

Surface Water Sample Collection

FSOP 2.3.1 (October 4, 2011)

Ohio EPA Division of Environmental Response and Revitalization

1.0 Scope and Applicability

- 1.1 This FSOP provides general procedures for surface water sample collection in shallow surface water (i.e., less than approximately two feet). The methods, procedures, and sampling equipment selected for a sampling event should always meet the site- or project-specific data quality objectives (DQOs).
- 1.2 Surface waters include rivers, streams, lakes, ponds, wetlands, springs, and seeps. In addition, surface water may be sampled from drainage ditches, man-made lagoons or impoundments, discharge pipes/outfalls, storm sewers and associated manholes or vaults, or areas of transient ponding.
- 1.3 This FSOP is not applicable to collection of surface water samples in water deeper than approximately two feet or if using specialized surface water sampling equipment. For surface water sampling in deeper water, or with specialized equipment (e.g., Kemmerer sampler) consult the Ohio EPA, Division of Surface Water (DSW) for an appropriate methodology.
- 1.4 This FSOP is not necessarily applicable to field activities conducted by Emergency Response, the Office of Special Investigations, the Radiation Assessment Team or other specialized teams.

2.0 Definitions

Not applicable

3.0 Health and Safety Considerations

- 3.1 Always be conscious of hazards associated with the water body during surface water sampling, especially if sampling a lake, pond, wetland, lagoon, impoundment, river, or large stream.
- 3.2 Never enter a river or stream under high-flow conditions.
- 3.3 Be aware of trip or fall hazards along river banks and lagoon or impoundment slopes.
- 3.4 Be aware of the dangers of working near low-head dams (e.g., rapid flow and undercurrents) as well as hazards that may be posed by other man-made structures such as manholes, vaults, weirs, pump houses, and associated electrical or mechanical equipment.
- 3.5 If sampling from a boat, always wear a personal flotation device (PFD).
- 3.6 Follow Ohio EPA's Boating Safety SOP (SP10-12) if sampling from a boat.

- 3.7 Never walk on a surface crust or partially submerged debris in a lagoon or impoundment.
- 3.8 Do not collect samples from a frozen lake, pond, lagoon, or impoundment unless authorized by a site-specific health and safety plan. Never collect samples from a frozen river, stream, or any other flowing water body that is frozen over.
- 3.9 When collecting surface water samples, use the “buddy system,” with at least two persons present at all times.
- 3.10 Be aware of biological hazards, e.g., snakes, ticks, mosquitoes, and poison ivy, in areas around water bodies.
- 3.11 Never enter an OSHA-defined confined space for any reason during surface water sampling activities. Only Ohio EPA Office of Special Investigation (OSI) staff or other appropriately trained staff are qualified to enter confined spaces for reconnaissance or sampling activities, and will perform such work as necessary in accordance with Ohio EPA’s Confined Space Entry Policy (OEPA-SM-10-002).
- 3.12 Always review the site-specific health and safety plan (HASP) for site-specific sampling hazards before beginning work.

4.0 Procedure Cautions

- 4.1 Sample surface water before sampling sediment whenever possible.
- 4.2 Avoid agitating and splashing surface water during sampling. Aeration of the sampled water may cause loss of volatile organic compounds or other undesirable changes in sample quality.
- 4.3 Avoid disturbing sediments during surface water sampling. Incorporating excessive sediment into (increasing the turbidity of) a surface water sample often artificially elevates the concentrations of certain constituents, particularly metals and polynuclear aromatic hydrocarbons. If sediments are disturbed, allow sufficient time for the sediment to settle and the water to clear before sampling.
- 4.4 Avoid introducing foreign materials into surface water samples. “Foreign materials” may include vegetative debris (leaves, tree bark, plant stems, etc.) or fragments of solid waste or debris materials (paper, plastics, wood fragments, etc.)
- 4.5 Samples may be collected at the surface water (air/water) interface or below the water surface dependent on project DQOs.
- 4.6 If collecting multiple samples from flowing surface water, begin at the downstream location and work upstream to avoid compromising sample quality (e.g., increasing sample turbidity or disturbing contaminated sediments).

- 4.7 If using pre-preserved sample containers, take care not to flush the preservative from the container during the sampling process.
- 4.8 Use a glass sample jar or stainless steel dipper to collect samples for organic chemical analyses. Plastic dippers or sample containers may serve as a source of cross contamination for certain organic chemicals.

5.0 Personnel Qualifications

Ohio EPA personnel performing field sampling activities must meet DERR's qualifications for performing work at uncontrolled hazardous waste sites.

6.0 Equipment and Supplies

- 6.1 Equipment and supplies needed regardless of sampling method:
 - 6.1.1 Chain-of-custody forms
 - 6.1.2 Clear tape
 - 6.1.3 Decontamination equipment and supplies (FSOP 1.6, Sampling Equipment Decontamination)
 - 6.1.4 Field logbook, field log sheets, or activity-specific field forms
 - 6.1.5 Method-specific analytical sample containers with waterproof labels
 - 6.1.6 Paper towels
 - 6.1.7 Pens and markers (preferably waterproof)
 - 6.1.8 Personal protective equipment per the HASP and PFDs when sampling from a boat
 - 6.1.9 Sample coolers
 - 6.1.10 Sampling gloves
 - 6.1.11 Sample preservatives, (e.g., ice, HCl, HNO₃, NaOH, H₂SO₄)
 - 6.1.12 Stainless steel dippers or clean sample jars for sample collection
 - 6.1.13 Water quality monitoring instruments, e.g., pH/temperature/specific conductance meter, dissolved oxygen meter, turbidity meter
- 6.2 Other equipment and supplies that may be needed for unique circumstances such as seep sampling and/or surface waters that are difficult to access:
 - 6.2.1 Coliwasa
 - 6.2.2 Disposable bailers
 - 6.2.3 Extension rod (for stainless steel dipper or glass sample jar)
 - 6.2.4 Hand auger, sampling spoon, or shovel
 - 6.2.5 Inertial lift pump
 - 6.2.6 Peristaltic pump and sampling tubing
 - 6.2.7 Small diameter PVC well screen and sand pack to construct seep sampling point

7.0 Procedures

- 7.1 General surface water sampling procedures (regardless of sampling method)

- 7.1.1 If possible, conduct site reconnaissance to identify potential sampling locations.
- 7.1.2 If using pre-labeled sample containers, complete each label and cover with clear tape before sampling.
- 7.1.3 Use decontaminated or disposable equipment to collect each sample.
- 7.1.4 Wear a pair of clean sampling gloves when collecting each sample.
- 7.1.5 Samples should be collected in the following order of sensitivity to volatility and turbidity: (1) volatile organic compounds (VOCs); (2) metals; (3) semi-volatile organic compounds (SVOC)s; (4) pesticides, herbicides and PCBs; and (5) general water quality parameters, e.g., ammonia, chloride, alkalinity, etc.
- 7.1.6 After filling, preserving, and labeling sample containers, place each sample container in a cooler on ice for shipment or delivery to the laboratory. Complete the chain-of-custody form.
- 7.1.7 Collect DQO-required field water quality measurements such as pH, temperature, specific conductance, dissolved oxygen, or turbidity.
- 7.1.8 Record all sampling information on the attached Surface Water Sample Collection Data Form (preferred). A field log book or field log sheet may also be used to record the pertinent information if the field data form is not used (refer to FSOP 1.3, Field Documentation).
- 7.1.9 Decontaminate stainless steel dippers and any other sampling equipment used between samples in accordance with FSOP 1.6, Sampling Equipment Decontamination.
- 7.1.10 Dispose of investigation derived waste (IDW) in accordance with FSOP 1.7, Investigation Derived Wastes.
- 7.1.11 Follow all applicable criteria in FSOP 1.5, Sample Custody and Handling, when handling or shipping/transporting samples to the laboratory.
- 7.1.12 Clearly mark the sampling locations for Global Positioning System (GPS) surveying.
- 7.2 Sampling using a sample jar or stainless steel dipper
 - 7.2.1 For samples collected at the surface water interface, use a clean sample jar or a decontaminated stainless steel dipper to fill the sample containers. Avoid overfilling pre-preserved sample containers and diluting the preservative.
 - 7.2.2 For samples collected below the surface water interface, collect the samples as follows:

- 7.2.2.1 Close, invert, and completely submerge unpreserved sample containers. Pre-preserved sample containers cannot be used.
 - 7.2.2.2 If the surface water is flowing, position the sample container opening in the upstream direction.
 - 7.2.2.3 Fill each container by opening it under water, slowly turning it right side up, and allowing it to fill completely without breaking the water surface.
 - 7.2.2.4 Close each filled container while still submerged.
 - 7.2.2.5 Add preservatives to the sample container after the sample has been collected.
 - 7.2.2.6 Alternatively, collect the sample from below the surface water interface using a peristaltic pump and disposable tubing. One sampler holds the tubing in the water while the other operates the pump and fills the sample containers from the bank or shore of the surface water body. This technique allows the use of pre-preserved sample containers.
- 7.3 Sampling from springs or seeps
- 7.3.1 If possible, avoid sampling springs or seeps during periods of significant rainfall.
 - 7.3.2 Developed springs generally consist of a trench filled with buried gravel, which may include a discharge pipe and/or a concrete basin. If the spring has a flowing discharge pipe, simply fill the sample containers at the outflow (just as if collecting a water sample from an outdoor tap). If the spring consists only of a concrete basin with no discharge pipe, collect the sample directly from the basin using the techniques described in Section 6.2.
 - 7.3.3 Collect surface water samples from seeps or undeveloped springs using the techniques described in Section 6.2 if a sufficient depth of ponded water is present. Otherwise, use any of the following techniques to provide adequate water volume for sampling:
 - 7.3.3.1 Excavate a small area of the seep or undeveloped spring to a depth of approximately six inches using a clean sampling spoon or shovel. After allowing the excavation to fill with water (and allowing time for sediment to settle out and turbidity to drop), use the techniques described in Section 6.2 to collect a sample.
 - 7.3.3.2 Use a sampler specifically designed to collect seep samples such as a stainless steel scoop that has been modified to capture and contain water as it slowly discharges from a seep. Such samplers may help to reduce sample turbidity.

- 7.3.3.3 To collect low turbidity samples, easily purge prior to sampling, or collect multiple samples over time, install a small-diameter well screen in the seep or undeveloped spring to construct a fixed sampling sump:
 - 7.3.3.3.1 Use a hand auger to excavate a shallow boring approximately two feet deep.
 - 7.3.3.3.2 Install approximately 2.5 feet of PVC well screen with a sand pack. Use a PVC cap or J-plug to close the top of the screen when the sump is not being used.
 - 7.3.3.3.3 Allow sufficient time for the sump to fill completely and for disturbed sediment to settle before sampling. If necessary, sediment-laden water may be purged from the sump after installation and prior to sampling to obtain lower turbidity samples.
 - 7.3.3.3.4 Use a disposable bailer, peristaltic pump, or inertial lift pump to collect a sample from the sump (screen) after it fills with water.
- 7.4 Some surface waters may be difficult to sample due to site characteristics or health and safety concerns, such as an impoundment with steep banks or a deep storm sewer or outfalls with extremely high flows. Consider using the following equipment for these circumstances:
 - 7.4.1 Extension rod for a stainless steel dipper or glass sampling jar
 - 7.4.2 Disposable bailer
 - 7.4.3 Peristaltic pump with extended tubing

8.0 Data and Records Management

Refer to FSOP 1.3, Field Documentation.

9.0 Quality Control and Quality Assurance

- 9.1 Quality assurance/quality control (QA/QC) sample requirements are to be specified in the site-specific work plan. QA/QC samples may include duplicate samples, trip and equipment blanks and matrix spike/matrix duplicate samples depending upon the project DQOs. In general, surface water sampling events should include at least one duplicate sample. If VOC samples are being collected for analysis, at least one trip blank should be submitted per sample shipment.

- 9.2 If possible, collect duplicate samples at locations where contamination (or chemicals of concern) are known or likely to be present at detectable concentrations.

10.0 Attachments

Surface Water Sample Collection Data Form

11.0 References

FSOP 1.3, Field Documentation

FSOP 1.5, Sample Custody and Handling

FSOP 1.6, Sampling Equipment Decontamination

FSOP 1.7, Investigation Derived Wastes

Ohio EPA, Office of Safety and Labor, Confined Space Entry Policy (OEPA-SM-10-002)

Ohio EPA, Office of Safety and Labor, Standard Operating Procedure SP10-12, Boating Safety

Surface Water Sample Collection Data Form
Ohio EPA Division of Environmental Response and Revitalization

Sample Identification:

Site Name _____

Sample ID # _____

Date _____ Time _____

Sampler _____

Sample Location Description:

Waterbody Name _____

Location¹ _____

Site Description² _____

Latitude _____ Longitude _____

Velocity/Flow (circle one): *intermittent* *interstitial* *slow* *moderate* *fast* *very fast*

General Appearance _____

Field Parameters:

Temperature _____ pH _____ Specific Conductance _____

Turbidity _____ Dissolved Oxygen _____ Other _____

Sample Collection Description:

Water Depth at Sample Location _____

Surface or Subsurface Sample _____

Substrate Description³ _____

Collection Method _____

Form instructions and site location map on opposite side of page

