



# SURFACE WATER SAMPLING

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## 1.0 SCOPE AND APPLICATION

This standard operating procedure (SOP) is applicable to the collection of representative liquid samples, both aqueous and non-aqueous from streams, rivers, lakes, ponds, lagoons, and surface impoundments. It includes samples collected from depth, as well as samples collected from the surface.

These are standard (i.e., typically applicable) operating procedures which may be varied or changed as required, dependent upon site conditions, equipment limitations or limitations imposed by the procedure or other procedure limitations. In all instances, the ultimate procedures employed should be documented and associated with the final report.

Mention of trade names or commercial products does not constitute U.S. Environmental Protection Agency (EPA) endorsement or recommendation for use.

## 2.0 METHOD SUMMARY

Sampling situations vary widely, therefore, no universal sampling procedure can be recommended. However, sampling of both aqueous and non-aqueous liquids from the above mentioned sources is generally accomplished through the use of one of the following samplers or techniques:

- C Kemmerer bottle
- C Bacon bomb sampler
- C Dip sampler
- C Direct method

These sampling techniques will allow for the collection of representative samples from the majority of surface waters and impoundments encountered.

## 3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

Once samples have been collected, the following procedure should be followed:

1. Transfer the sample(s) into suitable, labeled sample containers.
2. Preserve the sample if appropriate, or use pre-preserved sample bottles. Do not overfill bottles if they are pre-preserved.
3. Cap the container, place in a ziploc plastic bag and cool to 4°C.
4. Record all pertinent data in the site logbook and on field data sheets.
5. Complete the Chain of Custody record.
6. Attach custody seals to cooler prior to shipment.
7. Decontaminate all sampling equipment prior to the collection of additional samples with that sampling device.

## 4.0 INTERFERENCES AND POTENTIAL PROBLEMS

There are two primary interferences or potential problems with surface water sampling. These include cross contamination of samples and improper sample collection.

1. Cross contamination problems can be eliminated or minimized through the use of dedicated sampling equipment. If this is not possible or practical, then decontamination of sampling equipment is necessary. Refer to the Sampling Equipment Decontamination SOP.
2. Improper sample collection can involve using contaminated equipment, disturbance of the stream or impoundment substrate, and sampling in an obviously disturbed area.

Following proper decontamination procedures and minimizing disturbance of the sample site will eliminate these problems.

## 5.0 EQUIPMENT/APPARATUS

Equipment needed for collection of surface water samples may include (depending on technique chosen):

- C Kemmerer bottles
- C Bacon bomb sampler
- C Dip sampler
- C Line and messengers
- C Sample bottles/preservatives
- C Ziploc bags
- C Ice
- C Coolers
- C Chain of Custody records, custody seals
- C Field data sheets
- C Decontamination equipment
- C Maps/plot plan
- C Safety equipment
- C Compass
- C Tape measure
- C Survey stakes, flags, or buoys and anchors
- C Camera and film
- C Logbook/waterproof pen
- C Sample bottle labels

## 6.0 REAGENTS

Reagents will be utilized for preservation of samples and for decontamination of sampling equipment. The preservatives required are specified by the analysis to be performed.

## 7.0 PROCEDURES

### 7.1 Preparation

1. Determine the extent of the sampling effort, the sampling methods to be employed, and the types and amounts of equipment and supplies needed.
2. Obtain the necessary sampling and monitoring equipment.
3. Decontaminate or pre-clean equipment, and ensure that it is in working order.
4. Prepare scheduling and coordinate with staff, clients, and regulatory agency, if appropriate.
5. Perform a general site survey prior to site entry, in accordance with the site specific Health and Safety Plan.
6. Use stakes, flagging, or buoys to identify and mark all sampling locations. If required the proposed locations may be adjusted based on site access, property boundaries, and surface obstructions. If collecting sediment samples, this procedure may disturb the bottom.

### 7.2 Representative Sampling Considerations

In order to collect a representative sample, the hydrology and morphometrics of a stream or impoundment should be determined prior to sampling. This will aid in determining the presence of phases or layers in lagoons, or impoundments, flow patterns in streams, and appropriate sample locations and depths.

Water quality data should be collected in impoundments, and to determine if stratification is present. Measurements of dissolved oxygen, pH, and temperature can indicate if strata exist which would effect analytical results. Measurements should be collected at one-meter intervals from the substrate to the surface using the appropriate instrument (i.e., a Hydrolab or equivalent).

Water quality measurements such as dissolved oxygen, pH, temperature, conductivity, and oxidation-reduction potential can assist in the interpretation of analytical data and the selection of sampling sites and depths when surface water samples are collected.

Generally, the deciding factors in the selection of a sampling device for sampling liquids in streams, rivers, lakes, ponds, lagoons, and surface impoundments are:

1. Will the sample be collected from shore or from a boat?
2. What is the desired depth at which you wish to collect the sample?
3. What is the overall depth and flow direction of river or stream?
4. What type of sample will be collected (i.e., water or lagoon liquids)?

### 7.2.1 Sampler Composition

The appropriate sampling device must be of a proper composition. Selection of samplers constructed of glass, stainless steel, PVC or PFTE (Teflon) should be based upon the analyses to be performed.

## 7.3 Sample Collection

### 7.3.1 Kemmerer Bottle

A Kemmerer bottle (Figure 1, Appendix A) may be used in most situations where site access is from a boat or structure such as a bridge or pier, and where samples at depth are required. Sampling procedures are as follows:

1. Use a properly decontaminated Kemmerer bottle. Set the sampling device so that the sampling end pieces (upper and lower stoppers) are pulled away from the sampling tube (body), allowing the substance to be sampled to pass through this tube.
2. Lower the pre-set sampling device to the predetermined depth. Avoid bottom disturbance.

3. When the Kemmerer bottle is at the required depth, send down the messenger, closing the sampling device.
4. Retrieve the sampler and discharge from the bottom drain the first 10-20 mL to clear any potential contamination of the valve. Transfer the sample to the appropriate sample container.

### 7.3.2 Bacon Bomb Sampler

A bacon bomb sampler (Figure 2, Appendix A) may be used in situations similar to those outlined for the Kemmerer bottle. Sampling procedures are as follows:

1. Lower the bacon bomb sampler carefully to the desired depth, allowing the line for the trigger to remain slack at all times. When the desired depth is reached, pull the trigger line until taut. This will allow the sampler to fill.
2. Release the trigger line and retrieve the sampler.
3. Transfer the sample to the appropriate sample container by pulling up on the trigger.

### 7.3.3 Dip Sampler

A dip sampler (Figure 3, Appendix A) is useful in situations where a sample is to be recovered from an outfall pipe or along a lagoon bank where direct access is limited. The long handle on such a device allows access from a discrete location. Sampling procedures are as follows:

1. Assemble the device in accordance with the manufacturer's instructions.
2. Extend the device to the sample location and collect the sample by dipping the sampler into the substance.
3. Retrieve the sampler and transfer the sample to the appropriate sample container.

### 7.3.4 Direct Method

For streams, rivers, lakes, and other surface waters, the direct method may be utilized to collect water samples from the surface directly into the sample bottle. This method is not to be used for sampling lagoons or other impoundments where contact with contaminants is a concern.

Using adequate protective clothing, access the sampling station by appropriate means. For shallow stream stations, collect the sample under the water surface while pointing the sample container upstream; the container must be upstream of the collector. Avoid disturbing the substrate. For lakes and other impoundments, collect the sample under the water surface avoiding surface debris and the boat wake.

When using the direct method, do not use pre-preserved sample bottles as the collection method may dilute the concentration of preservative necessary for proper sample preservation.

## 8.0 CALCULATIONS

This section is not applicable to this SOP.

## 9.0 QUALITY ASSURANCE/ QUALITY CONTROL

There are no specific quality assurance (QA) activities which apply to the implementation of these procedures. However, the following general QA procedures apply:

1. All data must be documented on field data sheets or within site logbooks.
2. All instrumentation must be operated in accordance with operating instructions as supplied by the manufacturer, unless otherwise specified in the work plan. Equipment checkout and calibration activities must occur prior to sampling/operation and they must be documented.

## 10.0 DATA VALIDATION

This section is not applicable to this SOP.

## 11.0 HEALTH AND SAFETY

When working with potentially hazardous materials, follow U.S. EPA, OSHA and corporate health and safety procedures.

More specifically, when sampling lagoons or surface impoundments containing known or suspected hazardous substances, adequate precautions must be taken to ensure the safety of sampling personnel. The sampling team member collecting the sample should not get too close to the edge of the impoundment, where bank failure may cause him/her to lose his/her balance. The person performing the sampling should be on a lifeline and be wearing adequate protective equipment. When conducting sampling from a boat in an impoundment or flowing waters, appropriate boating safety procedures should be followed.

## 12.0 REFERENCES

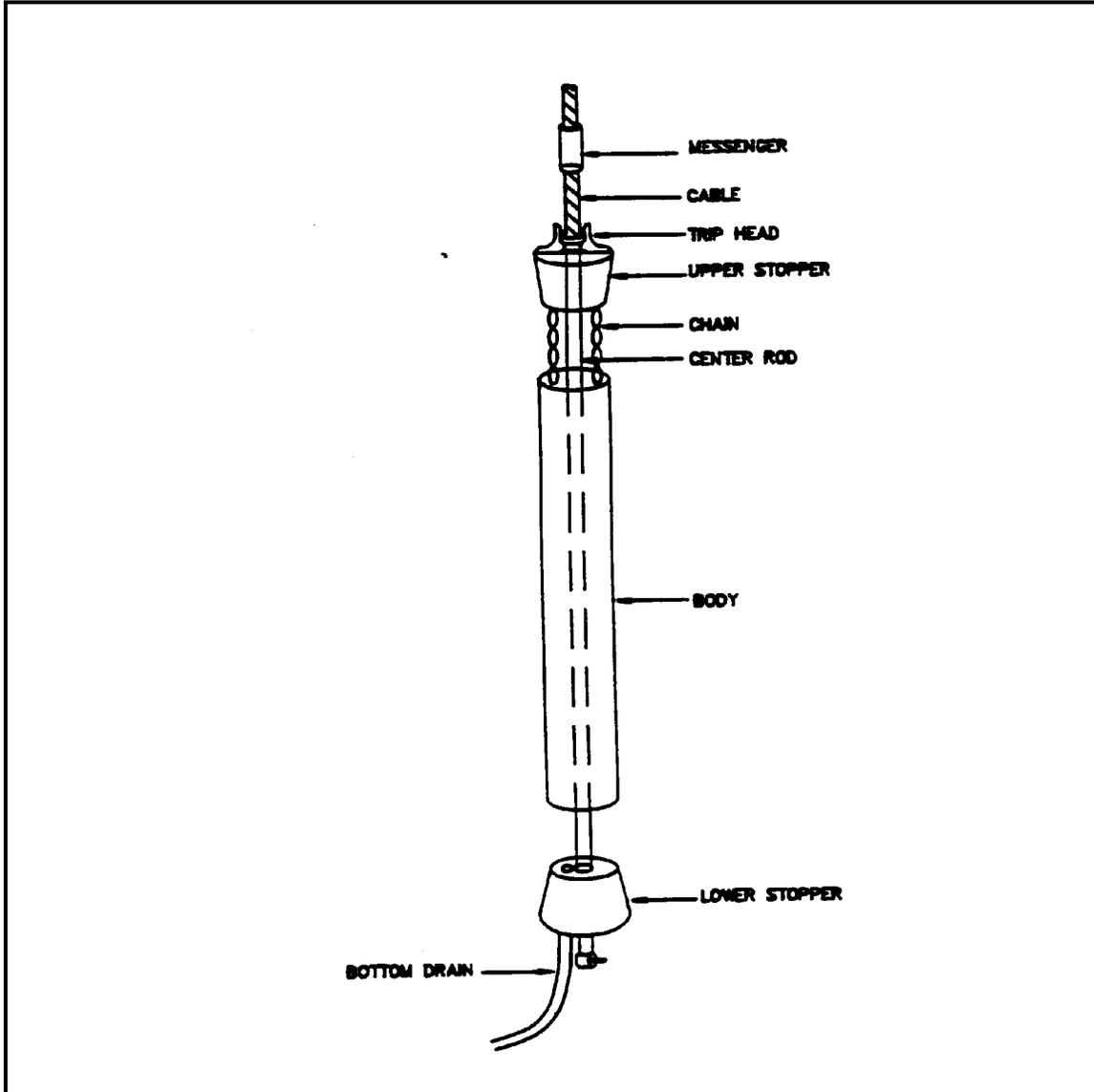
U.S. Geological Survey. 1977. National Handbook or Recommended Methods for Water Data Acquisition. Office of Water Data Coordination Reston, Virginia. (Chapter Updates available).

U.S. Environmental Protection Agency. 1984. Characterization of Hazardous Waste Sites - A Methods Manual: Volume II. Available Sampling Methods, Second Edition. EPA/600/4-84-076.

# APPENDIX A

## Figures

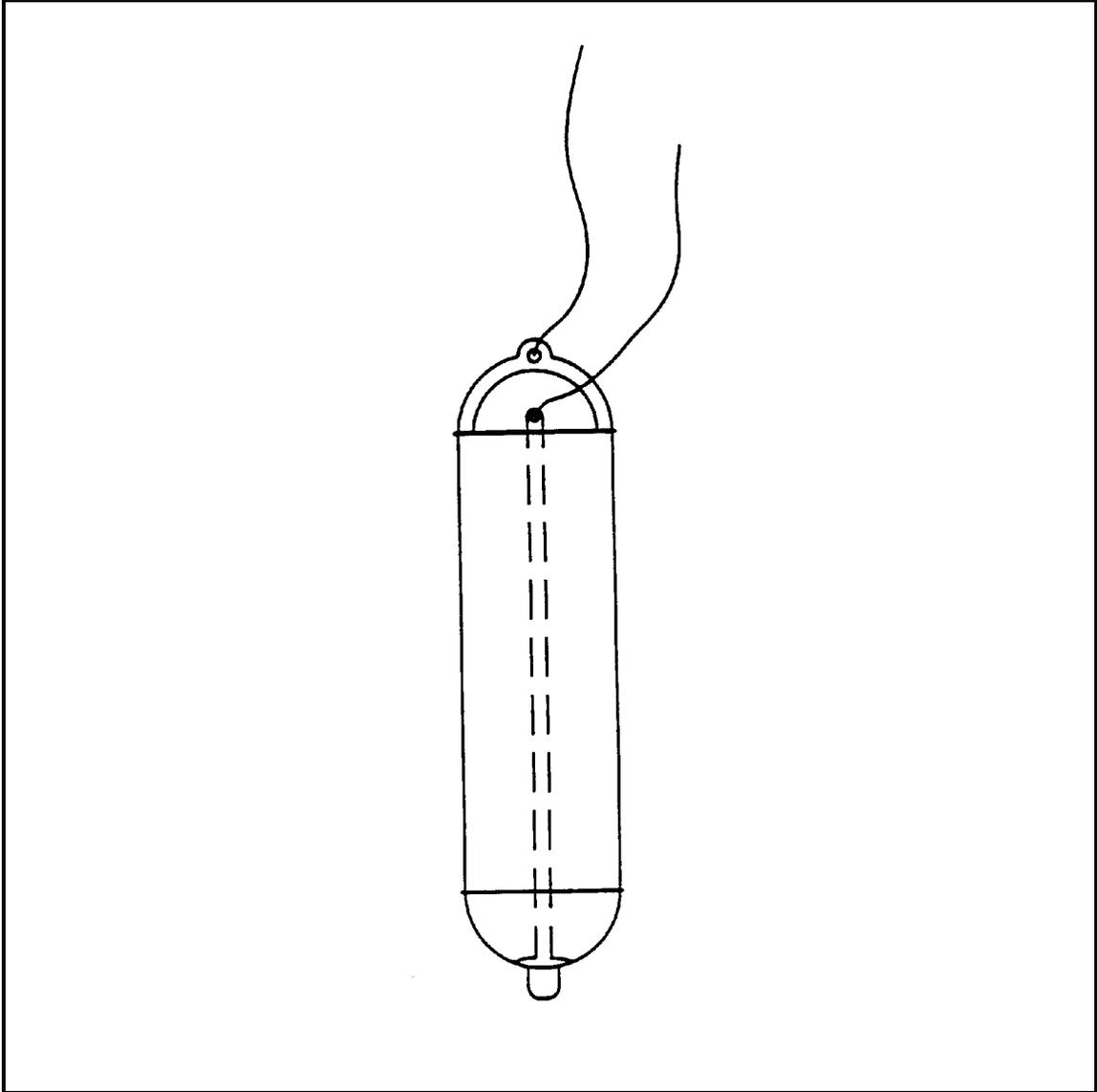
FIGURE 1. Kemmerer Bottle



**APPENDIX A (Cont'd)**

Figures

FIGURE 2. Bacon Bomb Sampler



**APPENDIX A (Cont'd)**

Figures

FIGURE 3. Dip Sampler

