and will include observations on grain size, roundness of grains and sorting. Soil color will be documented using a Munsel color chart.
- Homogenize the soil using a stainless steel trowel or spoon and fill the sample containers for THg and grain size analysis.

- Label sample jars/sample bag
- Return unused soil to the collection location.
- Store the sample on ice in a cooler and document sample.
- Record applicable information on the Sample Collection Field Sheet and COC.
- Decontaminate all equipment prior to moving to next location following the decontamination procedures.

Soil Sampling Using Hand Auger Corer

- ☐ Be aware of safety. Don appropriate PPE.
- ☐ Locate sample transect and select boring location at the top interval sampled during surficial sampling and record location with a GPS.
- ☐ Auger until refusal or the underlying gravel deposit is encountered, retaining each 1-foot increment on separate pieces of aluminum foil.
- ☐ Once it is determined that the appropriate sample depth has been achieved. Homogenize each 1-foot interval in a stainless steel mixing bowl.
- ☐ Soil descriptions will be documented using the Unified Soil Classification System (USCS) methodology and will include observations on grain size, roundness of grains and sorting. Soil color will be documented using a Munsel color chart.
- ☐ Once soil descriptions have been fill designated sample containers.
- ☐ Return unused soil to the collection location.
- ☐ Store the sample on ice in a cooler prior to shipment of the sample to the contract laboratory

Field Quality Assurance/Quality Control

Field quality assurance/quality control (QA/QC) samples are designed to help identify and minimize potential sources of sample contamination due to field procedures and to evaluate potential error introduced by sample collection and handling. All field QA/QC samples are labeled with QA/QC identification numbers and sent to the laboratory with the other samples for analyses. The frequency of QA/QC samples is specified in the WP.

Duplicate Samples

Collecting duplicate samples allows for evaluation of natural variability by comparing the analytical results of two samples from the same location. Duplicate samples also check for the consistency of field techniques and laboratory analysis. The duplicate samples will be handled in the same manner as the primary sample, assigned a distinct identification number, and shipped to the laboratory along with the primary sample it duplicates. Duplicate samples will be determined by the sample collection program. Stations will be determined in the field based on professional judgment.

Matrix Spikes and Matrix Spike Duplicates

Matrix spikes (MS) and matrix spike duplicate (MSD) samples will be obtained by collecting additional material at a selected station. MS and MSD samples are prepared at the laboratory by dividing a control sample into two aliquots, then spiking each with identical concentrations of specific analytes. The spike samples are then analyzed separately, and the results are compared to evaluate the effects of the sample matrix on the analytical accuracy and precision. Separate samples for matrix spikes (MS) and matrix spike duplicates (MSD) must be collected unless the laboratory specifies that these analyses can be run using an actual sample. MS/MSD samples will be labeled and shipped to the laboratory along with the primary sample from which they were collected.

Field/Equipment Blank Samples

An equipment rinsate sample of sampling equipment is intended to check if decontamination procedures have been effective. A rinsate sample (also referred to as a "field blank") will be collected from the decontaminated sampling equipment before it is used to obtain the sample. Organic-free deionized water will be rinsed over the decontaminated sampling apparatus and transferred to the sample bottles. The same parameters that are being analyzed in the samples will be analyzed in the rinsate samples. The rinsate sample is assigned a QA/QC sample identification number, stored in an iced cooler, and shipped to the laboratory along with the sediment/residue samples collected that day.

Sample Identification, Handling, and Chain-of-Custody

Samples will be identified, handled, and recorded as described in this sampling guideline. The sample parameters for analysis, preservation, and handling are specified in the Phase I system characterization. Each sample container has a sample label affixed to the outside. The sampler marks each label using waterproof ink with the following information:

- Project name
- Sample identification number
- Date and time of collection
- Initials of sampling technician
- Requested analysis
- Method of preservation

Sample containers will be packed in bubble wrap to minimize breakage or damage to samples and placed in metal or plastic coolers. Dry ice will be placed around sample containers and additional cushioning material will be added to the cooler, if necessary. Paperwork will be put in a Ziploc bag and placed on top of the sample containers or taped to the inside lid of the cooler. The cooler will be taped closed and a signed custody seal will be affixed to the side of the cooler. Laboratory address labels will be placed on top of the cooler.

All samples are expected to contain low levels of contamination and will be packaged and shipped as environmental samples in accordance with applicable federal and state regulations. All shipments containing dry ice will conform to federal, state, and carrier regulations. Standard

procedures to be followed for shipping environmental samples to the analytical laboratory are outlined below.

- All environmental samples collected will be transported to the laboratory by AECOM personnel, shipped through Federal Express or equivalent overnight service, or picked up by a lab courier.
- Shipments will be scheduled to meet holding time requirements.

The laboratory will be notified to be prepared to receive a shipment of samples. If the number, type, or date of shipment changes due to site constraints or program changes, the laboratory will be informed.

AECOM has established a program of sample COC that will be followed during sample handling activities in both field and laboratory operations. The primary purpose of COC procedures is to document the possession of the samples from collection through shipping, storage, and analysis to data reporting and disposal. The Task Manager or his/her designee will be responsible for monitoring compliance with COC procedures.

Tracing sample possession will be accomplished using the COC record. A COC entry will be recorded for every sample, and a COC record will accompany every sample shipment to the laboratory. At a minimum, the COC record will contain the following information for each sample:

- Sample number and identification of sampling point
- Date and time of collection
- Sample type
- Number, type, and volume of sample container(s)
- Sample preservative
- Analysis requested
- Name, address, and phone number of laboratory or laboratory contact
- Signature, dates and times of persons in possession
- Any necessary remarks or special instructions

Once the COC is complete and the samples are ready for shipment, the COC will be placed inside the shipping container, and the container will be sealed. Samples are considered to be in custody if they are within sight of the individual responsible for their security or locked in a secure location. Each person who takes possession of the samples, except the shipping courier, is responsible for sample integrity and safekeeping.

Field Logbook and Field Data Sheet

The most important aspect of documentation is thorough, organized, and accurate record keeping. All information pertinent to the investigation will be recorded in the field logbook and/or field data sheets. All entries in logbooks will be made in waterproof ink. Corrections will consist of line-out deletions that are initialed and dated. Entries will include the following, as applicable:

- Project name and number
- Name of sampler and field personnel
- Date and time of sample collection
- Sample number, location, and depth
- Sampling method
- Sampling media
- Sample type (grab or composite)
- Sample physical characteristics
- Sample preservation
- Observations at the sampling site (e.g., weather conditions)
- Unusual conditions
- Names and addresses of field contacts
- Names and responsibilities of field crew members
- Names and titles of any site visitors
- Location, description, and log of photographs (if taken)
- References for all maps and photographs
- Information concerning sampling changes, scheduling modifications, and change orders
- Summary of daily tasks and information concerning sampling changes, scheduling modifications, and change orders dictated by field conditions
- Signature and date by personnel responsible for observations

Field investigation situations vary widely. No general rules can include each type of information that must be entered in a logbook or data sheet for a particular site. Site-specific recording will include sufficient information so that the sampling activity can be reconstructed without relying on the memory of field personnel. The logbooks will be kept in the field team member's possession or in a secure place during the investigation. Following the investigation, the logbooks will become a part of the final project file.

Sample Collection Field Sheet

Sample Collection Field Sheets will be completed for each sample by the sampling personnel (geologist, geological engineer, or geotechnical engineer). Most of the information required on the field sheet will have been completed at the conclusion of the soil sampling.

Health and Safety Procedures

To avoid incidents or injuries during sampling, the following health and safety procedures should be followed:

- Toxic or otherwise harmful concentrations of metals or other constituents are unlikely to be encountered while sampling floodplain soils. However, sampling crews should be trained in the general hazards of field sampling and how to minimize risks of exposure.
- Operating in or around waterbodies carries the inherent risk of drowning. U.S. Coast Guard approved personal flotation devices must be worn when operating or sampling from a boat, when sampling in more than a few feet of water, or when sampling in swift currents.
- Collecting samples in cold weather, especially around cold waterbodies, carries the risk of hypothermia, and collecting samples in extremely hot and humid weather carries the risk of dehydration and heat stroke. Sampling team members should wear adequate clothing for protection in cold weather and should carry an adequate supply of water or other liquids for protection against dehydration in hot weather.
- Sampling team members must cover exposed skin and/or use sunscreen for protection from sun exposure.
- When working on all waterbodies, sampling teams must develop and employ an emergency response plan, including the use of an onshore monitor that is accountable for the whereabouts of the team. The monitor can request aid if the team fails to report in at end of workday and can provide assistance to rescuers or the team under any emergency situation.

References

USEPA, Washington, D.C., Lisa Feldt - Principal Editor, Report Number EPA/540/P-87/001, "A Compendium of Superfund Field Operations Methods," December 7.

USEPA, 1996. Region IV Environmental Investigations Standard Operating Procedures and Quality Assurance Manual.