

Information Paper 1.1 Collection of Water Samples

Intent and Scope

The purpose of this package is to enhance the user's knowledge and ability to make decisions regarding the collection of water samples from various water bodies. The Information Paper (IP) supplies a "method menu" table with a description of some of the available methods, their applications, and their limitations. This IP also provides general practical advice based on The Clean Water Team's experience in using these methods. The reader is then referred to the Standard Operation Procedures (SOPs) for step-by-step instructions for each specific procedure.

Principles of Water Sampling Methods

Water samples can be collected in one of four ways:

- Directly – a hand-held sampling container is dipped in the water and gets filled (water gets in while air gets out of the same opening). The rate of filling depends on the size of the opening. For extended reach, the sampling container can be attached to a pole or a rope and is extended away from the user.
- Replacement of air with water - a sampling apparatus that has an intake opening separate from the air outlet is lowered into the water column, water comes in through the intake (which is usually equipped with a pipe leading into the container) and air escapes through the separate hole in the ceiling of the container.
- Trapping – an apparatus is sent into the water column while open on both ends, and a “messenger” that travels down the line causes it to close and trap the portion of the water column it held.
- Pumping – water is drawn from the desired location by being “sucked” through a tubing, using a pump of some sort, into a container.

Selecting a Method to Collect Water Samples

Table -1 provides a "user's menu" that includes several options to choose from. It is intended for use as a selection tool in response to the specific needs, level of operator skill, data quality objectives, and safety concerns of each individual project.

Table 1. Access to Different Types of Waterbodies and Available Sampling Tools

Type of access	Activity	Volume (liter)	Discrete depths	creeks/rivers	Ponds/lakes	Ocean	Surf zone	Mudflats /wetlands	Notes
Direct	wading		Enables, with apparatus	from downstream, safety issues	Not recommended (sediment resuspension)	Can't do	From shore out	Carefull!	1, 2
Direct	dipping containers from bank		no	need to avoid scum, mud	need to avoid scum, mud		Can't do	Can't do	
Device from bank	throwing bucket & rope	5-10	no	Not recommended for rapid currents	Very useful for large samples, does not avoid margin		Can't do	Can't do	2
Device from bank	Extending pole and beaker	0.5-1	no	Avoids margins, allows control	Avoids margins, allows control				2
Apparatus from bank (with pole or pole & rope) or from bridge (with rope)	Kemmerer, Van Dorn, Nansen, Syringe pump Inverted bicycle pump	0.5 1 0.5-1 0.1-0.2 0.5-2	yes						2,3
Boat (direct or with apparatus)	Variable		Enables, with apparatus	Carefully	Very useful	Very useful	Can't do	Can't do	2

Notes

1. Wading often requires specialized gear such as hip waders, chest waders, or "mud floats" (small inflated inner-tube under platform with straps to hold boot)
2. A sampling apparatus is defined here as a gadget that allows for collection of water from a desired depth (Kemmerer, Van Dorn, syringe, inverted bicycle pump). Bucket plus rope and pole plus beaker are referred to as "Devices". The major difference is about the way water is taken in.
3. Most sampling apparatus allow for depth-integrated sampling, but getting a representative sample requires knowledge of depth and control over the speed of moving the apparatus up and down the water column.

Monitoring tips

Whenever possible, any sample collection efforts for non-sterile purposes should include rinsing of devices and container in sample water. Devices, apparatus, and containers should be rinsed three times with sample water, taking care to dispose the rinse water away from the sampling location, prior to collection of the sample that will be shipped to a laboratory or analyzed in the field.

It is very important to decontaminate beakers, buckets, and all other devices used to fetch the water from the source and transfer it into the (dedicated, pre-cleaned) sample container that eventually gets shipped away from the source. Cleaning sampling devices and apparatus should be done before and after each trip as well as between samples. Thorough cleaning, herewith referred to as “decontamination” can be done with Alconox (a detergent that does not leave residues on utensils) followed by a thorough rinse with tap water and then with deionized water. In some cases, it is not necessary to decontaminate between samples taken on the same trip in the same waterbody.

The user is encouraged to seek specific advice on disinfecting bucket, beaker, etc. if used to collect samples aseptically into a sterile container (e.g., for Coliform counts)

The telescopic pole is a very useful companion to any sampling efforts. It can even be used as a cane when climbing steep and slippery banks! A pole is essential for extending instrument probes (that are mounted on long cables) into the desired location in the river if you are standing on the bank - you just cannot do it without a pole because the probe falls to the bottom. Moreover, in slow-moving waters the DO electrodes without stirrers require rapid movement; a pole can enable this while cable cannot. Another good use of a pole is for a sterile sampling container that can be attached to a pole using a Velcro “harness”.

Sources and Resources

This Information Paper has been created by the Clean Water Team implementing the Citizen Monitoring Program of the State Water Resources Control Board. The developer and contact person for further information is:

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Look for further guidance on pH in this folder - that will eventually include -

- Information Paper IP-1.1(Samp) (this document)
- SOP-1.1.1 Water sampling using the Kemmerer or Van Dorn bottles
- SOP-1.1.2 Water sampling using the syringe pump apparatus