Water Sampling Guide

For Trained Sampling Personnel

Field Trip Preparation at the Office

- Learn project objectives and priorities; discuss if needed.
- For special data collections (e.g., nutrients, metals, etc.), ensure data collection protocols are available and make supplementary preparations as necessary.
- Review field notes and site descriptions for changes needed since last trip.
- Determine sampling sites, methods, and needed field processing and measurements. Refer to the project quality assurance plan.
- Pack field notebook, forms, and pencils.
- Determine proper bottle type(s) types. Wash and pack all containers according to specified procedure (acid-washed, rinsed with de-ionized water, etc.). Assemble, pre-label, and package bottles for each site. Include extras.

- Assemble, verify working condition, clean, and calibrate all needed samping devices and instruments, e.g., VanDorn sampler, thermometer or thermistor, and dissolved oxygen meter. Record results in project log. Ensure equipment has been serviced per manufacturer directions. Pack any necessary calibration standards, calibration tables, and instructions.

- Pack necessary instruments for weather and ancillary measurements, e.g., thermometer, barometer, anemometer, compass, and measures for rainfall/snow depth.
- Determine field processing and treatment requirements for any special sampling, e.g., nutrients, metals, turbidity, etc.
- Gather, inspect, and pack safety/communications equipment (see *Safety Equipment* checklist).
- Leave word on when you should return and how you may be contacted in case of an emergency.

Safety Checklist

- Navigation equipment (maps, compass, GPS)
- Radio or cell-phone with list of communication frequencies or phone numbers
- First-aid kit, life vests, and other safety equipment as appropriate
- Protective gloves and goggles for handling acids or preservatives
- Food, water, appropriate clothing, and survival gear

Key References

Field Guide for Surface Water Sample and Data Collection, June 2001, by John T. Turk, Water Dipper, Inc., funded by and available from USDA Forest Service Air Program, Fort Collins, CO.

Monitoring Wilderness Stream Ecosystems, January 2001, by Jeffrey C. Davis and others, RMRS-GTR-70 available from USDA Forest Service, Rocky Mountain Research Station, Fort Collins, CO.

www.fs.fed.us/emc/nris/water

www.stream.fs.fed.us/

Before Leaving Vehicle

- Pack list of sites with order of sampling, bottles, camera (if needed), field forms, notebook, equipment, and calibration tools.
- Pack navigation, safety, and communications equipment, food, water, and survival gear as needed.
- Leave visible note of trip plan and schedule in case of emergency.

Calibration Procedures in the Field

Consult manufacturers manuals for more specific instructions.

Specific Conductance at 25°C

Obtain at least 2-point calibration that brackets expected field value. Either prepare calibration curve and interpolate or adjust instrument using the zero control for one standard and the temperature/slope control for a second standard. Some instruments may have only one control, and the standard closest to the field value should be used for a 1-point calibration if a calibration curve is not done.

Dissolved Oxygen

Check probe and replace filler solution/ membrane if needed. Adjust redline or zero settings and let run about 5 minutes. Equilibrate using ambient water temperature; record temperature. Put probe in *unpressurized* calibration chamber just below water surface (if no tube connects chamber to the atmosphere); equilibrate, record new temperature, look up saturation value at this temperature in calibration table, correct for atmospheric pressure, adjust D.O. reading using calibration control, record all values used.

Project-Specific Calibration

Conduct calibration according to project and equipment notes.

pH

Obtain 2-point calibration that brackets expected field value. This is best-done shore side. The solutions should be stirred or swirled when electrode is inserted, but the measurements must be made when the solution is still.

Open electrode breather hole, rinse electrode tip using deionized water, soak in first buffer (one nearest expected field value) and adjust reading to buffer value at ambient temperature (usually using standardization control).

Rinse with deionized water and soak in second buffer and adjust reading to buffer value at ambient temperature (usually using slope control). Rinse and insert in dilute acid standard and record reading; three aliquots can be used to stabilize reading. Record each reading. Rinse and soak electrode in lake/ stream sample for 5 minutes; soak electrode for 5 minutes in a second aliquot. Electrode can be left soaking in sample until all measurements are made.

After the calibration above is complete, insert the electrode in a new sample and take a reading after 1 minute. Replace with two fresh samples and take additional readings after 1 minute each.

Water's Edge Preparation

- **Verify correct location.** Use GPS coordinates and photos if possible.
- **Determine that designated sampling site is useable and safe.** If an alternative site is required, select a safe site with good hydraulic connection to the main body of lake (or main flow in stream). Avoid very shallow or highly vegetated areas, if possible. Prepare detailed description of the new site so others can easily locate it and record your reason for choosing it.
- **Record site location.** Include coordinates on field forms/notebook.

- **Record site conditions.** Include wildlife (insects, fish, amphibians) observed, indications of high/low water level, sampling problems (surface scum, algal mats, slush, etc.), land use disturbance (campsites, livestock, fire, timber harvest, mining, etc.), lake or stream width and depth, slope.

- **Record weather conditions.** Include percent cloud cover, wind speed and wind direction, air temperature, atmospheric pressure, indication of recent storms (i.e., soaked ground in otherwise dry areas, standing pools on rock indentations, downed branches or leaves), status of snowmelt (if applicable).
- **Unpack sample collection devices and pre-labeled bottles for this site.**
- **Soak** sampling devices to minimize contamination.
- **Record sample information.** Include date, time, personnel, sampling methods used (e.g., grab, pole, from raft) sampling equipment used (with instrument models/serial numbers), precautions used to prevent contamination (e.g., gloves, soaking of sampling device, rinsing, etc.), processing or preservation used (if appropriate).
- **Take photos** (if needed) and **record photo subjects** in sequence.

Grab or Pole Sample Collection

- Ensure that all appropropriate steps in *Water's Edge Preparation* are done.
- Assemble all instruments, field forms, and bottles at sampling site. Discard deionized water from bottles, if necessary. Record sampling date/time.
- Without disturbing sediment, submerge bottles in area near sampling site, uncap, fill, discard water away from area to be sampled (3 times).
- In undisturbed sampling area, submerge bottle to desired depth, uncap, fill, cap.
- Perform field processing and preservation, as necessary.
- Group bottles for site together, pack on ice. **Do not exceed specified holding times.** (See *Field Guide for Surface Water Sample and Data Collection.*)

Lake Point Sample Collection

These instructions are for lakes only. Grab samples, as discussed above, can be collected from rafts but point samplers are preferred.

- Collect all instruments, safety gear, field forms, and bottles at launch site. Discard deionized water from bottles, if necessary.

- If a sampling site is not already designated, determine deepest area using fathometers or projection of topography from surrounding hillsides. Prepare detailed description of any new site so others can easily locate it.
- Anchor boat, if possible, or maintain position by moving into wind or current.
- Complete profiles of field measurements are highly recommended. Record start and end time of profile.
- Record sampling date/time. Rinse point sampler and lower to selected depth (such as meter below surface and 1 meter above bottom), trigger, rinse bottles 3 times, fill, cap. Record sampler used, depths, the time of each sample collection.
- Perform any plankton or macroinvertebrate collections.
- Lower Secchi disk in shade of raft until it disappears, record depth. Raise disk until it reappears, record depth. Secchi disk depth is average of these two readings.

- On shore, perform field processing and preservation of samples as appropropriate.
- Group bottles by site and pack ice around samples. **Do not exceed specified holding times** (see *Field Guide for Surface Water Sample and Data Collection*).

On Return to the Vehicle

- Group samples by site.
- Verify that all required data are recorded on bottles and field forms.
- Pack samples in cooler with plenty of ice.
- Ship samples as soon as possible to lab, ensuring no weekend delay and specified holding times are not exceeded.

Field Trip Completion at the Office

- Clean and pack all instruments and supplies together so they are ready for next use. Replace/repair any damaged items or those in short supply.
- Send note on unusual conditions observed and on any changes that need to be made in future sampling at this and other sites to project leader and other team members. This should be archived in project QA report.
- Enter field data into computer according to current agency guidance.