Sample Containers, Preservation, and Field Quality Control

Effective Date:	2/19/2015
Next Review Date:	2/19/2018

Hazard Class: ☐ Low ☑ Moderate ☐ High/Complex

Usage Mode: ☑ Reference ☐ Use Every Time (UET) ☐ Both Reference & UET

Approval Signatures:

Name	Z#	Signature	Date
Alan MacGregor	112808	/S/ Signature on File	12/18/2014

Classification Review: ☒ Unclassified ☐ UCNI ☐ Classified: _____

Name	Z#	Signature	Date
David B. Rogers	115164	/S/ Signature on File	11/18/14

Document No./Revision No.	Issue Date	Action	Description
EP-ERSS-SOP-5056, R0	10/16/07	New	New document number, reformatted, minor technical changes. Supersedes ENV-DO-206, formerly E-SOP-1.02 and WQH-SOP-020.
ER-SOP-20235, R0	2/19/2015	New	• Document supersedes EP-ERSS-SOP-5056, *Field Quality Control Samples*, and EP-ERSS-SOP-5059, *Sample Containers and Preservation*. New number issued in accordance with ADEP Numbering Guide. • Updated to new template to include editorial changes. • Corrected two typographical errors in Section 4.2, Item 5 (“mostly” and “percent”). • Removed Step 6, Section 4.1. • Document number change to reflect organizational changes from CAP to ERP.

CONTENTS

1.0 PURPOSE AND SCOPE

The purpose of this procedure is to delineate the responsibilities, specific requirements, and process for sample containers, preservation techniques, field quality control (QC), and holding times as specified by field regulations and guidance documents within Los Alamos National Laboratory.

2.0 BACKGROUND AND PRECAUTIONS

2.1 Background

The use of specific types of sample containers and preservation techniques is mandatory for hazardous site investigations because the integrity of any sample is diminished over time. Physical factors (light, pressure, temperature, etc.), chemical factors (changes in pH, volatilization, etc.), and biological factors may alter the original quality of the sample. Because the various target parameters are uniquely altered at varying rates, distinct sample containers, preservation techniques, and holding times have been established to maintain sample integrity for a reasonable and acceptable period of time.

2.2 Precautions

The volume of sample collected should be sufficient to perform all of the required analysis. An additional amount should be collected to provide for any quality control needs, split samples, or repeat examinations. All field QC samples must be sampled, preserved, and transported in the same manner as regular samples. If the samples were collected in an area controlled by a radiological work permit, they must be released by RP-1 before transfer to the Sample Management Office (SMO). The samples shall be preserved and secured at the site until the shipping requirements are met and the samples are removed from the site.

Never clean and reuse bottles. Keep bottles in clean, dry place until the sample has been collected and is ready to be transferred to the appropriate container.

3.0 REFERENCES

- *U.S. EPA Specifications and Guidance for Contaminant-Free Sample Container*, Publication 9240.05A, EPA/540/R-93/051, December 1992
- EPA SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*
- EP-CAP-SOP-20236, *Handling, Packaging, and Transporting Field Samples*

4.0 ACRONYMS

COC	chain-of-custody (form)
QC	quality control
SAP	sample and analysis plan
SMO	Sample Management Office (ER project)
VOC	volatile organic compound

5.0 EQUIPMENT AND TOOLS

Certified 300 series sample containers; available from vendors such as I-CHEM (J-CHEM Certified 300 Series), Environmental Sampling Supply, etc.

NOTE: A certificate of analysis with a bar-coded production number is typically in every case supplied by the vendor. Each bottle in the 300 series has a bar-code label for absolute traceability and is for use with the automated sample tracking system. The certificate of analysis should be retained for records.

6.0 STEP-BY-STEP PROCESS DESCRIPTION

6.1 Obtaining Proper Sample Containers and Preservatives

Field Team Member

1. The sample containers and preservatives are often determined as part of the applicable sample and analysis plan (SAP). In that case, follow (SMO) field chain-of-custody specifications. Otherwise, check the EPA website for proper containers and preservatives.
2. Verify that all materials are ready and available before going into the field, including all QC samples such as trip blanks, field blanks, etc., that are required by the SAP.
3. Obtain field chain-of-custody forms (COCs) and individual bottle identification stickers before going into the field.
4. Obtain bottles from the SMO when applicable. If programs purchase their own supplies they must be of the same quality. For sample collection, use only certified 300-series sample containers that have been processed and meet or exceed *U.S. EPA Specifications and Guidance for Contaminant-Free Sample Container* (Publication 9240.05A, EPA/540/R-93/051, December 1992).
5. Proper sample bottle sizes and sample volumes are often determined as part of the SAP. Otherwise, verify that all water samples for organics contain extra aliquots for the potential of laboratory QC problems and/or breakage during shipment.
6. Document all pertinent comments and any deviations on the field COC or field logbook.

6.2 Collecting Samples

Field Team Member

1. Unless a priority for sample collection is otherwise specified in the SAP, for all matrices, fill bottles in the following order:
   a. volatile organics
   b. semi-volatile organics
   c. metals
   d. other inorganic parameters
   e. radiochemistry

2. Follow this vial-filling technique for volatiles:
   a. If the bottle is not already prepared with preservative, add the preservative before the sample is taken.
   b. Pour liquid samples into the vials without introducing any air bubbles.
   c. If bubbling occurs as a result of vigorous pouring, discard the sample and refill the vial.
   d. Completely fill the vial at the time of sampling so that when the septum cap is fitted and sealed and the vial is inverted, no headspace is visible.
   e. Do not open appropriately filled vials again before analysis.

   [NOTE: Because of solubility differences affected by temperature change, pea-sized bubbles may accumulate in the vials during transportation and storage. The bubbles should not adversely affect sample integrity. The accumulation of bubbles will occur during storage but should not be present at the time of sampling.]
3. Refer to the media-specific sample collection procedure for sampling details
4. Collect solid samples in the following manner:
   a. Collect the solid sample in En Core® samplers, or fill the specific jar as completely as possible.
   b. Tap the sides of the jar slightly during filling to try and eliminate as much air space as possible.
   c. If samples are shipped to the laboratory in En Core® samplers, extrude the samples and place them in sample containers within 48 hours of sample collection.
5. Collect sludge samples in the following manner:
   a. Take into consideration the consistency of the material because the analytical laboratory will extract or analyze the sample with respect to the relative percent of liquid solid components.
   b. If the sludge is mostly water with relatively low solid content (<40% solids), use the appropriate water sample containers.
   c. If the specific analysis to be performed is applicable only to a certain fraction of the sludge, note this on the analytical request form.

6.3 Preserving Samples

Field Team Member

1. The preservative type and volumes are often determined as part of the SAP and specified on the field chain-of-custody. Otherwise, for all samples, determine the type of preservation required for the specific analyses requested in accordance with EPA SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, and established industry practices for use by accredited analytical laboratories.

   [NOTE: Acid, base, or buffer preservative quantities are to be added to samples.]
2. Preserve samples immediately following sample collection (except in the case of samples for organics analyses as described above).

   [NOTE: The SMO does not preserve samples.]

   [NOTE: The proper reagent for pH adjustment should be in an easily usable form that can be added at the time of sampling.]

3. Store samples in a cooler with ice, or other appropriate cooling material, until they are delivered to the SMO as follows:
   - Place the samples in an insulated container (cooler) and maintain on ice (ice in bags or chemical "blue" ice) at 4º Centigrade within 8 hours of sample collection (where applicable).
   - Avoid freezing the sample, particularly when using a small, <40-ml glass container, by wrapping it in bubble wrap to isolate it from the "blue" ice.
4. If using an acid or base preservative, check the sample pH with pH paper; however, never insert the pH paper directly into the sample vial.

6.4 Implementing Holding Times

Field Team Member

1. To minimize potential effects to samples caused by holding time concerns, consider holding times and shipment schedules when planning the sample collection schedule.
2. Use the sample collection date and time for the beginning of the holding time.

   [NOTE: Both the sampler and the subcontract analytical laboratory must use this date/time. If the holding times are expressed in days, the sample must be extracted/analyzed before midnight. If the holding times are expressed in hours, the sample must be extracted/analyzed before the expressed time frames are exceeded. Remember to take into account time zone differences when collecting samples.]
3. When parameters are required to be analyzed in the field, use the allowable holding times, which are the maximum times that samples are considered valid.
4. If the site has suspected radiation contamination, obtain radiation-screening results for the SMO or BUS-4 to ship the samples. (See EP-CAP-SOP-20236, *Handling, Packaging, and Transporting Field Samples*, for handling and transporting the samples.)

   [NOTE: These results may be from historical knowledge or may be derived from field screening measurements of gross alpha/beta and gross gamma.]
5. If the samples are collected in an area controlled by a Radiological Work Permit, obtain a release by RP-1 before transfer to the SMO.
6. Preserve and secure the samples at the site until the shipping requirements are met and the samples are removed from the site.

6.5 Pre-Operation Activities

Field Team Leader

1. The number and type of field QC samples are often specified as part of the SAP. Otherwise, evaluate the requirements for field QC samples as part of preparation of the site-specific SAP.
2. Include QC samples in accordance with the following table:

QC Sample Type	Sample Matrix	Frequency	Purpose
Field Duplicate	Soil and Water	One per day per matrix type or 1 per 20 samples, whichever is more frequent	To evaluate the reproducibility of the sampling technique

Equipment Rinsate Blank	Deionized water used to rinse equipment	One per day or 1 per 20 samples collected, whichever is more frequent	To evaluate decontamination procedures
Trip Blank	Volatile organic compound (VOC)-free soil or sand; or VOC-free deionized water	One per day or 1 per 20 samples collected for VOC analysis, whichever is more frequent	To determine contamination during storage and transport

3. Determine the need for additional types of QC samples to be collected during the SAP preparation activities.

   [NOTE: These additional types of QC samples may be collected to obtain information concerning the sampling site (e.g., background and control samples).]

4. Obtain deionized water in sealed containers appropriate for transport to the field and in sufficient quantity to prepare the required equipment rinseate blanks.

   [NOTE: Do not use tap water or drinking water purchased from a local store because these sources typically contain trihalomethanes.]

5. Obtain trip blanks from the SMO.

6.6 Sample Collection Process

Sample Collection Personnel

1. Collect and prepare each type of QC sample required in the manner prescribed in the table in Section 6.5 of this procedure.
2. The number and type of field QC samples are often specified as part of the SAP. Otherwise, refer to the table in Section 6.5 of this procedure for the collection frequency of field QC samples that shall be addressed within the SAP.

6.7 Equipment Rinseate Blank

Sample Collection Personnel

1. After decontaminating the field sampling equipment, rinse the equipment with deionized water, and collect the rinsate for analysis.
2. Rinse all equipment surfaces that come in contact with the sampling materials (e.g., the inside of the bailer).
3. Collect rinsate water throughout the day, and fill the sample container all at once at the end of the day's sampling activities.

   [NOTE: Do not collect the water used for decontaminating the field sampling equipment.]

6.8 Field Duplicate

Sample Collection Personnel

1. Collect two separate samples from the same source and at the same location and time.
2. Place the samples in separate containers, follow the sample preservation procedure, label each as a unique sample, and submit both samples for the same analyses.

6.9 Trip Blank

Sample Collection Personnel

1. Obtain trip blanks before the day's sampling events, and submit with the regular samples at the end of each day's sampling activities (when collecting samples for VOC analysis), or at the end of the project if the required frequency is maintained. [NOTE: The number of trip blanks to be prepared depends on the number and frequency of VOC samples to be collected.]
2. Maintain the trip blank containers with the regular sample containers throughout the sampling event, and return them to the SMO with the collected samples.
3. Do not open the trip blank container(s) at any time during the sampling activities.

7.0 RECORDS

Field Team Member

1. Submit the following records generated by this procedure to the applicable field operations task leader:
   - daily activity log forms or field notebooks that include deviations (if applicable), calibration information, records of daily activities, and any other pertinent information, at a minimum
   - completed COC
   - sample collection log