

Appendix I:

Surface Water Sample Collection SOP

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COLLECTION OF SURFACE WATER SAMPLES

These methods allow for the collection of grab samples utilizing a high-density polyethylene (HDPE) bucket or wide mouth HDPE or glass bottle. This standard operating procedure document (SOP) has been developed to maintain consistent data collection procedures and to ensure the quality of the data collected.

1.0 FIELD EQUIPMENT

The following equipment listed is necessary for sampling procedures.

1. 1-gallon HDPE bucket with lid, nylon rope
2. Distilled or reagent-grade deionized water
3. Sample bottles (provided by laboratory):
 - a. One 1000 mL HDPE with H_2SO_4 preservative for $\text{NH}_3\text{-N}$, TKN and Total Nitrates
 - b. One 1000 mL HDPE unpreserved bottle for BOD, TSS, TDS, Chloride, Sulfate
 - c. One 1000 mL HDPE bottle with HNO_3 preservative for Metals, (including Phosphorous and Mercury)
 - d. Two 1000 mL amber glass bottles unpreserved for Pesticides, PCBs and PNAs
 - e. Three 40 mL VOA vials with HCl preservative for VOCs
4. Portable temperature/pH meter (dissolved oxygen & conductivity meter optional)
5. Disposable gloves
6. Cooler and ice
7. Antibacterial soap
8. Sharpie markers and labels
9. Field books/log sheets/chain of custody
10. Sampling pole

2.0 PREPARATION

Before samples are collected, sample bottles should be labeled correctly with station I.D. number, the sampler's initials, and a space for the date and time to be filled in later. Sample bottle lids should also be labeled to prevent contamination between samples.

Coolers and samples bottles should be inspected before samples are collected. If dirt, residual chemicals, or any other types of contaminants are present, the sample bottle should be discarded. The coolers should be washed with mild soap and wiped down if any contaminants are present.

Sampling buckets shall be scrubbed with a solution of soap and water. Make sure the cleaning detergent is free of phosphates (orthophosphate sample).

The sampler's hands should be washed with antibacterial soap prior to sampling events. Disposable gloves will be worn during sample collection, and special care should be taken to avoid touching the inner surface of sample lids or bottles.

3.0 PROCEDURE

Sample bottles should be kept closed until they are filled. At each sample collection site, the sampler will wear a new pair of gloves for decontamination and a new pair for sample collection.

If samples are taken from a bridge, collect the sample from the upstream side of the structure unless otherwise noted in site description maps.

When sample during precipitation events, cover the sample bucket at all times with a lid.

A log-sheet/chain of custody should be maintained during sampling and should include the following information:

- a. Date and time of sample
- b. Signature of collector and transporter
- c. Signature of person who relinquished the sample to lab
- d. Weather conditions during sampling (i.e., air temperature; cloudy, rain, snow)
- e. Time
- f. Sample storage temperature upon receipt in lab
- g. Visual observation of sample
- h. Field measurements such as pH and temperature

3.1 Sample Collection HDPE Bucket or Wide Mouth Bottle

Inspect the bucket to ensure that it is in good condition. The nylon rope attached should not be frayed or torn.

3.1.1 Decontamination

The bucket and wide mouth bottle must be cleaned with a phosphate-free detergent and blank water before samples are collected and between sampling sites. Blank water should be deionized water. The equipment should be scrubbed with detergent and deionized water before the rinsing steps below are followed. Alternatively, a new bottle may be used for each sample.

Step 1 – Blank Water Rinse

- Rinse the inside of the bucket or wide mouth bottle by swirling with blank water.
- Discard the remaining blank water.
- Repeat Step 1.

3.2 Sample Collection Procedure

The stream depth will determine the equipment to be used to collect the sample. To reduce the chance of disturbing the substrate/sediment the following protocols will be followed. Samples may be collected from the bridge with a bucket if the depth is at least twice the height of the bucket. At shallower depths the field technician will use a sampling poll with a wide mouth bottle at the end. As a last resort, the field technician will wade into stream and collect the sample, standing downstream of the collection point so as not to collect kicked up sediment.

Step 1a – River Rinse and Field Measurements from Bucket

- Lower the bucket into the stream and fill.
- Discard the contents.

Step 1b – River Rinse Wide Mouth Bottle

- River rinse by filling the bottle with river water.
- Discard the remaining contents.

Step 2 – Sample Collection - Bucket

- Lower the bucket to mid-depth at center of flow, do not disturb bottom sediment.

Step 2b – Sample Collection - Pole

- Lower the sample bottle attached to the sampling pole to mid-depth at center of flow, do not disturb bottom sediment.

Step 3 – Fill Sample Bottles

Fill each sample bottle. Over filling of sample bottles with preservative should be avoided to prevent loss of preservative.

3.3 Field Measurements

Sample pH and temperature must be measured on site within 15 minutes of collection. Follow the laboratory and manufacturers instructions for calibrating, cleaning and using the pH and temperature meter. The results shall be recorded on the log-sheet/chain of custody.

4.0 **SAMPLE HANDLING, TRANSPORTATION, QUALITY ASSURANCE, AND BLANKS**

All samples are placed in a cooler with ice after labeling. Samples are to be transported to the laboratory within the prescribed holding times. All samples will be taken to (chosen laboratory).

4.1 Quality Assurance

Field blank and duplicates shall be collected. The laboratory shall adhere to their Quality Assurance Plan for samples received in the lab. Quality control limits and frequency of field quality control samples is specified at the end of this SOP.

4.2 Duplicate Samples

Duplicate samples are to be filled from the same round of stream water. Duplicate samples will be taken for all parameters once every twenty (20) samples.

4.3 Field Blank

Sample bottles should be filled with blank water from unopened blank water containers. Field blanks should be performed for VOCs and Metals including Phosphorous and Mercury once a month.

5.0 **CHAIN OF CUSTODY**

Chain of Custody forms must be filled out and accompany all samples to their laboratory. An example is attached.

| | Method | MDL/Reporting Limit | Quantitation Limit |
|---------------------------------|-------------------------------|---------------------|--------------------|
| <u>Demand</u> | | | |
| BOD | SM5210B | | |
| Chloride | EPA 325.2 | | |
| Conductivity | SM2510B | | |
| Dissolved Oxygen | SM4500(B-G) | | |
| pH | SM4500-H+B | | |
| Temperature | EPA / Standard Methods | | |
| TDS | EPA 160.1 | | |
| TSS | EPA 160.2 | | |
| <u>Metals</u> | | | |
| Total Hardness | SM2340 B | | |
| Mercury | EPA245.1 | | |
| Cadmium | EPA200.8 | | |
| Calcium | EPA200.8 | | |
| Copper | EPA200.8 | | |
| Iron | EPA200.8 | | |
| Lead | EPA200.8 | | |
| Magnesium | EPA200.8 | | |
| Zinc | EPA200.8 | | |
| <u>Nutrients</u> | | | |
| Ammonia | SM4500 NH3 (B-H) | | |
| Nitrogen/Nitrate | SM4500 NO3 D | | |
| Nitrogen/Nitrite | SM4500 NO2 B | | |
| TKN | SM4500 N _{ORG} (B-D) | | |
| Phosphorous | SM4500 P (E-H) | | |
| <u>Other</u> | | | |
| Oil and Grease | EPA 1664 | | |
| Fecal Coliform | SM9222 | | |
| Chlorophyll a | EPA 445/446 | | |
| <u>Water Organics</u> | | | |
| PCBs | EPA 608 | | |
| Pesticides | EPA 608 | | |
| Semivolatile Organics | EPA 625 | | |
| Volatile Organics | EPA 624 | | |
| <u>Sediment Metals</u> | | | |
| Mercury | EPA 7471A | | |
| Arsenic | EPA 6010B | | |
| Barium | EPA 6010B | | |
| Cadmium | EPA 6010B | | |
| Chromium | EPA 6010B | | |
| Copper | EPA 6010B | | |
| Iron | EPA 6010B | | |
| Lead | EPA 6010B | | |
| Manganese | EPA 6010B | | |
| Nickel | EPA 6010B | | |
| Potassium | EPA 6010B | | |
| Silver | EPA 6010B | | |
| Zinc | EPA 6010B | | |
| <u>Sediment Organics</u> | | | |
| PCBs | EPA 8082 | | |
| Pesticides | EPA 8081 | | |
| Semivolatile Organics | EPA 8270 | | |

| | <u>Precision and Accuracy</u> | | <u>Frequency Requirements</u> | | |
|---------------------------------|-------------------------------|-----------------|-------------------------------|------------------|--------------|
| | Accuracy (% Recovery) | Precision (RPD) | Field Blank | Field Duplicate | Holding Time |
| <u>Demand</u> | | | | | |
| BOD | | | N/A | 1 per 20 samples | 48 Hours |
| Chloride | | | N/A | 1 per 20 samples | 28 Days |
| Conductivity | | | N/A | 1 per 20 samples | 28 Days |
| pH | | | N/A | 1 per 20 samples | 15 Minutes |
| Sulfate | | | N/A | 1 per 20 samples | 28 Days |
| TDS | | | N/A | 1 per 20 samples | 7 Days |
| TSS | | | N/A | 1 per 20 samples | 7 Days |
| <u>Metals</u> | | | | | |
| Total Hardness | | | N/A | 1 per 20 samples | 6 Months |
| Mercury | | | 1 monthly | 1 per 20 samples | 28 Days |
| Cadmium | | | 1 monthly | 1 per 20 samples | 6 Months |
| Calcium | | | 1 monthly | 1 per 20 samples | 6 Months |
| Copper | | | 1 monthly | 1 per 20 samples | 6 Months |
| Iron | | | 1 monthly | 1 per 20 samples | 6 Months |
| Lead | | | 1 monthly | 1 per 20 samples | 6 Months |
| Magnesium | | | 1 monthly | 1 per 20 samples | 6 Months |
| Zinc | | | 1 monthly | 1 per 20 samples | 6 Months |
| <u>Nutrients</u> | | | | | |
| Ammonia | | | N/A | 1 per 20 samples | 28 Days |
| Nitrogen/Nitrate | | | | | |
| Nitrogen/Nitrite | | | N/A | 1 per 20 samples | 28 Days |
| TKN | | | N/A | 1 per 20 samples | 28 Days |
| Phosphorous | | | 1 monthly | 1 per 20 samples | 28 Days |
| <u>Other</u> | | | | | |
| Oil & Grease | | | | 1 per 20 samples | |
| Fecal Coliform | | | | 1 per 20 samples | |
| Chlorophyll a | | | | 1 per 20 samples | |
| <u>Water Organics</u> | | | | | |
| PCBs | | | N/A | 1 per 20 samples | 7/40 Days |
| Pesticides | | | N/A | 1 per 20 samples | 7/40 Days |
| Semivolatile Organic | | | N/A | 1 per 20 samples | 7/40 Days |
| Volatile Organic Comp | | | 1 monthly | 1 per 20 samples | 14 Days |
| <u>Sediment Metals</u> | | | | | |
| Mercury | | | 1 monthly | 1 per 20 samples | 28 Days |
| Arsenic | | | 1 monthly | 1 per 20 samples | 6 Months |
| Barium | | | 1 monthly | 1 per 20 samples | 6 Months |
| Cadmium | | | 1 monthly | 1 per 20 samples | 6 Months |
| Chromium | | | 1 monthly | 1 per 20 samples | 6 Months |
| Copper | | | 1 monthly | 1 per 20 samples | 6 Months |
| Iron | | | 1 monthly | 1 per 20 samples | 6 Months |
| Lead | | | 1 monthly | 1 per 20 samples | 6 Months |
| Manganese | | | 1 monthly | 1 per 20 samples | 6 Months |
| Nickel | | | 1 monthly | 1 per 20 samples | 6 Months |
| Potassium | | | 1 monthly | 1 per 20 samples | 6 Months |
| Silver | | | 1 monthly | 1 per 20 samples | 6 Months |
| Zinc | | | 1 monthly | 1 per 20 samples | 6 Months |
| <u>Sediment Organics</u> | | | | | |
| PCBs | | | N/A | 1 per 20 samples | 14 Days |
| Pesticides | | | N/A | 1 per 20 samples | 14 Days |
| Semivolatile Organics | | | N/A | 1 per 20 samples | 14 Days |
| Volatile Organic Comp. | | | 1 monthly | 1 per 20 samples | 14 Days |