

## 7.3 PROTOCOL FOR SAMPLING SUSPENDED SEDIMENTS

### Overview

Suspended sediments should not be construed as being suspended solids samples since the former are measured usually by taking a set volume from one depth/location and passing the volume through a filter to obtain a weight of solids. In contrast, suspended sediments are collected using samplers that allow the sediment and water to enter the sampler at the same velocity as the stream water. The US Geological Survey (USGS) has designed numerous types of samplers for different applications. The reader is advised to review USGS (2005) to select the sampler appropriate for the conditions that may be encountered.

### Sources

Federal Interagency Sedimentation Project (1965), Environment Canada (1999)

### At a glance

#### Manual collection

- 1** Use a clean bottle for each separate sediment sample.
- 2** Use one suspended sediment sample for each vertical point selected in a stream cross-section.
- 3** Orient the intake nozzle upstream directly into the current.
- 4** Hold in a horizontal position while the sediment sampler is lowered into the stream.
- 5** Avoid submerged obstructions immediately upstream.
- 6** Lower the sampler at a uniform rate from the water surface to the bottom of the stream, then immediately reverse and raise it to the water surface at a uniform but not necessarily equal rate to that used to lower the sampler.
- 7** Immediately remove the bottle, cap it, and mark details on it: sample site, date and time of collection, location in cross section, and total depth at sample location.
- 8** Discard the sample if the bottle becomes entirely full.
- 9** Determine from the laboratory the actual volume sample requirements as this may involve more than one composite sample to be collected from each location.

#### Centrifuge collection

*prior to  
initial setup*

- 1** Ensure that the centrifuge top assembly is constructed of stainless steel (solvent washable) if collection of both suspended sediment and centrifugate is planned. Use a standard cast iron top assembly if centrifugate collection is not anticipated.
- 2** Prior to initial setup, wash the centrifuge bowl(s), internal discs, and hold-down nut(s) with soap and water, rinse again with water, then follow with a final rinse with de-ionized water. Rinse the bowl, hold-down nut, T-wrench, top assembly, and intake lines with acetone, then hexane. Install the solid disc (i.e. the one with no holes) on the bottom of the disc pile. Wrap

these parts in fired aluminum foil for transfer to the sampling location (to fire aluminum foil, remove foil from the cardboard roll, place in muffle furnace at 400° C for 3-6 hours).

**3** Install the centrifuge bowl on the centrifuge spindle, screw in the two bowl stops and tighten the cast retaining ring using the large bowl ring and the rubber hammer (counter-clockwise to tighten) once at the sampling location. Tighten the retaining ring until the marks on the ring and bowl match. Tighten the upper ring holding the light top flange hand-tight. Use clean disposable polyethylene gloves while handling the centrifuge bowl. Unscrew the bowl stops after the bowl flanges have been attached and ensure that the brake is not engaged by testing that the bowl spins freely. Replace the top assembly and screw down the assembly stops.

**4** Attach the sheathed Teflon intake line to the submersible pump, and secure the pump in the position and location desired (position the intake facing upstream). Pump water through the lines for approximately two minutes prior to attaching to the centrifuge top assembly.

*start  
centrifuge  
before pump*

**5** Start the centrifuge with the submersible pump off. Once operational speed has been reached (1-2 minutes), re-start the submersible pump, and adjust the intake valve on the top of the centrifuge for a flow of 4 litres/minute. Use the graduated cylinder and a stopwatch to measure the flow. Check the flow rate a number of times during the initial 15 minutes of operation, and then approximately hourly thereafter. Record the time that sample collection started, the flow rate, and any other pertinent variables in a field notebook.

**6** Use Teflon tubing, preferably flex-tubing, to attach to the centrifuge outlet if centrifugate is to be collected. The generator (at least 3500 watt, preferably 5000 watt) should be situated as far from the centrifuge as practical (and downwind) to reduce the chance of sample contamination from generator exhaust.

**7** Collect samples of raw sample water and centrifugate periodically to check on centrifuge recovery efficiency and to allow subsequent calculation of sediment and contaminant loading.

**8** At shutdown, first stop the submersible pump (noting the time in the field notebook) and then shut down the centrifuge. Allow the centrifuge bowl to come to a complete stop before opening the top assembly. The bowl break should only be used once the bowl has nearly come to a stop.

**9** Screw in the two bowl stops, and loosen the large cast flange (clockwise to loosen). Loosen the bowl stops and remove the bowl from the spindle. Pour out (gently and slowly) any residual water in the bowl. Cover the bowl opening with fired aluminum foil until the sample is removed.

**10** Use solvent-washed stainless steel spatulas and/or knives to transfer sediment from the centrifuge bowl to pre-cleaned, tare weight determined and pre-labeled sample containers of the appropriate type. Once the sample has been transferred, weigh and calculate sample wet weight. Record the wet weight on the sample container and in the field notebook.

**11** Wash and rinse the centrifuge bowl as soon as possible before sediments have a chance to dry on the bowl and discs, which makes the task much more difficult.



Photo 16. Manual suspended sediment sampler on sampling rod