

Sample Custody and Handling

FSOP 1.5 (March 8, 2011)

Ohio EPA Division of Environmental Response and Revitalization

1.0 Scope and Applicability

- 1.1 This procedure describes standard practices used by the Division of Environmental Response and Revitalization (DERR) for custody and handling of environmental samples (generally water, soil, sediment, soil gas, or air) prior to receipt by a laboratory for chemical analysis. Sample handling includes packaging and shipping activities (U.S. EPA, 2007).
- 1.2 A chain-of-custody (COC) form documents the exchange of samples from the field to the laboratory and supports the integrity and defensibility of the sampling process. The COC form generally includes the following information (in the following order):
 - 1.2.1 Project name and location
 - 1.2.2 Sampler's name and contact information
 - 1.2.3 Laboratory name and contact information
 - 1.2.4 Sample number/identification
 - 1.2.5 Date and time of sample collection
 - 1.2.6 Grab or composite designation
 - 1.2.7 Number and types of containers comprising a sample
 - 1.2.8 Analytical methods and preservatives
 - 1.2.9 Notes concerning samples
 - 1.2.10 Sampler's signature
 - 1.2.11 Signatures of individuals involved in the sample transfer (with the exception of commercial shipping personnel)
 - 1.2.12 Air bill or shipping number
- 1.3 Agency personnel are responsible for the care and custody of samples from the time of collection to the time the samples are relinquished directly to the laboratory or to a commercial shipper for transportation to the laboratory. U.S. EPA (2007) considers a sample "under custody" under the following conditions:
 - 1.3.1 The sample is in possession or in view after being in possession.
 - 1.3.2 The sample was in possession and then secured or sealed to prevent tampering.
 - 1.3.3 The sample was in possession when placed in a secured area.
- 1.4 Proper packaging and prompt shipment of samples is very important for the following reasons:
 - 1.4.1 Protecting samples from temperature increases that may cause changes in analyte composition or concentration.
 - 1.4.2 Reducing the chance of leaking or breaking of sample containers and exposure of field sampling or laboratory personnel to toxic substances.

- 1.4.3 Ensuring compliance with shipping regulations.
- 1.4.4 Minimizing the potential for sample theft or tampering.
- 1.4.5 Ensuring that analytical holding times for samples are met.
- 1.5 This procedure is consistent with certain Contract Laboratory Program (CLP) requirements that are generally accepted practices for sample custody and handling for environmental investigations. However, it does not meet all CLP requirements. Contact the DERR Site Investigation Field Unit (SIFU) for assistance with CLP project requirements before field activities are initiated.
- 1.6 This procedure does not apply to shipping samples that are hazardous materials (also referred to as dangerous goods), which includes hazardous waste characteristics as defined in Ohio Administrative Code (OAC) 3745-51-03 per the Hazardous Materials Transportation Act (49 CFR 170-179). Characteristics of hazardous wastes (ignitability, corrosivity, reactivity, and toxicity) are identified in OAC 3745-51-20 to OAC 3745-51-24 and listed hazardous wastes are identified in OAC 3745-51-30 to OAC 3745-51-35. If shipping a suspected hazardous material always contact SIFU for assistance. In addition, DERR's Transportation of Samples Guidance (DERR-00-RR-025) provides a detailed description of the proper procedures for packaging, transporting, and shipping hazardous materials.

2.0 Definitions

Not applicable

3.0 Health and Safety Considerations

- 3.1 Large sample coolers filled with environmental samples and ice typically weigh between 40 and 60 pounds. Always use proper lifting techniques, and if needed, request assistance to avoid injuries. Seek medical attention if needed.
- 3.2 Glass containers may break during sample handling and packing. Always handle glass containers with care and be aware of the potential for broken glass when packing or rearranging. Broken glass may cause cuts or lacerations. Seek medical attention if needed and/or use first aid kit for cuts or lacerations.
- 3.3 Strong acids or bases, e.g., HCl, HNO₃, H₂SO₄, and NaOH, are often used to preserve water samples. Skin or eye contact with preservatives or preserved samples may result in injury. Wear appropriate personnel protective equipment (e.g., gloves and eye protection) to avoid chemical burns. Use potable water to flush exposed areas and seek medical attention if needed. *(If directly exposed to a concentrated acid or base, seek medical attention immediately.)*

4.0 Procedure Cautions

- 4.1 Most environmental samples must be preserved on ice at 4°C (+/-2°C) to prevent sample degradation. Temperature-sensitive samples should be shipped same-day or next-day delivery to the laboratory.
- 4.2 Do not use “blue ice” packs for temperature preservation of environmental samples. Natural ice is more reliable for maintaining a sample temperature of 4°C (+/-2°C). Additionally, “blue ice” typically contains ingredients (e.g., propylene glycol or styrene) that could contaminate volatile organic compound (VOC) or semi-volatile organic compound (SVOC) samples if the packs leak during transportation.
- 4.3 Never place loose ice in a sample cooler being prepared for commercial shipment. If the ice melts and water leaks from the cooler during transit, shipment to the laboratory may be delayed or terminated. Always contain ice in sealable plastic bags or within a sealed heavy duty plastic bag used as a cooler liner.
- 4.4 Special handling and shipping requirements apply to environmental samples containing concentrated preservatives. Some chemical preservatives are regulated as hazardous materials by U.S. Department of Transportation (U.S. DOT). The Hazardous Materials Transportation Act (49 CFR 170-179) provides detailed guidelines for shipping hazardous materials. For example, a shipping cooler containing soil samples preserved with methanol per SW-846 Method 5035A must be classified and assigned the appropriate proper shipping name (psn), packaged with approved shipping materials, and appropriately labeled. Always contact SIFU for assistance with hazardous material shipping. Designated SIFU staff are trained to prepare hazardous materials for shipping in accordance with U.S. DOT regulations.
- 4.5 Each sample cooler should contain a separate COC form documenting only the samples being transported within that cooler. This practice maintains the COC for all samples in case of a lost or misrouted shipment. In addition, this practice helps prevent potential confusion when the samples are received and logged at the laboratory.
- 4.6 If shipping samples on a Friday for next-day delivery, inform the laboratory that the samples will be arriving on Saturday. Confirm the receiving address for the Saturday delivery, which may be different than the receiving address for sample delivery during weekdays. Note that some commercial shippers may also require a special air bill for Saturday delivery or “Saturday Delivery” labels on the shipping cooler.
- 4.7 If shipping samples with expedited turnaround times or analytical holding times less than seven days, e.g., unpreserved water samples for VOC analysis, contact the laboratory on the day that the samples are shipped and remind or inform them of the expedited turnaround times. Also, be aware that the holding times

for some analytical methods are so short that the samples must be delivered to the laboratory via Ohio EPA staff or courier on the same day. For example, SW-846 Method 7196A for hexavalent chromium in ground water or surface water has a 24-hour holding time. If in doubt about sample holding time requirements, contact SIFU for assistance.

5.0 Personnel Qualifications

Ohio EPA personnel entering the site must meet DERR's qualifications for performing work at uncontrolled hazardous waste sites.

6.0 Equipment and Materials

- 6.1 COC forms
- 6.2 Clear tape (for securing and protecting completed labels on sample containers)
- 6.3 Custody seals
- 6.4 Custody tape
- 6.5 Duct tape (for packaging sample containers)
- 6.6 Environmental samples to be shipped
- 6.7 Large heavy duty plastic bags (for use as sample cooler liners)
- 6.8 Ice
- 6.9 Knife or scissors
- 6.10 Packing materials (bubble wrap, styrofoam molds, and/or packing peanuts)
- 6.11 Pens and markers, preferably waterproof
- 6.12 Sealable plastic bags (pint to two-gallon size for sample containers, COC forms, and/or ice)
- 6.13 Shipping cooler
- 6.14 Shipping (mailing) forms for air or ground delivery (unless samples are being delivered directly to the laboratory by an Ohio EPA staff member or courier)
- 6.15 Shipping labels for package handling (including but not necessarily limited to "Fragile," "This Side Up," and "Do Not Drop")
- 6.16 Strapping tape (for sealing shipping coolers)
- 6.17 Temperature blanks (if required by the laboratory)
- 6.18 Trip blanks (if the shipping cooler includes samples for VOC analysis)

7.0 Procedures

- 7.1 Sample custody and COC forms
 - 7.1.1 To maintain proper custody, keep samples in sight or in a secured location, e.g., a locked vehicle or room. If samples are to be stored overnight prior to shipment to the laboratory, seal the sample cooler with custody tape to prevent tampering.
 - 7.1.2 District office personnel may leave samples at the Groveport Field Office in the custody of SIFU or other Ohio EPA field staff prior to delivery to a laboratory.

- 7.1.3 Use only blue or black ink to complete COC forms.
- 7.1.4 If samples are being shipped to a DERR contract laboratory, contact SIFU, a District Office Laboratory Coordinator, or the contract laboratory for specific instructions on completing the contract laboratory's COC form.
- 7.1.5 If submitting samples to the Ohio EPA Division of Environmental Services (DES) laboratory, use DES COC forms. Contact DES for specific instructions on completing their COC forms.
- 7.1.6 Prior to shipping a sample cooler, review the COC form for accuracy and ensure that each sample being shipped within that cooler is properly documented on the COC form. Never include samples being shipped in other coolers. If required, include the air bill or shipping tracking number on the COC form.
- 7.1.7 Sign and date each COC form.
- 7.2 Sample handling (packaging and shipping)
 - 7.2.1 Inspect the sample containers to be shipped for loose or improper fitting lids, damaged lids, and incomplete or illegible sample labels. Document such problems as appropriate and correct if possible. If correction is not possible, inform the District Office Site Coordinator and the SIFU Sampling Team Leader or SIFU Laboratory Coordinator.
 - 7.2.2 Use clear tape to cover and protect the labels on sample containers.
 - 7.2.3 Wrap glass sample containers in bubble wrap and/or use other protective shipping materials such as styrofoam molds to help prevent container breakage.
 - 7.2.4 Place glass sample containers in sealable plastic bags to contain the contents and prevent potential cross contamination of other samples if broken in transit.
 - 7.2.5 Seal any drainage holes in the shipping cooler. Use only clean, dry shipping coolers.
 - 7.2.6 Place two large heavy duty plastic bags in the shipping cooler as liners, one inside of the other.
 - 7.2.7 Place sample containers upright inside the inner bag. Include a trip blank if samples are being submitted for VOC analysis and a temperature blank if required by the laboratory. Place larger, heavier containers on the bottom of the shipping cooler and smaller, lighter sample containers at the top. Use additional packing material between containers to help prevent breakage. Do not overfill the cooler with sample containers and packing material. Allow at least 25% of the cooler volume for ice.

- 7.2.8 Twist the inner bag closed while removing excess air volume. Seal the inner bag using duct tape.
- 7.2.9 Fill the available area between the inner bag and outer bag with fresh ice.
- 7.2.10 Twist the outer bag closed and seal it using duct tape.
- 7.2.11 As an alternative to Steps 6.2.6 through 6.2.10 for small-sized or medium-sized shipping coolers, place all sample containers in sealable plastic bags and make ice packs using one-gallon or two-gallon sealable plastic bags. The ice should be double-bagged to help prevent leakage into the cooler.
- 7.2.12 If shipping by common carrier, place the completed COC form in a sealable plastic bag and place it in the cooler on top of the bagged sample containers. Otherwise, give the COC to the laboratory courier or hand deliver it to the laboratory with the samples. (Remember to include the airbill or shipping tracking number on the COC form if required).
- 7.2.13 Check that the cooler lid closes properly. If it does not, remove some ice and/or reconfigure the sample containers (repeat Steps 6.2.5 through 6.2.11 as necessary).
- 7.2.14 Affix a signed and dated custody seal to the closed cooler. Protect the custody seal by covering it with clear tape.
- 7.2.15 Secure the lid by circling the cooler and lid several times with strapping tape. For small to medium coolers, tape the left and right sides. For large coolers, tape the midsection of the cooler in addition to the right and left sides.
- 7.2.16 Affix "Do Not Drop," "Fragile," and "This Side Up" stickers, and any other needed shipping stickers to the sides or top of the cooler.
- 7.2.17 Complete the air bill and/or other shipping forms. If shipping overnight on a Friday, remember to check the "Saturday Delivery" box on the form. Never check "Shipper Release" or "Signature Release" boxes. Unless otherwise instructed by the SIFU Laboratory Coordinator, do not declare a value for the cooler and always bill the receiver (the laboratory).
- 7.2.18 If shipping by common carrier, attach the air bill and/or other shipping forms on the top of the cooler and ship same-day or next-day delivery.

8.0 Data and Records Management

Refer to FSOP 1.2.1, Field Documentation.

9.0 Quality Control and Quality Assurance

Check the completed COC form for errors or omissions by comparing the sample cooler contents to the form prior to sealing the cooler for shipment.

10.0 Attachments

None

11.0 References

DERR Transportation of Samples Guidance (DERR-00-RR-025), September 1998

FSOP 1.2.1, Field Documentation

Hazardous Material Transportation Act, U.S. Code of Federal Regulations, 49 CFR 170-179

Ohio Administrative Code 3745-51-03, 3745-51-20 through 24, and 3745-41-30 through 35

U.S. EPA, 2007, Contract Laboratory Guidance for Field Samplers, OSWER 9240.0-44, EPA 540-R-07-06