

# Appendix D

## Quick-Reference Field Guides for Water Quality Sampling

### 1. Conditions That May Warrant Collection of a Water Quality Sample

#### Condition

#### Analyze for

Muddy water	Total suspended solids
Black water	Total suspended solids, pH*
High-flow conditions	Total suspended solids
Clear water devoid of life	pH, acidity
High total iron	pH
High specific conductance	pH
Groundwater with bubbles	pH, acidity
High sulfur coal seam	pH, sulfate
Presence of treatment facilities	Total suspended solids, total iron, pH
Low pH	Total iron, total manganese, acidity
Red, orange, or red-brown water	pH, total iron
Black, oily appearance	Total manganese
"Yellow boy" stains	pH, total iron
High pH	Alkalinity
Muddy water with low pH	Dissolved iron
Citizens complaint alleging: Presence of metals in water	Specific conductance,* pH, dissolved metals, total metals
Inorganic constituents	Specific conductance, pH, major ionic constituents
"Contamination" of water supply	Specific conductance, pH, temperature

\*Temperature measurements should be made simultaneously with all pH and specific conductance measurements made with field meters.

### 2. Measurement of Temperature

Temperature measurements should be made directly in the source, if possible.

1. Check thermometer for liquid-column separation.
2. Immerse bulb into source.
3. Allow reading to stabilize.
4. Read temperature with bulb immersed.
5. Report temperature to the nearest degree C.
6. Return thermometer to protective case.

If temperature cannot be measured in the source, collect at least an 8-ounce bottle of water and measure temperature immediately.

### 3. Measurement of pH

#### Calibration of Meter

Calibrate meter using two buffer solutions, 4 and 7 or 7 and 10, using last the buffer having a pH nearest that of the sample.

1. Check battery.
2. Expose filling opening on electrode to atmosphere.

3. Place function switch on "standby" or "ready."
4. Measure temperature of buffers.
5. Set temperature compensation to temperature of buffers.
6. Rinse electrode with deionized water and blot dry.
7. Place electrode into buffer.
8. Place function switch on "measure."
9. Adjust "standardize" knob to pH of buffer.
10. Place function switch on "standby."
11. Rinse electrode thoroughly with deionized water.

#### Measurement of pH

1. Place electrode into sample to a depth of approximately 1 inch.
2. Measure temperature of sample.
3. Set temperature compensator to temperature of sample.
4. Turn function switch to "measure."
5. Allow meter readout to stabilize.
6. Record pH to nearest 0.1 pH unit.
7. Rinse electrode with deionized water.
8. Cover electrode with moist protective cap containing distilled water or buffer.

If litigation is anticipated, repeat measurement and record all readings. Do not average values.

Precautions:

1. Never remove electrode from buffer or sample unless meter is in "standby" or "off" position.
2. Dirty connectors on pH electrodes may result in erroneous readings.
3. An unstable reading may indicate either static electricity (reduce with an antistatic cloth) or a broken or loose cable shield wire.
4. Keep electrode filled with the recommended solution to within ½ inch of filling opening.
5. Keep electrode tip moist by filling the provided rubber cap with either pH 7 buffer solution or deionized water.
6. Never immerse the electrode to such a depth that the surface of the filling solution is below that of the test solution.
7. Follow instructions which accompany the meter on use of the temperature compensator. This knob may serve more than one function.
8. Do not let the electrodes freeze.
9. Avoid contamination of buffer. Use a separate container (cup) and discard it after use.
10. Broken or scratched electrodes can give erroneous readings.
11. Do not leave meter exposed to extreme weather conditions.

#### 4. Measurement of Specific Conductance

Check instrument against at least two known standards before every field trip.

1. Check battery.
2. Rinse electrode with sample water.
3. Return electrode to sample for temperature equilibration.
4. Agitate electrode in sample to eliminate air bubbles.
5. Measure temperature of sample.
6. Set temperature compensator to temperature of sample.
7. Read conductance according to manufacturer's instructions.
8. Remove electrode from sample, then reinsert it and repeat steps 4 through 7 until two consecutive readings are in agreement.
9. Record conductance in micromhos at 25°C.
10. Remove electrode from sample and rinse thoroughly with deionized water.

Precautions:

1. Gently agitate electrode in sample to eliminate air bubbles.
2. Allow water temperature and electrode temperature to equalize.
3. Make temperature correction (Automatic or manual compensator or by table).
4. Make sure electrode is clean.
5. Do not leave meter exposed to extreme weather conditions.

#### 5. Sample Collection— Raw Untreated Sample (RU)

Depending upon flow conditions, use either a US-DH-48 sediment sampler with a clean bottle, or only a clean narrow-mouth bottle to collect the sample.

1. Rinse sampler and sample container by collecting a small amount of native water. Discard water after rinsing.
2. Lower and raise the sampler at a uniform rate. DO NOT STRIKE BOTTOM.
3. Repeat step No. 2 at all points (verticals) deemed necessary to collect a sample representative of the cross-sectional flow.
4. Cap sample tightly.

"RU" samples collected in the above manner can be used for the determination of inorganic, nonmetallic constituents such as:

- Acidity
- Settleable matter

#### 6. Sample Collection—Raw Chilled Sample (RC)

Depending upon flow conditions, use either a US-DH-48 sediment sampler with a clean bottle, or only a clean narrow-mouth bottle to collect the sample.

1. Rinse sampler and sample container by collecting a small amount of native water. Discard water after rinsing.
2. Lower and raise the sampler at a uniform rate. DO NOT STRIKE BOTTOM.
3. Repeat step No. 2 at all points (verticals) deemed necessary to collect a sample representative of the cross-sectional flow.
4. Cap sample tightly and CHILL.

"RC" samples collected in the above manner can be used for the following determinations:

- Nonfilterable residue (total suspended solids)
- Alkalinity

#### 7. Sample Collection— Raw Acidified Sample (RA)

Depending upon flow conditions, use either a US-DH-48 sediment sampler with a clean bottle, or only a clean narrow-mouth bottle to collect the sample. Acidified samples are collected in acid-rinsed bottles only.

1. Rinse sampler and sample container by collecting a small amount of native water. Discard water after rinsing.
2. Lower and raise the sampler at a uniform rate. DO NOT STRIKE BOTTOM.
3. Repeat step No. 2 at all points (verticals) deemed necessary to collect a sample representative of the cross-sectional flow.

4. Acidify immediately with concentrated nitric acid.
5. Cap tightly.

“RA” samples collected in the above manner can be used for the determination of total concentrations of the following metals: aluminum, manganese, arsenic, mercury, cadmium, nickel, chromium, selenium, iron, zinc, and lead.

### 8. Sample Collection— Filtered Unacidified Sample (FU)

Depending upon flow conditions, use either a US-DH-48 sediment sampler with a clean bottle, or only a clean narrow-mouth bottle to collect the sample.

1. Rinse sampler and sample container by collecting a small amount of native water. Discard water after rinsing.
2. Lower and raise the sampler at a uniform rate. DO NOT STRIKE BOTTOM.
3. Repeat step No. 2 at all points (verticals) deemed necessary to collect a sample representative of the cross-sectional flow.
4. The sample must be field-filtered through a 0.45-micron membrane filter as follows:
  - a. Using a 50-milliliter syringe, draw a small amount of sample water to rinse syringe. Discard water. Repeat this rinsing procedure once again.
  - b. Draw sample water into syringe.
  - c. Insert syringe outlet tip into filter holder and force sample through filter into sample bottle. Repeat as necessary to obtain required volume.
5. Cap sample tightly.

“FU” samples collected in the above manner can be used for the determination of some dissolved major ionic constituents—for example, one or more of the following:  
 dissolved solids (180°C);  
 chloride, dissolved;                      silica, dissolved; and  
 fluoride, dissolved;                      sulfate, dissolved.

### 9. Sample Collection— Filtered Chilled Sample (FC)

Depending upon flow conditions, use either a US-DH-48 sediment sampler with a clean bottle, or only a clean narrow-mouth bottle to collect the sample.

1. Rinse sampler and sample container by collecting small amount of native water. Discard water after rinsing.
2. Lower and raise the sampler at a uniform rate. DO NOT STRIKE BOTTOM.
3. Repeat step No. 2 at all points (verticals) deemed necessary to collect a sample representative of the cross-sectional flow.
4. The sample must be field-filtered through a 0.45-micron membrane filter as follows:
  - a. Using a 50-milliliter syringe, draw a small amount of sample water to rinse syringe. Dis-

card water. Repeat this rinsing procedure once again.

- b. Draw sample water into syringe.
  - c. Insert syringe outlet tip into filter holder and force sample through filter into sample bottle. Repeat as necessary to obtain required volume.
5. Cap sample tightly and CHILL.

A sample collected in the above manner can be used for all the dissolved major ionic constituents listed under the filtered unacidified sample (FU) plus the following:

nitrate, dissolved; and  
 phosphate, ortho, dissolved.

### 10. Sample Collection— Filtered Acidified Sample (FA)

Depending upon flow conditions, use either a US-DH-48 sediment sampler with a clean bottle, or a narrow-mouth bottle to collect the sample. Acidified samples are collected in acid-rinsed bottles only.

1. Rinse sampler and sample container by collecting a small amount of native water. Discard water after rinsing.
2. Lower and raise the sampler at a uniform rate. DO NOT STRIKE BOTTOM.
3. Repeat step No. 2 at all points (verticals) deemed necessary to collect a sample representative of the cross-sectional flow.
4. The sample must be field-filtered through a 0.45-micron membrane filter as follows:
  - a. Using a 50-milliliter syringe, draw a small amount of sample water to rinse syringe. Discard. Repeat this rinsing procedure once again.
  - b. Draw sample water into syringe.
  - c. Insert syringe outlet tip into filter holder and force sample through filter into sample bottle. Repeat as necessary to obtain required volume.
5. Acidify immediately with concentrated nitric acid.
6. Cap sample tightly.

“FA” samples collected in the above manner can be used for the determination of dissolved metals and some dissolved major ionic constituents. For example, one or more of the following: Metals: aluminum, arsenic, cadmium, chromium, iron, lead, manganese, mercury, nickel, selenium, and zinc. Major Ionic Constituents: calcium, magnesium, potassium, and sodium.



## 12. Chain of Custody Form for Water Samples

PERSON DELIVERING SAMPLE: \_\_\_\_\_  
(Signature)

FIELD SAMPLE NUMBER(S): \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

DATE AND TIME DELIVERED TO LABORATORY: \_\_\_\_\_

LABORATORY NAME AND ADDRESS: \_\_\_\_\_

REPRESENTATIVE RECEIVING SAMPLE(S): \_\_\_\_\_  
(Signature)

### Optional Section:

#### TO THE LABORATORY:

Test the parameters checked below:

1. \_\_\_\_\_ pH
2. \_\_\_\_\_ Total Acidity
3. \_\_\_\_\_ Total Alkalinity
4. \_\_\_\_\_ Total Iron
5. \_\_\_\_\_ Dissolved Iron
6. \_\_\_\_\_ Total Manganese
7. \_\_\_\_\_ Specific Conductance
8. \_\_\_\_\_ Total Suspended Solids
9. \_\_\_\_\_ Other (Specify)

**13. Chain of Custody Within Office**

I, \_\_\_\_\_ have received  
Name and Title

\_\_\_\_\_ \*  
Number of Samples Sample Numbers

from \_\_\_\_\_ on \_\_\_\_\_  
Name and Title Date

\_\_\_\_\_ at \_\_\_\_\_  
Time Place

Source of Samples

Name of Coal Company: \_\_\_\_\_

Location: \_\_\_\_\_

\* \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
Signature of Sample Submitter

\_\_\_\_\_  
Signature of Sample Receiver

# 14. Water Discharge Sampling Log

Inspector: \_\_\_\_\_

(signature)

ID Number: \_\_\_\_\_

## WATER DISCHARGE SAMPLING LOG

Name of Company or Facility: \_\_\_\_\_ Permit Number: \_\_\_\_\_

Sample Number: \_\_\_\_\_

Name of individual collecting sample: \_\_\_\_\_

Date and time of sampling: \_\_\_\_\_

General climatic conditions: \_\_\_\_\_

Names of any witnesses to the sampling: \_\_\_\_\_

### General Surveillance Parameters:

1. Field pH \_\_\_\_\_ Method: \_\_\_\_\_
2. Describe visible turbidity: \_\_\_\_\_
3. Temperature: \_\_\_\_\_
4. Specific conductivity: \_\_\_\_\_
5. Preservation method: \_\_\_\_\_

Provide rough sketch of where sample was taken in relation to minesite location, drainage courses, natural drainways, stream confluences, or other physical features: (Indicate North Arrow)

Give a brief description of site conditions: \_\_\_\_\_

### If Deep Mine: Description of sample discharge

Ancillary area discharge (non-refuse surface areas of the mine including haul roads) \_\_\_\_\_  
Refuse area discharge \_\_\_\_\_ Borehole discharge \_\_\_\_\_ Treatment plant discharge \_\_\_\_\_  
Preparation plant discharge \_\_\_\_\_ Sedimentation pond discharge \_\_\_\_\_ Uncontrolled discharge \_\_\_\_\_  
Other: \_\_\_\_\_

### If Surface Mine: Description of sample discharge

Sedimentation pond discharge \_\_\_\_\_ Uncontrolled channel discharge \_\_\_\_\_ Uncontrolled discharge \_\_\_\_\_  
(Non-channeled surface runoff) \_\_\_\_\_ Other: \_\_\_\_\_

### Specify:

1. Is there any chemical treatment being done on the water being sampled?
2. Discharge source: \_\_\_\_\_