

## 6.2.4 PROTOCOL FOR SAMPLING THE WATER COLUMN IN LAKES AND STREAMS AT DEPTH

### Overview

Normally samples are taken from the deepest area of the water body. This type of sampling allows the characterization of water quality at various depths and so provides information as to how water quality changes with depth due to factors such as stratification, sediment release, mass balance, etc.

### Sources

Alberta Environment (2006 a), British Columbia MWLAP (2003)

### Special safety concerns

When sampling from a small watercraft, it is important to be organized. Space is at a minimum and confusion with ropes from anchors, sampling equipment and additional instruments can cause a tripping hazard. Ensure all water safety gear is worn. Delegate responsibilities, for example, one individual is responsible for taking field measurements or raising and lowering the anchor, while the second individual collects the water samples.

### At a glance

*collect samples at bow*

**1** The boat should always be anchored when doing a profile. Samples should always be collected at the bow of the boat. The bow will always point into the wind when anchored, thus reducing the potential for contamination from the boat or motor.

**2** It is important that a temperature profile be measured at every metre of depth. This will determine the status of the water body and establish at what depth the samples should be collected.

**3** When the water body is completely mixed (uniform temperature), samples should be collected at mid-depth. However, when a temperature profile exists, samples should be collected mid-depth for each layer (you should then record the depths of the major stratified zones- epilimnion, thermocline, hypolimnion).

*clean samples first*

**4** Water from depth can be pumped to the surface (Geopump Sampler or Master Flex) or collected via grab sample at depth (Van Dorn/Kemmerer Depth Samplers). Once the Van Dorn sample bottle (Figure 4) has reached the appropriate depth, a messenger is released to activate the sampler and to trigger both ends of the sampler to close. This ensures that the sample is collected at exactly the correct depth as per the study design. After sampling, all samplers should be rinsed thoroughly and any plants, animals or mud removed at site before the equipment is deployed in another water body. Sampler cleaning ensures that aquatic invasive species will not be transferred to new water bodies.

**5** When sampling from a boat, it is important that the “clean” principle of sample collection be used. This means that all surface water samples are collected first. The process then

moves to sampling at depth, this process will eliminate the possibility of contamination from the field measurements. (it usually takes some time for the field meters to find equilibrium). Samples are collected at increasingly deeper levels, shallow to deep. Once the sample has been collected in the Van Dorn bottle (see below) it is raised to the surface and a hose is attached to a drain valve this removes the water sample from the Van Dorn bottle and fills the laboratory sample bottles. Filtered samples should be completed on shore.

### Protocol for a Peristaltic Pump

- 1** Lower the inlet tubing with the weight attached to the first sampling depth and run the pump for at least 5 minutes to flush the pumping system. Run longer if using long tubing to ensure tube is well flushed.
- 2** Do not touch the sample bottles with the sampler tubing. Fill the bottles with the sample water from each appropriate depth. Ensure any laboratory requirements for head space and specific parameter requirements are met.
- 3** Lower the inlet tubing to the next sampling depth - run the pump 1 minute for each 10 m of tubing, before filling bottles.
- 4** When filling Winkler DO bottles place the outlet tube at the bottom of the bottle, rinse the bottle three times with the total volume of water in the bottle, and slowly remove the tube to prevent any aeration and stopper.
- 5** Collect samples at identified intervals, stopping at 1 m above the bottom. After all depths have been sampled, raise the pump intake hose above the lake surface and run the pump until the tubing is empty.
- 6** Shut the pump off and store appropriately.

### Protocol for a Van-Dorn or Kemmerer sampler

Only use Van Dorn (Figure 5) and Kemmerer samplers for lake sampling sites > 2 m in depth and > 1 m in depth, respectively. Ensure that the Van Dorn/Kemmerer sampler is functioning properly. Do not touch the inside of the sampler body or end plug. Store the sampler in the open position in a clean place. Calibrate and mark the sampler line starting from the mid-point of the sampler tube to ensure correct water sampling depths.

- 1** Ensure the sampling bottle is clean (rinse bottles three times if not pre-washed) and then open the sampler by raising the end seals. Set the trip mechanism and lower the sampler to the desired depth.
- 2** Send the messenger down to “trip” the mechanism that closes the end seals. Raise the sampler to the surface.
- 3** Allow a small volume of water to pass through the outlet tube to flush the drain valve. This further reduces the possibility

of contamination with water from the previous depth. If collecting Winkler titration field samples, pour off the Winkler DO samples the first time a given depth is sampled to prevent future aeration. When filling Winkler DO bottles place the outlet tube at the bottom of the bottle, rinse the bottle three times with the total volume of water in the bottle, and slowly remove the tube to prevent any aeration and stopper.

*flush drain  
valve*

**4** Continue to transfer the water sample from the Van Dorn bottle to individual sample containers via the drain valve. Avoid contact with the drain spout to prevent contamination.

**5** Collect water samples at the required depths down to 1 m above the lake bottom repeating the above steps. Always work from the top to the bottom of the water column.

### Other sources

ISO (2008 a), Newfoundland and Labrador Environment and Conservation (1999), Environment Canada (2009), Nova Scotia Department of Environment and Labour 1996, ISO 1987

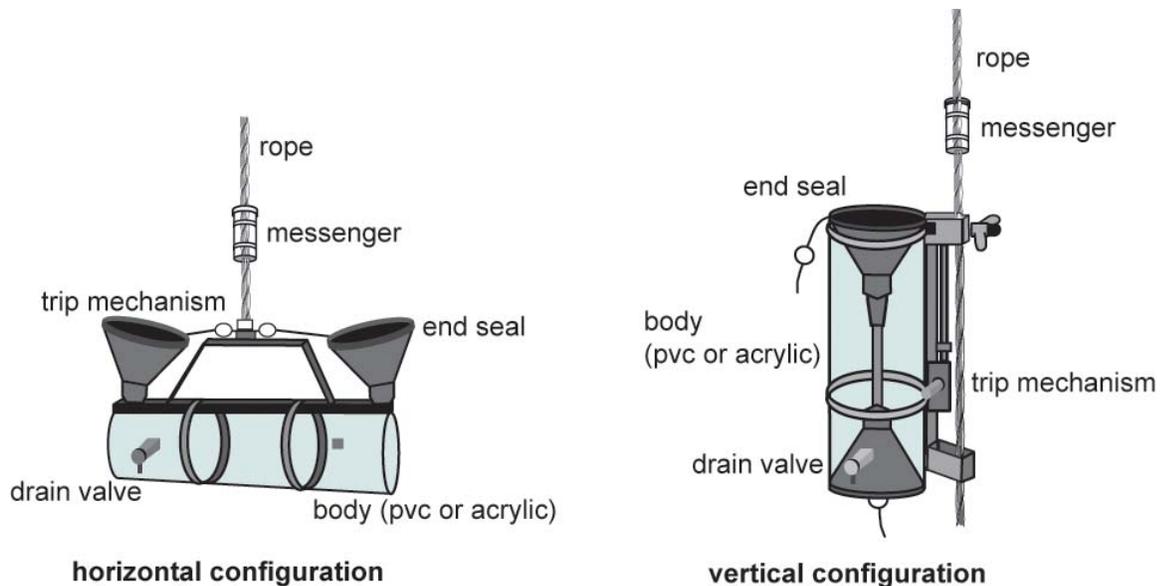


Figure 5. Van Dorn depth water sampler – horizontal and vertical configurations (MWLAP 2003)