

Water Monitoring Program
**WASHINGTON CONSERVATION DISTRICT
STANDARD OPERATING PROCEDURE (S.O.P.) No. 1**

WATER GRAB SAMPLING

Water Monitoring Program
Standard Operating Procedure No. 1
WATER GRAB SAMPLING

Table of Contents

1.0	SCOPE AND APPLICABILITY	
1.1	Overview of Water Grab Sampling Required.....	3
1.2	Scope of the S.O.P.	3
2.0	DEFINITIONS	
2.1	Discrete Grab Sample	3
2.2	Duplicate Samples	3
3.0	EQUIPMENT AND MATERIALS	3
4.0	PROCEDURES	
4.1	General Procedural Requirements	4
4.2	Collecting Discrete Grab Samples	5
4.3	Field Documentation.....	5
4.4	Sample Labeling and Identification	6
4.5	Sample Handling.....	6
4.6	Sample Transport and Chain of Custody	7
4.7	Submission to the Laboratory	9
5.0	HEALTH AND SAFETY	9
6.0	PERSONNEL	
6.1	Field Sampling Personnel	10
6.2	Quality Assurance Personnel	10
7.0	QUALITY ASSURANCE AND CONTROL (QA/QC)	
7.1	Data Management and Records Management.....	10
7.2	Submission of Duplicate Samples	10
7.3	Quality Assurance Audits	11

1.0 SCOPE AND APPLICABILITY

.1 Overview of Water Grab Sampling Required

Water grab sampling refers to the collection of water samples from specific locations at specific times, without the use of automated sampling equipment. Grab sampling is done manually by a field crew. Samples are submitted to a laboratory for analysis for selected parameters.

For the Washington Conservation District (WCD), grab sampling is typically used for collecting lake water samplings and stream samples. Grab samplings for stream flow is only employed for base flow or storm flow stream conditions where flow or time weighted compositing are not desired.

.2 Scope of the S.O.P.

This SOP describes procedures and requirements for collecting water grab samples, recording the necessary field data, and transmitting the collected samples to laboratory facilities for analysis. This includes requirements regarding sample handling and chain-of-custody records, along with requirements for quality assurance and quality control (QA/QC).

2.0 DEFINITIONS

.1 Discrete Grab Sample

A "discrete" grab sample is one that is taken at a selected location, depth and time.

.2 Duplicate Samples

Duplicate samples are obtained by dividing one sample into two or more identical sub-samples. This should be done periodically to obtain information on the magnitude of errors owing to contamination, random and systematic errors, and any other variabilities that are introduced from the time of sampling until samples arrive at the lab. The typical objective for watershed sampling is to collect duplicate samples from 5% of all samples.

3.0 EQUIPMENT AND MATERIALS

Equipment and supplies that are needed for water grab sampling include:

- Field log book
- Hip or chest waders to allow sampling personnel to wade into the stream if necessary
- First-aid kit
- Sample bottles or containers

- Blank sample bottle labels (as provided by the laboratory to which samples will be submitted)
- Chain-of-custody and laboratory sample submission forms
- Sampling pole or rod (if necessary) to which sample bottles can be easily and securely attached
- Intermediate sample container, if necessary
- Decontamination water (deionized or distilled water) for intermediate sampler rinsing

4.0 PROCEDURES

.1 General Procedural Requirements

Only the recommended type of sample bottle for each parameter should be used. The parameters analyzed for each monitoring program vary. Refer to Table SOP1-1 for the general requirements for the parameters analyzed for typical WCD programs.

**Table SOP1-1
 Recommended Sample Containers and Sample Preservation**

Parameter	Container	Preservation	Maximum Storage/ Holding Time
Total Suspended Solids	Polyethylene or glass	Refrigerate to 4°C	7 days
Carbonaceous Biochemical Oxygen Demand	Polyethylene or glass	Refrigerate to 4°C	24 hours or 8 days cold
Fecal Coliform, <i>E. coli</i>	Sterilized polyethylene or glass, plastic whirl-pak	Refrigerate to 4°C;	4 hours
Ammonia	Polyethylene or glass	Refrigerate to 4°C	28 days
Chloride	Polyethylene or glass	Refrigerate to 4°C	28 days
Nitrate + Nitrite	Polyethylene or glass	Refrigerate to 4°C	28 days
Soluble Reactive Phosphorus or Ortho-Phosphours	Polyethylene or glass	Filter upon arrival at laboratory using 0.45 µm membrane filter	24 hours
Chemical Oxygen Demand	Polyethylene or glass	Refrigerate to 4°C	28 days
Phosphorus	Polyethylene or glass	Refrigerate to 4°C	28 days
Chlorophyll-a	Polyethylene or glass	Keep in the dark, Refrigerate to 4°C	8 hours
Total Kjeldahl Nitrogen	Polyethylene or glass	Refrigerate to 4°C	28 days
Volatile Suspended Solids	Polyethylene or glass	Refrigerate to 4°C	7 days
Metals	Polyethylene or glass	Refrigerate to 4°C	180 days

Dissolved Phosphorus	Polyethylene or glass	Refrigerate to 4°C	28 days
Total Sulfate	Polyethylene or glass	Refrigerate to 4°C	28 days
Total Hardness	Polyethylene or glass	Refrigerate to 4°C	30 days
Total Alkalinity	Polyethylene or glass	Refrigerate to 4°C	14 days
Total Organic Carbon	Polyethylene or glass	Refrigerate to 4°C	14 days
Turbidity	Polyethylene or glass	Refrigerate to 4°C	7 days

The inner portion of sample bottles and caps should not be touched with bare or gloved hands.

Sample bottles for fecal coliform must be pre-sterilized and sealed. Sample bottles must be kept in a clean environment away from dust, dirt, fumes and grime. Vehicle cleanliness is important to eliminating contamination problems.

Samples must be delivered to the laboratory as soon as possible and within the holding times specified in Table SOP1-1. Fecal coliform or E. Coli samples, with a maximum holding time of 4 hours, are the most time-sensitive parameter for delivery to the laboratory. Samples must never be allowed to stand in the sun. They should be stored in a cool place. Ice chests are required for this purpose.

.2 Collecting Discrete Grab Samples

When collecting discrete grab samples:

- Do not include large non-homogeneous particles or detritus in the sample.
- To collect the sample, clamp the bottle onto a properly designed sampling rod or pole (if necessary). If samples can be gathered within arm's reach, a pole need not be used.
- To gather water samples from a creek or other watercourse, dip the sample bottle into the flow being careful not to draw in bottom sediments or detritus.
- Face the sampling bottle upstream to avoid contamination.
- If an intermediate sample container is used for sample collection, a dedicated intermediate container must be used for each sample site. The intermediate container must be rinsed before and after use with laboratory supplied distilled/deionized water. Also, the intermediate container must be rinsed at least three times with the stream, creek, or effluent water being sampled before collection of the sample for analysis.
- Be certain to completely fill bottles and leave as little headspace as possible
- Once the sample bottle has been filled, quickly cap it and place it in a suitable storage container (i.e., ice chest) for transportation to the laboratory facility.

.3 Field Documentation

During each sampling run, field notes will be taken using either waterproof field notebooks with pens containing waterproof ink (e.g., ballpoint pens) or with PDA's (personal desktop assistants)

with electronic field note recording capabilities. These notes will describe field conditions, weather, procedures followed, any problems encountered, and any modifications to standard procedures. The field notes will include:

- Date and time of sample collection at sample sites visited, and sample ID numbers
- Sampling team initials
- Sampling team assignments (e.g., sample collector, forms completion, field notes)
- Weather conditions (temperature, wind, cloud cover)
- General observations regarding flow, water clarity, odors at sampling sites
- Description of any problems that occur
- Modifications to established procedures

Complete and accurate field logbook notes are an essential part of the QA/QC process (see below). Proper attention must therefore be given to completing the field notes during the course of each sampling trip.

.4 Sample Labeling and Identification

The labels must be legibly and completely filled out and placed firmly on the bottle when samples are collected.

All samples will be assigned an 8-character project sample number, as shown below. The sample number will be clearly written on the sample label. Information on river mile, type of sample (grab or composite), start time and date of sampling period, and end time and date will also be clearly indicated on the sample label in order to match information on lab submission sheet.

Sample Labeling:

Site Name

Mile--XX

Composite/Grab

Project #: Enter unique 8 character # here

Start date: MM/DD/YYYY End date: MM/DD/YYYY

Start time: HH:MM

End time: HH:MM

.5 Sample Handling

When samples are collected, careful handling is required to minimize risk of contamination. Samples should be handled as little as possible and by as few people as possible.

- Sample containers should remain sealed/capped until used
- The inner portion of sample bottles and caps should not be touched with bare or gloved hands
- Sample bottles must be kept in a clean environment away from dust, dirt, fumes and grime. Vehicle cleanliness is important to eliminating contamination problems.
- Samples must never be allowed to stand in the sun. They should be stored in a cool place. Ice chests are recommended.

.6 Sample Transport and Chain of Custody

The field sampling crew will initiate a chain-of-custody form for all samples. An example of a chain-of-custody form is shown below.

Example Sample Chain of Custody Form:

Sample(s) Present	Site Name	Project Number
X	Stream Name: N. tributary to Wilmes Lk (MS1)	5518-00-01
	Stream Name: N. tributary to Bailey Lk (MS2)	5518-00-01
XX	Stream Name: E. tributary to Powers Lk (Powers)	5518-00-01
	Stream Name: Trib. Mississippi River MR-3 (100th St.)	5518-00-01
	Stream Name: Trib. Mississippi River (Newport)	5518-00-01
	Stream Name: Trib. Mississippi River (St Paul Park)	5518-00-01
X	Stream Name: Carnelian Creek at May Ave (May Ave)	5518-00-02
X	Stream Name: Carnelian Creek at Ozark Trail (Ozark)	5518-00-02
	Stream Name: Carnelian Crk at Big Car. Lake (Big Car)	5518-00-02
	Stream Name: SILVER CR (Silver-95)	7102-99-01
XX	Stream Name: CAR MARINE	7102-99-01
X	Stream Name: BROWNS CR	7102-99-01
X	Stream Name: Brown's Creek at McKusick Rd (McKusick)	5518-00-03
X	Stream Name: Brown's Creek at Hwy 15	5518-00-03
X	Stream Name: Trib. To Browns Creek at Long Lake Inlet1 (Furgala)	5518-00-03
XXX	Stream Name: Trib. To Browns Creek at Long Lake Inlet2	5518-00-03
X	Stream Name: Trib to Brown's Creek at Brown's Creek Diversion	5518-00-03
	Stream Name: Sunrise River at Comfort Lake Outlet (Comfort Out)	5518-00-04
X	Stream Name: Sunrise River at Comfort Lake Inlet (Comfort In)	5518-00-04
	Stream Name: Sunrise River at Little Comfort Lake Inlet (Little Comfort)	5518-00-04
	Stream Name: Sunrise River at Forest Lake Outlet (Forest)	5518-00-04
	Stream Name: Tributary to Sunrise River at outlet of Bone Lake (Bone Out)	5518-00-04
	Stream Name: Tributary to Sunrise River at inlet of Bone Lake (Bone In 1 – 238th)	5518-00-04
XX	Stream Name: Tributary to Sunrise River at South inlet of Bone Lake (Bone In 2 – 228th)	5518-00-04
	Stream Name: Tributary to Sunrise River at outlet of Shields Lake (Shields)	5518-00-04
X	Stream Name: Perro Creek	5518-00-05

By signing below, I fully understand and acknowledge that the information above is correct and correlates completely with the material(s) received

Lab Sample Originator Submittal Signature: _____ Date/Time: _____

Lab Sample Transporter Submittal Signature: _____ Date/Time: _____

Lab Personnel Received Sample Signature: _____ Date/Time: _____

Chain-of-custody forms will include information on project name, date and time of sample collection, number of samples, sample ID number, date and time of sample custody transfer, and the names of persons from and to whom custody was transferred.

The chain-of-custody form will be signed and dated each time custody is changed.

If commercial couriers are used to transport samples to the laboratory, copies of the custody form will be made by field sampling personnel before samples are shipped to the laboratory. (The commercial courier does not sign the custody form.) The original custody form will be sealed in a plastic bag and sealed in the shipping container. Once received by the laboratory, the sample custodian at the lab will inspect the samples for damage, sign the custody form, make a copy for the laboratory file, and then forward the original form to the project's field program manager for filing in the project files.

.7 Submission to the Laboratory

Blank copies of laboratory submission forms are to be provided by the laboratory to which samples will be submitted for analysis.

The laboratory submission forms will be completed by the field sampling crew and will accompany the chain-of-custody forms when the samples are delivered to the laboratory.

The laboratory sample submission forms must include information on the identification numbers for all samples submitted, which parameter analysis is required on each sample, and the method of sample preservation used at the time of sample collection.

5.0 HEALTH AND SAFETY

Gathering of water samples may result in exposure to sewage and bacteriologically contaminated water. All field sampling personnel must therefore be adequately protected against risk of exposure to such contaminants.

- Field personnel shall wear rubber gloves or suitable hand protection during the collection and handling of samples.
- Before embarking on any sample collection activities, field personnel shall acquire adequate medical protection against risk of infectious disease, including (as a minimum) protection against tetanus, polio, pertussis, diphtheria, and hepatitis A. Hepatitis B protection is also recommended.
- While working in the field, the field crew shall carry a complete first-aid kit that provides materials for disinfection and protection of any skin cuts or abrasions. Personnel will promptly attend to any such cuts or abrasions and seek medical attention if appropriate. Any need for first aid or medical attention shall be recorded in the field logbook, including

information on time and location of any injury to personnel and description of first-aid treatment applied.

6.0 PERSONNEL

.1 Field Sampling Personnel

The field personnel responsible for sample collection should be technical personnel with experience in conducting this type of work.

All field personnel must have acquired recommended medical preventatives and inoculations to guard against risks associated with sampling of contaminated waters. The specific requirements are set out above, under "Health and Safety."

.2 Quality Assurance Personnel

Field quality assurance reviews and auditing requirements (described below) will be the responsibility of the sampling team leader. This person must have experience in water sampling and environmental monitoring programs, and be familiar with sample handling, preservation, chain of custody, and laboratory submission requirements.

7.0 QUALITY ASSURANCE AND CONTROL (QA/QC)

.3 Data Management and Records Management

Field sampling personnel will be responsible for maintaining copies of all chain-of-custody forms and laboratory sample submission forms.

Field sampling personnel will be responsible for maintaining the field logbook.

Field sampling personnel will be responsible for providing the sampling team leader with the above materials after each grab sampling run, to allow the QA personnel to carry out QA review and audit.

The QA personnel will also keep copies of all chain-of-custody and laboratory submission forms, and will be responsible for maintaining a record of the results of reviews and audits of the individual sampling runs (see below).

.4 Submission of Duplicate Samples

Duplicate samples are obtained by dividing one sample into two or more identical sub-samples. This should be done on 5% of samples and on each sampling run. The purpose is to obtain

information on the magnitude of errors owing to contamination, random and systematic errors, and any other variabilities that are introduced from the time of sampling until samples arrive at the lab.

.5 Quality Assurance Audits

Immediately after completion of a sampling run, the sampling team leader will carry out a review and audit of the sampling run. This will include:

- Review of the field log book
- Review of copies of chain-of-custody forms and lab submission forms
- Interview with field sampling personnel

The purpose is to determine whether or not all grab sample collection, handling, transmission, and laboratory submission procedures were properly executed.

If this review determines that there were errors or deficiencies in the procedures used, then the quality assurance personnel will review the matter in detail with the field sampling crew to ensure that any necessary corrective action is taken to ensure that the problems do not recur. The QA personnel will make records of the errors or deficiencies and take any other corrective action that may be appropriate or necessary to avoid errors in data that may result from the sampling run.