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**QUALITY CONTROL/QUALITY ASSURANCE DOCUMENTATION**

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## **1.0 SCOPE AND APPLICABILITY**

This document presents the North Dakota Department of Environmental Quality (DEQ), Division of Water Quality's (DWQ) Standard Operating Procedure (SOP) for collecting sediment samples in lakes and reservoirs. This SOP applies to all DWQ field staff, non-DWQ cooperators, and citizen volunteers.

## **2.0 SUMMARY OF METHOD**

While surface water quality samples tell a story about the present state of a lake, sediment samples can tell the story of a lake's past. The chemical characterization of sediments can be an important indicator of toxic contamination. Sediments, by their nature can become the repository of years of pollutant accumulations. Sediment samples are analyzed for major organic contaminants (i.e., PCBs, pesticides) and trace elements including mercury. The ND DEQ collects these samples using a gravity corer sampler with a sectioning tube.

## **3.0 HEALTH AND SAFETY WARNING**

Field personnel should take appropriate precautions when operating watercraft and working on, in, or around water. All boats should be equipped with safety equipment such as personal flotation devices (PFD's), oars, air horn, etc. North Dakota's boating laws and rules shall be followed by all field personnel.

Field personnel should be aware that hazardous conditions potentially exist at every waterbody. If unfavorable conditions are present at the time of sampling, the sample visit is recommended to be rescheduled. If hazardous weather conditions arise during sampling, such as lightning or high winds, personnel should cease sampling and move to a safe location.

## 4.0 CAUTIONS

The sampler should take care to collect the sediment sample after all other samples have been collected. Collecting a sediment sample disturbs the bottom sediment as well as the water column, which could alter results from profiles and water quality samples.

## 5.0 INTERFERENCES

As stated in the previous section, the sample should be collected last, as the disturbance of the sediment could negatively impact the water quality sample or temperature and dissolved oxygen profile. The sampler should take care to keep the sampler vertical during the entire process, as turning the sampler to the side could mix the sample slightly and render it unusable.

## 6.0 PERSONNEL QUALIFICATIONS/RESPONSIBILITIES

All personnel collecting sediment samples from lakes and reservoirs must read this SOP annually and acknowledge they have done so via a signature page (see Appendix B). New field personnel must also demonstrate successful performance of the method. The signature page will be signed by both trainee and trainer to confirm that training was successfully completed and that the new monitor is competent in carrying out this SOP. The signature page will be kept on-file at DWQ along with the official hard copy of this SOP.

## 7.0 EQUIPMENT AND SUPPLIES

Supplies needed sample collection:

- \_\_\_\_\_ Copy of this SOP
- \_\_\_\_\_ Bathymetric lake map, if available
- \_\_\_\_\_ Gravity corer head (gravity, with cable and messenger; Figure 1)
- \_\_\_\_\_ Sectioning tube (2.5" in diameter, line 5 cm from bottom of tube; Figure 1)
- \_\_\_\_\_ Sectioning stage (Figure 1)
- \_\_\_\_\_ Extruder rod (small diameter PVC pipe recommended)
- \_\_\_\_\_ Spatula
- \_\_\_\_\_ Syringe (60 mL) with tubing siphon overlying water
- \_\_\_\_\_ Core plug
- \_\_\_\_\_ Screwdriver
- \_\_\_\_\_ Toilet brush
- \_\_\_\_\_ Nitrile gloves
- \_\_\_\_\_ Stainless steel bowl
- \_\_\_\_\_ Large tub or bucket

Supplies needed for sample processing:

- \_\_\_\_\_ Stainless steel spoonulette
- \_\_\_\_\_ Glass jar(s)
- \_\_\_\_\_ Sample labels
- \_\_\_\_\_ Pens, pencils and sharpies
- \_\_\_\_\_ Cooler with ice
- \_\_\_\_\_ Electrical tape

## **8.0 PROCEDURE**

Upon arrival to the sample site, establish which sampler is going to collect the sediment sample.

### **8.1 Sample collection:**

- 1) Insert the core tube into the sample housing apparatus and tighten the hose clamp screws, securing the tube.
- 2) Lower the corer through the water column until the bottom of the tube is barely touching the sediment. Note: This is sometimes difficult to detect in lakes with soft sediment. The sampler can also lower the corer and measure the depth using marks on the attached rope. Using the depth on the depth finder and the marks on the rope, the sampler can drop the corer from about one meter above the sediment surface.
- 3) When the bottom has been detected, raise the corer to about one meter above the sediment surface and then lower the corer, allowing it to settle into the bottom sediment maintaining line tension.
- 4) Drop the messenger, tripping the mechanism. Ensure that the line remains taut throughout so that the messenger reaches the sampler.
- 5) Slowly raise the corer back to the surface, but do not take the corer completely out of the water. Keep the corer tube just below the water's surface.
- 6) With the tube still in the water, reach under the water and put the corer tube plug into the bottom of the tube. Note: To do this, do not tilt the corer more than 45 degrees to ensure that the surface sediments are not disturbed.
- 7) With your hand holding the plug, raise the corer into the boat in a vertical position. Stand the corer in the bottom of a five-gallon bucket.

- 8) Detach the core tube from the corer by loosening the screws on the hose clamp and remove the housing apparatus.
- 9) Place the extruder rod in the bucket. Slowly lift the corer tube from the bottom, holding onto the bottom and the corer tube plug. Rest the top of the extruder rod against the corer tube plug.
- 10) Slowly lower the coring tube onto the extruder rod until the sediment is about one centimeter from the top of the tube.
- 11) Remove residual water using syringe, taking care not to disturb surface sediments.
- 12) Secure the sectioning stage to the top of the corer tube. Place the sectioning tube above the hole of the stage. Slowly push the extruder rod until the top of the sediment reaches the five centimeter mark on the sectioning tube. Slide the sectioning tube off of the stage and into the stainless steel bowl.
- 13) Rinse and scrub corer tube, sectioning tube and stage using the toilet brush.
- 14) Two identical sediment samples are homogenized for each sediment sample; therefore, repeat steps 1 through 13.

## **8.2 Sample Processing:**

- 1) With two sediment core samples in the stainless steel bowl, homogenize (i.e., mix) the sample using the spoonulette.
- 2) Remove any sticks, rocks or trash from the sample.
- 3) Label sample jar(s) and apply clear packing tape over the labels.
- 4) Divide homogenized samples among sample containers.
- 5) Apply electrical tape around the rim of the lid in a clockwise direction.
- 6) Rinse and scrub bowl and spoonulette in lake water.
- 7) Place the sample in a cooler on ice.



8) If samples are not going to be submitted immediately, samples can be frozen until analysis can be completed.

## **9.0 DATA AND RECORDS MANAGEMENT**

Samplers will fill out the field report form, water column chemistry sample log and Sample ID/Custody Record (all in Appendix A).

## **10.0 QUALITY ASSURANCE AND QUALITY CONTROL**

Quality Assurance and Quality Control (QA/QC) procedures will be followed as explained above. QA/QC samples (i.e., field bottle blanks and duplicates) will be collected at the first and subsequent tenth sample for each project (i.e., 1<sup>st</sup>, 10<sup>th</sup>, 20<sup>th</sup>, etc.). A project-specific Sampling and Analysis Plan (SAP) may require different measures of QA/QC. For example, smaller-scale 319 water quality monitoring projects may not require field bottle blank sample collection.

### **Related DWQ SOPs**

Standard Operating Procedures for the Measurement of Temperature and Dissolved Oxygen Profiles in Lake and Reservoirs

Standard Operating Procedures for Collecting Water Quality Samples

Standard Operating Procedures for Measuring Secchi Disk Transparency

**APPENDIX A**  
Field Reporting and Custody Forms



**APPENDIX B**  
SOP Acknowledgement and Training Form



