New Mexico Environment Department (NMED) Surface Water Quality Bureau (SWQB)

Standard Operating Procedure (SOP) for

CHEMICAL SAMPLING IN LOTIC ENVIRONMENTS

Approval Signatures

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1.0 Purpose and Scope

The purpose of this SOP is to describe the sample collection techniques, preservation and acidification requirements, equipment, and quality control activities associated with the chemical sampling of surface water in lotic environments. This SOP also applies to chemical sampling in lakes (Lentic environments). However, it does not include sample collection procedures for conducting lake sampling, refer to the SWQB SOP 12.1 for Lake Sampling protocols (NMED/SWQB 2020a or current version).

2.0 Personnel Responsibilities

The Monitoring, Assessment and Standards Section (MASS) Program Manager coordinates with Monitoring Team Supervisor, and the Quality Assurance Officer (QAO) as applicable to ensure quality data is collected, verified, and validated to support program commitments.

The Quality Assurance Officer (QAO) is involved in the development and revision of this SOP to ensure the SOP meets the requirements of the SWQB's Quality Assurance Project Plan. The QAO; the MASS Program Manager; and SWQB subject matter experts (e.g., the MASS Monitoring Team Lead and field staff scientists) will determine if any revisions to this SOP are needed at a minimum of every two (2) years in accordance with the most current SOP 1.1 for the Creation and Maintenance of SOPs (https://www.env.nm.gov/surface-water-quality/sop/). Pending the review and approval of the document, the QAO will ensure the SOP is accessible through the SWQB's website.

SWQB Supervisors (e.g., TMDL and Assessment Supervisor, Standards & Outreach Supervisor) are responsible for their staff conducting chemical sampling when not completed by the Monitoring Team.

The Monitoring Team Supervisor is responsible for delegation of responsibilities to Monitoring Team staff for chemical sampling for a particular survey according to Field Sampling Plan (FSP). Responsibilities include but are not limited to sampling, management of Monitoring Team staff, and ensuring staff adhere to sample frequency and sampling locations according to applicable FSP.

All SWQB personnel who collect chemical samples in lotic environments or process samples for chemical sampling in lotic environments are responsible for implementing procedures as prescribed in this SOP. SWQB staff who conduct procedures described under this SOP are required to sign the SOP acknowledgment statement for Chemical Sampling in Lotic Environments, prior to conducting procedures detailed in this SOP.

3.0 Background and Precautions

3.1 Background

All chemical water sampling activities in lotic and lentic waters shall comply with this SOP. Methods of sample collection, preservation, and handling used in this SOP shall comply with methods described in the following references or that are approved by EPA:

- "Guidelines establishing test procedures for the analysis of pollutants under the Clean Water Act," 40 CFR Part 136 or any test procedure approved or accepted by EPA using procedures provided in 40 CFR Parts 136.3(d), 136.4 and 136.5;
- Standard Methods for the Examination of Water and Wastewater, latest edition, American Public Health Association;
- Methods for Chemical Analysis of Water and Waste, and other methods published by EPA Office of Research and Development or Office of Water;
- Techniques of Water Resource Investigations of the USGS;
- National Handbook of Recommended Methods for Water-Data Acquisition, latest edition, prepared cooperatively by agencies of the U.S. Government under the sponsorship of the USGS;
- Annual Book of American Society for Testing and Materials (ASTM) Standards. Volumes 11.01 and 11.02, Water (I) and (II), latest edition, ASTM International;
- Federal Register, latest methods published for monitoring pursuant to Resource Conservation and Recovery Act regulations; or
- Federal Register, latest methods published for monitoring pursuant to the Safe Drinking Water Act regulations.
- State of New Mexico Standards for Interstate and Intrastate Surface Waters (20.6.4 NMAC). Most current amendments.

3.2 Procedural Precautions

If other stream sampling work (e.g., collection of stream flow, physical habitat measurements) is to be done simultaneously, or prior to the collection of chemical water samples, then collect chemical water samples upstream of any other work/disturbances to prevent contamination with the water chemistry or wait for disturbed water to flow past the collection site.

Chemical surface water samples must not be collected in the same assessment unit (AU) within 7 days so that data is compliant with assessment procedures for evaluation of water quality standards. See the most current Comprehensive Assessment and Listing Methodology (CALM) (NMED/SWQB 2023 or most current).

It is recommended to contact a staff member from the laboratory(s) and/or section lead prior to sampling to ensure analyses can be carried out within required holding times. Analyses and holding times are impacted by holidays. If samples need to be rushed, due to an emergency or spill, contact the Monitoring Team Supervisor who will then contact the Chemistry Bureau Chief and the Surface Water Quality Bureau Chief to obtain approvals, ensure the proper coding is used for sample submission, and ensure laboratory staff are available after normal work hours/days to receive samples.

Organics sample containers, trip blanks, and hydrochloric acid (HCl) should be obtained from the SLD Organics Section. The Organics Section should be contacted at least one week prior to sample collection to ensure extractions and analyses can be carried out within holding times. Use self-adhering labels for organic sample bottles. Fill out labels on organics bottles and label containers before sampling to avoid having to write on wet surfaces. Only use pencils to fill out labels for organics to avoid sample contamination.

Total organic carbon and dissolved organic carbon require preservatives (phosphoric acid) provided by the laboratory. When utilizing SLD the Water Chemistry Section should be notified prior to sampling, to ensure all supplies are obtained prior to leaving for the sampling event.

Do not freeze samples collected in glass.

Site conditions or project-specific data collection objectives may necessitate the use of field procedures not included in this SOP. The use of field methods other than those presented in this SOP must be approved by the Program Manager or QAO for the project prior to use of modified field procedure or equipment. The change must be documented (e.g., email correspondence with Program Manager or OAO) and saved in the applicable survey folder on the SWQB network shared folders.

3.3 Safety Precautions

Do not attempt to wade into a stream if the depth (in ft) multiplied by the velocity (in ft/s) equals or exceeds the "rule of ten" or 10 square feet per second (ft^2/s). For example, a stream that is 2 ft deep, and has velocities of 5 ft/s or more, should be considered too dangerous to wade. Do not attempt to wade a stream if you feel it is unsafe, regardless of the outcome of the "rule of ten." Some channels have quicksand-like areas, deep holes, sharp rocks, excessive fallen logs, etc., that can lead to foot entrapment, injury, or falls. Staff should use the best professional judgment to assess the risks involved with data collection. Use gloves when working in waters suspected of having elevated contamination of pollutants identified in 20.6.4 NMAC or during sample collection to address Incident Response Monitoring (SWQB/NMED 2024). Refer to SWQB's JHA for further safety precautions when conducting field work.

Consult the SWQB Chemical Hygiene Plan (CHP), the SWQB Health and Safety Coordinator or SWQB Safety Liaison regarding acceptable practices for transferring concentrated acid in the Runnels Building Laboratory. Concentrated acid must always be transported in secondary containment vehicles and boats with a short-term exception allowed for pre-acidified sampling containers enroute from vehicles to stream or lake. Typically, in vehicles the SWQB ensures safety by transporting the secondary containment outside of where staff sit (e.g. the bed of truck or trunk of a car).

4.0 Definitions and Acronyms

For common definitions and acronyms not defined in this SOP, refer to the most up to date SWQB Quality Management Plan for Environmental Data Operations.

Analyte-Free Water – Water free of, or with the lowest attainable concentrations, of the analytes tested for in the requested analyses for a blank. Usually deionized (di), polished water obtained from the SLD Organics Section. Purer water may be necessary for some organic analyses.

Lentic – Inhabiting or situated in still, fresh water (as lakes or ponds).

Lotic – Inhabiting or situated in rapidly moving fresh water (as rivers or streams).

RID – is a unique reference ID number for samples submission.

Subject Matter Experts (SMEs) – Staff who are familiar with the purpose and procedure for accomplishing a task. All MASS Monitoring Team staff are considered and expected to be subject matter experts with all activities related to this SOP.

Environmental Sample (or Sample) – The medium (e.g., surface water), and any reagents or acids dissolved in the medium. The sample includes those materials that cannot be readily separated from the medium that is sampled.

Sampling Run –used to define the most common collecting period or grouping of sampling activities that are indicative of a SWQB MASS sampling operation. Typically, most samples are collected during multi-day collection events that depart and return to the office in a week (M-F). Blanks associated with a sampling run are assumed to represent a group of samples collected using the same equipment, vehicle, reagents, and acids. When multiple, single day sampling runs are conducted within a given week that maintain constant variables as described above, the single day sampling runs are considered collectively as a single sampling run. At least one (1) sampling staff must remain consistent throughout the sampling run to meet quality control requirements.

Quality Control (QC) Sample Definitions

Field blank – A sample of analyte-free water and acid, if required, that is exposed to ambient environmental conditions at the sampling site and to transportation and storage conditions. Field blanks check for contamination from the sampling equipment, added reagents or acids, and from the environment. Field blanks are currently collected for E. *coli.* and total coliform and must be collected at a rate of 10% of the total number of samples; to ensure quality control for the distribution of field blanks the SWQB requires one (1) field blank be collected per ten (10) environmental samples.

Trip blank – A blank prepared with analyte-free water and acid that is made at the analytical facility, sealed, transported and analyzed with environmental samples. Trip blanks are not exposed directly to ambient environmental conditions at the sampling site. Trip blanks are transported to the lab in the same manner as environmental samples. The purpose of a trip blank is to assess the potential for in-transit contamination of samples. Trip blanks are currently run only for VOCs at a frequency of 1 per sample run.

Reagent blank – A blank prepared in the lab using analyte-free water and reagent that is not exposed to ambient sampling conditions. Reagent blanks check for contamination from sample containers, analyte-free water and reagent.

Equipment blank – A sample prepared in the field, using analyte-free water and acid that has contacted all sampling equipment. Equipment blanks assess contamination from the sampling equipment and the acid, as well as from the ambient environment at the sampling site. Equipment blanks are currently collected for dissolved metals, hardness, and dissolved organic carbon and must be collected at a rate of 10% of the total number of samples. To ensure quality control over the distribution of equipment blanks the SWQB requires one (1) equipment blank per ten (10) environmental samples.

Duplicate – A sample that is split from a common container after sample collection and analyzed as two samples. Duplicates are used to assess the precision of sample collection and analysis.

Replicate – A second sample that is collected within 15 minutes and within 1 meter of an initial sample.

5.0 Equipment and Tools

The following list (Table 1) includes equipment that may be necessary for surface water chemical sampling in lotic waters:

Table 1. Sampling Equipment

SAMPLING SUPPLIES	GENERAL
Field sheets	Access authorization documents
Acid washed silicon tubing (0.19-inch internal diameter)	Defensive driving certificate, and NMED ID
Cubitainers (quarts, gallons)	Cell phone
Geo pump, with appropriate power cord(s)	First aid kit
Acid kit with concentrated sulfuric, nitric acid, 10% HCL,	Flashlight
Phosphoric acid	Maps
Pipets	Shovel
Nitrile gloves, powder free	Toolbox or multitool
Organics sample bottles (vials/bottles)	Vehicle Kit
VOC Whirl-Packs – travel blank	Hat
8oz glass amber bottle (DOC)	Sunscreen
Gallon Cubie with tap water for cleaning equipment	Rain gear
Analyte-free water for preparing blanks	Sunglasses/polarized glasses
Measuring tape (in feet and/or meters)	Clipboard
Wading rod	Boots/waders/sandals
Flow meter and cable	Garbage bags
Potassium iodide (KI) starch Test Paper (cyanide samples)	Pencils
Nylon rope	Sharpies
Plastic bucket	Safety glasses
Ice	
Coolers	
Pole sampler	
Ascorbic acid (cyanide samples)	
Submittal forms	
Kimwipes	

6.0 Collection of Water Samples for Chemistry Analyses (PROCESS DESCRIPTION)

For planning and scheduling purposes, review the most current applicable FSP to confirm planned chemical sampling stations, requested analytical suite and other data needs before conducting field work. Reference ID (RID) stickers will need to be obtained from SLD before fieldwork commences. A chemical sampling event will need to be created in SQUID for each sampling station that will be sampled for internal projects. Typically, this is completed by uploading the information from the Combined Data tab of the SLD Submittal Sheet into SQUID after sampling. Section 7.0 details to procedure in a step-by-step process.

Label all sample containers with the sample site location and sample type (e.g. dissolved metals) and place the pre-printed RID stickers on the lid of one liter and one-gallon flexible plastic containers or they can be placed on the sides of rigid plastic or glass containers. When labeling sample containers, sample type is typically abbreviated (e.g., TM, DM, Nuts, TSS/TDS). Write the RID number on the container with a Sharpie®. A summary of the required containers, preservatives, and holding times for various analyses is given below (Table 2). The RID number of each sample container is recorded in the Activity ID's/RIDs section of the Stream and River Field Form. Before sampling, ensure RIDs on containers, and sample type match the RIDs for each analytical suite identified in the Stream/River Field Data Form.

Ensure RIDs are applied to organics bottles before sampling to avoid having to apply on wet surfaces. Only use pencils to fill out labels for organics, if needed.

Instantaneous sonde measurements (i.e., temperature, specific conductance, salinity, dissolved oxygen, saturated dissolved oxygen, pH and turbidity) and stream flow are required to be collected at each chemical sample station. Data is recorded on the Stream/River Field Data Form. Instantaneous sonde measurements can be taken simultaneously with chemical samples, if taken so that the sediment is not disturbed at the chemical sampling point. Refer to SOP 6.1 Sondes (NMED/SWQB 2025 or current version) for information regarding collection of instantaneous measurements. Refer to SOP 7.0 Stream Flow Measurements (NMED/SWQB 2022 or current version) for information regarding flow measurements. If no flow is observed during the sample run, ensure it is recorded on Stream and River Field Data Form and documented with a picture.

Collect ambient water samples at monitoring site by immersing the sample container below the surface of the water with the container mouth facing upstream and all exposed flesh downstream from the opening of the container. Sample where the stream is flowing, well mixed and preferably more than 6 inches deep and representative of AU. Avoid getting streambed sediment or water surface materials in the sample. If sampling location must deviate more than 500 meters from established monitoring site, a new site must be created. For Equal-Width-Increment and Depth-Integrated Sample Collection Methods refer to Appendix A of this SOP.

It is not necessary to rinse new sampling containers, except for organic carbon samples (see organic carbon sampling below), with analyte-free or sample water before collecting the sample. If using sampling containers such as buckets or 1-gallon cubitainers to collect water for multiple samples, rinse the container twice with ambient water before collecting the sample. When adding acid to cubitainers, never insert the pipettor below the top of the neck of the cubitainer and keep the pipettor at an angle above the cubitainer to reduce the chance of debris falling off the pipettor or your hand into the sample.

Pipettes need to be stored separately, in a dry secure container, where pipettes are not exposed to elements during transportation. Typically, a container used for storage of pipettes would be similar to a Tupperware® container. Sample containers can be pre-acidified up to one week before use. Pre-acidified containers should be labeled and stored in secondary containment, such as coolers, with the lid propped open to minimize vapor buildup. Pre-acidified containers should not be opened in a closed area or near the face. Pre-acidified nutrient containers must be stored separately from pre-acidified total metals and dissolved metal containers so that cross contamination does not occur.

Use a bucket with a nylon rope, disposable bailer, or a pole sampler to collect water if sampling containers cannot be dipped directly in the water. Avoid contaminating the sample with debris from the rope and bridge, or other sampling platform. Use the first and second bucketful/container of water to rinse the bucket/container. Use the third bucket/container of water to collect the sample. Use a metal bucket when collecting organic samples and a plastic bucket when collecting metals samples. Do not let the metallic sonde components touch the sample water prior to collecting the sample from a bucket if sampling for metals.

6.1 Sample Collection and Processing for Specific Parameters

Refer to the SLD Submittal Form, an interactive submission form for analytical suite compositions, submission form can be accessed at https://www.env.nm.gov/surface-water-quality/sop/ under related field forms for SOP 8.2. If samples are to be submitted to a contract laboratory, complete the required chain of custody.

The 1-quart and 1-gallon cubitainers used for chemical sampling in lotic environments are required to have a polyethylene liner and a polyethylene (or a fluoropolymer sampling vessel) cap to meet requirements described in the Background and Precaution section of this SOP. TSS, TDS, Alkalinity, CL, SO_4, Nutrients, samples collected for development of the Clean Water Act (CWA) §303(d)/ §305(b) Integrated Report and List (IR), Total Maximum Daily Loads (TMDLs), or Water Quality Standard (WQS) amendments proposed by the SWQB do not require field blanks.

6.1.1 Total Suspended Solids (TSS), Total Dissolved Solids (TDS), Alkalinity, Chloride (Cl), and Sulfate (SO_4)

- Fill a 1-quart cubitainer with environmental water sample.
- Specific SWQB projects may require the preparation of a field blank by filling a 1-quart cubitainer with di water from SLD.
- Keep sample(s) on ice, at 6°C or less.

6.1.2 Nutrients

- Fill a 1-quart cubitainer with environmental water sample.
- Acidify with approximately 1 ml concentrated sulfuric acid (H_2SO_4) to a pH < 2. If using a pre-acidified container, do not overfill.
- Specific SWQB projects may require the preparation of a field blank by filling a 1-quart cubitainer with DI water and acidifying with 1 ml of concentrated sulfuric acid to a pH < 2.
- Keep environmental sample on ice, at 6°C or less

6.1.3 Orthophosphate

To prepare an environmental sample for orthophosphate analysis follow the steps below:

- Fill a cubitainer with at least 1 quart of stream, river, or lake water.
- Attach a 0.45 µm filter to one end of acid washed silicone tubing, ensure flow direction is correct.
- Ensure the silicon tubing ends do not touch surfaces that would cause contamination of the sample.
- Insert the mid-section of tubing into the Geo Pump and clamp.
- Insert other end of tubing into environmental sample (e.g., 1-quart of stream water).
- Turn the pump on and pump at least 75 ml of sample through the filter, discard, and collect the remainder in a 1-quart cubitainer. Keep the filter to the side of the neck of the receiving cubitainer to prevent dirt and dust from falling into the sample.
- Acidify with approximately 1 ml concentrated sulfuric acid (H_2SO_4) to a pH < 2.
- Keep the sample at 6°C or less.
- Place the used tubing in a separate bag from clean tubing and save for cleaning in the lab.
- Discard the 0.45 µm filter.

6.1.4 ORGANIC CARBON

Prior to leaving the office determine the number of equipment blanks required for sample run for Dissolved Organic Carbon (DOC). Ensure at least one (1) unused 1-liter glass amber bottle is taken into the field for each required equipment blank.

Note: When sampling TOC and DOC a plastic bucket cannot be used for sample collection.

For each environmental sample planned, an 8oz amber glass bottle is required. Sample bottles are provided by the SLD Water Chemistry Section or contact laboratory.

Dissolved Organic Carbon (DOC) --

Collection of an equipment blank is required prior to collection of DOC environmental sample. Equipment blanks are collected at a frequency as described in the Definition Section of this SOP.

Initial preparation for processing of DOC equipment blank:

- Triple rinse 8-oz glass amber bottle with DI water for equipment blank.
- Label an unused 1-liter glass amber bottle “DI Flush”. Triple rinse the 1-liter glass amber bottle with DI water, after triple rinse fill with DI water.

Filtering Procedure for DOC Equipment Blank

- Attach a 0.45 µm filter to one end of acid washed silicone tubing, ensuring flow direction is correct.
- Ensure the silicon tubing ends do not touch surfaces that would cause contamination of the sample.
- Insert the mid-section of tubing into the Geo Pump and clamp.
- Insert other end of tubing into 1-liter glass amber bottle filled with DI water conducted during initial preparation.
- Turn the pump on and pump at least three (3) liters of DI water through the filter prior to filling the 8 oz glass amber sample container. This will require the refilling of 1-liter amber glass bottle multiple time with DI water while filtering.

- When filling sample bottle keep the filter to the side of the neck of the receiving sample bottle to prevent dirt and dust from falling into the sample.
- Fill the 8-oz glass amber bottle and allow adequate volume for addition of preservative.
- Acidify the sample with concentrated phosphoric acid (H_3PO_4) to a pH ≤ 2.
- Keep samples on ice, at 6°C or less.
- Place the used tubing in a separate bag from clean tubing and save for cleaning in the lab.

To prepare an environmental sample for DOC analysis follow the steps below:

- Triple rinse 8-oz glass amber bottle with DI water for environmental sample
- Triple rinse 1-liter glass amber bottle with DI water, after triple rinse fill with DI water (this should be the same amber bottle used for equipment blank). Ensure bottle has been labeled "DI Flush".
- Triple rinse another 1-liter glass amber bottle with DI water, if secondary container is required for the collection of environmental sample. Label "Env Samp".

Filtering Procedure for DOC Environmental Sample

- Attach a 0.45 µm filter to one end of acid washed silicone tubing, ensuring flow direction is correct.
- Ensure the silicon tubing ends do not touch surfaces that would cause contamination of the sample.
- Insert the mid-section of tubing into the Geo Pump and clamp.
- Insert other end of tubing into 1-liter glass amber bottle filled with DI water conducted during initial preparation, label DI Flush.
- Turn the pump on and pump at least three (3) liters of DI water through the filter. This will require the refilling of 1-liter glass amber bottle multiple times with DI water while filtering.
- After filtering at least three (3) liters of DI water remove tubing from DI water container and place into environmental sample (e.g., directly into stream or triple rinsed secondary container) and flush at least 100 ml of environmental sample through filter prior to filling 8 oz glass amber bottle.
- Allow adequate volume in 8 oz glass amber bottle for addition of preservative.
- Acidify the sample with concentrated phosphoric acid (H_3PO_4) to a pH ≤ 2.
- Keep samples on ice, at 6°C or less.
- Discard the 0.45 µm filter.
- Place the used tubing in a separate bag from clean tubing and save for cleaning in the lab.

Total Organic Carbon (TOC) --

To collect an environmental sample for analysis of TOC follow the steps below:

- Triple rinse 8-oz glass amber bottle prior to collecting environmental sample.
- If a secondary container is needed for collection of environmental sample, a 1-liter amber bottle must be used and must be tripled rinsed with DI water prior to sample collection.
- Fill the 8-oz glass amber bottle with environmental sample and allow adequate volume for addition of preservative.
- Acidify the sample with concentrated phosphoric acid (H_3PO_4) to a pH ≤ 2.
- Keep samples on ice, at 6°C or less.

6.1.5 TOTAL METALS

- Fill a cubitainer with at least 1 quart of stream, river, or lake water.
- Acidify with 2 ml of concentrated nitric acid (HNO_3). If using a pre-acidified container, do not overfill.
- Keep sample(s) at ambient temperature.
- There are no blanks collected for total metals samples, however specific projects may require the preparation of a field blank by filling a 1-quart cubitainer with DI water and acidifying with 2ml of HNO_3.

6.1.6 TOTAL RECOVERABLE ALUMINUM

If stream turbidity is 30 NTUs or below, follow the instructions for total metals samples. If stream turbidity is greater than 30 NTUs, follow the instructions for dissolved metals samples but use a 10 µm filter instead of a 0.45 µm filter. There are no blanks collected for total recoverable aluminum samples.

6.1.7 DISSOLVED METALS AND HARDNESS

To prepare an environmental sample for hardness and dissolved metals follow the steps below:

- Fill a cubitainer with at least 1-quart of stream, river or lake water.
- Attach a 0.45 µm filter to one end of acid washed silicone tubing, ensuring flow direction is correct.
- Ensure the silicon tubing ends do not touch surfaces that would cause contamination of the sample.
- Insert the mid-section of tubing into the Geo Pump and clamp.
- Insert other end of tubing into environmental sample (e.g., 1-quart of stream water).
- Turn the pump on and pump at least 75 ml of sample through the filter, discard, and collect the remainder in a 1-quart cubitainer.
- Keep the filter to the side of the neck of the receiving cubitainer to prevent dirt and dust from falling into the sample.
- Acidify the sample with 2 ml of concentrated nitric acid.
- Keep the sample at ambient temperature.
- Place the used tubing in a separate bag from clean tubing and save for cleaning in the lab.
- Discard the 0.45 µm filter.

Equipment blank must be collected for dissolved metals and hardness at a frequency as detailed in the definition section of this SOP.

- Fill a new cubitainer with at least a quart of DI water and follow the filtering instructions above starting at step 2. **Do not reuse** tubing and filters from blanks in environmental samples.

6.1.8 RADIONUCLIDES

- Fill two, 1-gallon cubitainers of stream, river, or lake water
- Keep sample(s) at ambient temperature.
- SLD completes the preservative requirements.
- No blanks are collected for Radionuclide.

6.1.9 VOLATILE ORGANIC COMPOUNDS (VOCS)

Collection of samples for organic compounds requires samplers wear clean nitrile gloves while sampling.

- For each sample planned, obtain 2-40 ml vials in a Whirl-Pack from the SLD Organics Section.
- Fill the vials by submersion.
- Add 2 drops of 10% HCl (also obtained from the SLD Organics Section and less than 3 months old) to each vial.
- Fill the caps with sample water and cap the vials without leaving a headspace.
- Keep the vials together in a closed Whirl-Pack, on ice, at 6°C or less.

VOC Blanks

Obtain a VOC trip blank from the SLD Organics Section for each sample run that includes collecting VOC samples. The trip blank should be placed in a Whirl-Pack, then into a cooler on ice prior to leaving the laboratory. Remove the trip blank from the Whirl-Pack at a sampling station for approximately 1-2 minutes. Do not open the vials or acidify. Reinsert the trip blank into the Whirl-Pack and keep them in a cooler, on ice with the environmental samples until they're delivered to the lab.

Note: Trip blanks and HCL have to be obtained prior to sampling and should be stored in the walk-in cooler until taken to the field.

6.1.10 SEMI-VOLATILE ORGANIC COMPOUNDS (SVOCS), HERBICIDES, PESTICIDES

For each sample planned, obtain two 1L glass, amber colored bottles with Teflon lined caps and a bubble wrap sleeve for each from the SLD Organics Section.

- Fill both bottles by submersion and replace the lids underwater if possible.
- If the stream is not deep enough to submerse the sample container, use a third, new, 1-L glass amber bottle to fill the two sample bottles. A headspace is acceptable with SVOC samples. Keep bottles in bubble-wrap sleeves, before and after filling to avoid breakage.
- Store samples out of direct sunlight, on ice, at 6°C or less.

6.1.11 POLYCHLORINATED BIPHENYL (PCBS)

For each sample planned, obtain two 1L glass, amber colored bottles with Teflon lined caps and a bubble wrap sleeve for each from the contract laboratory, or as prescribed by laboratory.

- Fill both bottles by submersion and replace the lids underwater if possible.
- If the stream is not deep enough to submerge the sample container, use a third, new, 1-L glass amber bottle to fill the two sample bottles. A headspace is acceptable with PCB samples. Keep bottles in bubble-wrap sleeves, before and after filling, to avoid breakage.
- Store samples out of direct sunlight, on ice, at 6°C or less.

6.1.12 CYANIDE

If chlorine is suspected, evaluate the sample water for the presence of chlorine. Samples from streams that are not immediately downstream from outfalls are unlikely to contain chlorine. Samples can be checked for chlorine using potassium iodide (KI)-starch test paper (or similar method).

- Fill a 1-quart cubitainer with sample.
- If chlorine is present, remove it by adding ascorbic acid, a few crystals at a time, until a drop of sample produces no color on the starch test paper, then add one additional crystal.
- Preserve samples for cyanide analysis with sodium hydroxide.

- Most samples will require about 0.5 g solid NaOH per liter, approximately five pellets (sample must be at a pH of 12 or greater). Handle the pellets with wooden or plastic utensil or pour directly from the container.
- Keep samples on ice, at 6°C or less.

6.1.13 TOTAL RESIDUAL CHLORINE (TRC)

Collect samples for residual chlorine measurements directly below wastewater treatment plant outfalls when sampling for total residual chlorine for discharge monitoring from point sources. See SOP 8.3 NPDES Wastewater Sampling

6.1.14 MICROCYSTIN

Sampling should be performed mid-summer to fall when HABs are most likely to bloom.

- Collect surface grab samples using a 60 ml Polyethylene Terephthalate Glycol (PETG) bottle (or container provided by laboratory).
- Immediately store sample on ice away from sunlight. Samples must be maintained at 0-10° C until arrival at lab for analysis or stored in a -20° C freezer within 72 hours (Dinh, Quoc Tuc. et. al. 2021).
- Hold time for samples are not to exceed 14 days after collection, if stored in a -20° C freezer within 72 hours of sample collection (Dinh, Quoc Tuc. et. al. 2021).
- Samples must be shipped on ice.
- Notify laboratory as soon as possible prior to sampling to ensure they are prepared for sample processing.

6.1.15 CYLINDROSPERMOPSIN

Sampling should be performed mid-summer to fall when HABs are most likely to bloom.

- Collect surface grab samples using a 60 ml Polyethylene Terephthalate Glycol (PETG) bottle (or container provided by laboratory).
- Fill sample bottles taking care not to flush out the preservatives, if provided by laboratory (sodium bisulfate used as an acidic microbial inhibitor, ascorbic acid may be used as a reducing agent for chlorine).
- Immediately store sample on ice away from sunlight. Samples must be maintained at 0-10° C until arrival at lab for analysis or stored in a 0-6° C freezer within 48 hours (EPA method 545).
- Hold time for samples are not to exceed 28 days after collection, if stored at 0-6° C within 48 hours of sample collection (EPA method 545). Sample must not be frozen.
- Samples must be shipped on ice and arrive at 10° C.
- Notify laboratory as soon as possible prior to sampling to ensure they are prepared for sample processing.

6.2 Ambient Water Toxicity Testing

The USEPA Region 6 Laboratory conducts aquatic toxicity tests of water as part of the EPA Region 6 Ambient Toxicity Monitoring Program. An application process is required by EPA before selecting and scheduling ambient water toxicity testing. Contact the lab for further information.

6.3 Quality Control Sampling

Prepare and submit required blanks at a frequency of one per sampling run, unless otherwise indicated. Section 4.0 Definitions and Acronyms details the types of quality control samples utilized by the SWQB.

Currently, the SWQB only collects equipment blanks for dissolved metals, hardness, and DOC at a frequency as prescribed in the Definition and Acronyms Section of this SOP.

The SWQB also collects a trip blank for VOC samples at a frequency of 1 per sample run.

E. coli and total coliforms are not addressed in this SOP, however both require field blanks, see SOP 9.1 Bacteriological Sampling.

6.4 Handling, Packaging, and Transporting Samples

After sample collection:

- Check to see that samples are labeled, and lids are tightly fastened.
- Place samples with temperature storage requirements on ice in a coolers.
- Ensure that all samples required to be kept cool are surrounded by adequate ice, to appropriate temperature. See Table 2 for more details.
- Ensure all glass sampling containers are placed in bubble-wrap sleeves to protect from breaking.
- It may be necessary to place additional ice in coolers to accommodate for transit time/sample run.
- Always ensure cooler lids are properly closed.
- Handling procedures and holding times are summarized below (Table 2).

Samples taken for ambient water quality monitoring (i.e., for development of the CWA IR, TMDLs, WQS amendments proposed by the SWQB), do not require formal chain of custody procedures, the SWQB QAPP (NMED/SWQB 2024) provides more information on the chain of custody procedures for specific data acquisition type conducted by the SWQB.

Table 2. SWQB chemical sample handling procedures and holding times.

Sample Type	Sample Container	Preservation and Storage	Maximum Holding Time
TSS and TDS	1-quart polyethylene cubitainer	On ice, ≤ 6°C	7 days TSS – TDS
Alkalinity	1-quart polyethylene cubitainer	On ice, ≤ 6°C	14 days**
Cl and SO_4	1-quart polyethylene cubitainer	On ice, ≤ 6°C	28 days**
Total Nutrients	1-quart polyethylene cubitainer	1.0 ml concentrated sulfuric acid, on ice, ≤ 6°C	28 days
Orthophosphate	1-quart polyethylene cubitainer	Filter (0.45 μm) within 15 mins of sample collection, 1.0 ml concentrated sulfuric acid to a pH < 2, on ice, ≤ 6°	28 days***

Sample Type	Sample Container	Preservation and Storage	Maximum Holding Time
TOC/DOC	8 oz amber glass bottle	2-3 ml concentrated phosphoric acid, on ice, ≤ 6°C	28 days
Cyanide	1-quart polyethylene cubitainer	5-7 pellets NaOH, 0.6g ascorbic acid if chlorine present, on ice, ≤ 6°C	14 days
Total Metals	1-quart polyethylene cubitainer	2.0 ml concentrated nitric acid	28 days mercury – 6 months other*
Total Recoverable Aluminum	1-quart polyethylene cubitainer	Filter (10 μm) within 15 min of sample collection; 2.0 ml concentrated nitric acid.	6 months
Dissolved Metals / Hardness	1-quart polyethylene cubitainer	Filter (0.45 μm) within 15 min; 2.0 ml concentrated nitric acid	28 days mercury – 6 months other*
Semivolatile Organic Compounds (SVOCs), Herbicides, Pesticides	Two 1-liter glass amber bottles (lab)	On ice, ≤ 6°C	7 days
Volatile Organic Compounds	Two 40-ml glass vials (lab) in a Whirl-Pack	2 drops 10% HCl per vial (HCl provided by lab and prepared within 30 days of use), on ice, ≤ 6°C	14 days
Radionuclides	Two 1-gallon polyethylene cubitainers	No preservative in the field, store at room temperature. Laboratory adds preservative	6 months

Sample Type	Sample Container	Preservation and Storage	Maximum Holding Time
PCBs	Two 1-liter glass amber bottles (lab)	On ice (out of sunlight), ≤ 6°C	1 year
Cyanide	1-quart polyethylene cubitainer	5-7 pellets NaOH, 0.6g ascorbic acid if chlorine present, on ice, approximately 6°C	14 days
Microcystins	60 ml PTEG (or container prescribed by laboratory)	On ice in dark, ≤ 10°C, or -20°C > 72 hours	At 10°C ≤ 72 hours, At -20°C maximum of 14 days
Cylindrospermopsin	60 ml PTEG (or container prescribed by laboratory)	On ice in dark, ≤ 10°C, or 0-6°C > 48 hours - Sodium bisulfate -Ascorbic acid (if chlorine is present)	Maximum of 28 days at 0-6°C. Cannot be frozen.

* Metals, except chromium VI and mercury maximum hold time 28 days

** Typically analyzed in conjunction with TSS/TDS (i.e., 1-quart polyethylene cubitainer for TSS, TDS, CL and SO_4)

***Method does not require the use of preservative but must be analyzed within 48 hours. Acceptable method deviation, addition of sulfuric acid (H_2SO_4) to a pH < 2 for extending holding time up to 28 days per SLD recommendation.

6.5 Stream and River Field Data Form Completion

Either the paper or electronic versions of the Stream/River Field Data Form may be used to document sample collection. Staff must use the most up to date version of the Stream/River Field Data Form. The electronic and paper forms are identical; however, the electronic form has built in data entry quality checks and automated functions. Use of the electronic form also allows batch laboratory submittal sheet generation and SQUID sample event upload. Station and RID information on either form may be entered in preparation for the sampling event.

6.5.1 Paper Form

- Write the Project Name
- Enter site information, site ID, latitude, longitude, elevation, ecoregion, and driving directions

- Enter sampling event information: date and time, field staff, sonde and handset used, sampling equipment, sampling media, and indicate DO recalibration and pressure.
- Enter field measurements. Indicate missing values with "MDP", if needed
- Enter flow condition rating
- Enter RID numbers, Analytical Suites, and sample processing and preservation information.
- Enter observed probable sources in the Sampling Notes section
- Enter streamflow measurement method and result. Add any streamflow comments to the Flow Comments section
- Add any other relevant sampling event comments to the Sampling Notes section
- If hard copy field sheets were used, they must be scanned and saved in survey folder upon returning to the office.

6.5.2 ELECTRONIC FORM

- Type in the Project Name.
- Select the Station Name from the drop-down list and enter RIDs.
- At sampling station enter sampling event information: date and time (use the "Now" button as a shortcut). Select from the drop-down lists: field staff, sampling equipment, sampling media, and indicate DO recalibration and enter pressure.
- Select flow condition rating.
- Enter RID numbers (the grey button on the right side of the RDI field adds the next number in sequence) and select Analytical Suites and sample processing/preservation information. If not already completed in the laboratory prior to sampling.
- Record instantaneous Sonde measurements on Stream River Field Data Form.
- Press the Probable Source Observations drop-down list button. Click on an observed probable source then press the "Select Probable Source" button. Repeat for all observed sources then press the "Add to Comments" button.
- Select the Streamflow Measurement method and enter the flow result. Add any streamflow comments to the Flow Comments Section.
- If the form is complete, press the "Publish Field Sheet" button. Resolve any error messages. If the form is not complete, press the "Save Draft" button to save the file and complete at a later time.
- The Publish Field sheet button creates a pdf of the completed field sheet.
- Published and draft files are saved in the C:\FIELD_SHEETS folder on the local hard drive.
- Upon returning to the office ensure pdf and excel files of fields sheets are transferred to project survey folder.

7.0 Data and Records Management

All data obtained during chemical sampling is recorded on a Stream/River Field Data Form for each station sampled (even when dry). The Stream and River Field Data Form is then published and filed in project folder after data collection is complete. The SLD Submittal sheet is then used to important data from the Stream/River Field Data Form into SQUID using the macro-enabled processes in SLD submittal sheet. Refer to the section below regarding SQUID upload instructions. Once uploaded into SQUID a person who did not create the field sheets or submittal/upload will verify that the information in SQUID

matches the pdf version of the field sheet. Any corrections needed to the pdf will be added with the person's initials and date. Wrong information will be crossed out with a single line. Corrections in SQUID can be made if you have editing permission (see Monitoring Team Supervisor for more information). Once information is confirmed initial and date the top of the pdf where it says Verified. See figure1 below for details.

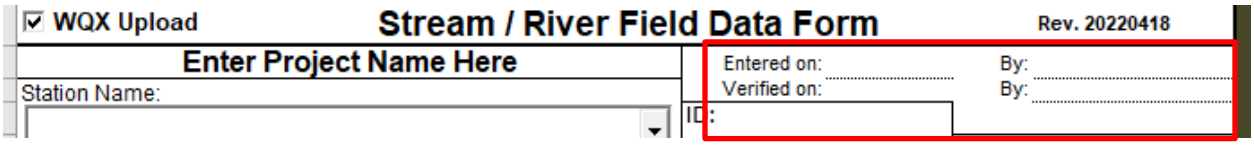

Figure 1. Stream/River Field Data Form

Once all field sheets in the survey folder have been verified add VV complete with staff initials to the end of the folder name. See Figure 2 below for example.

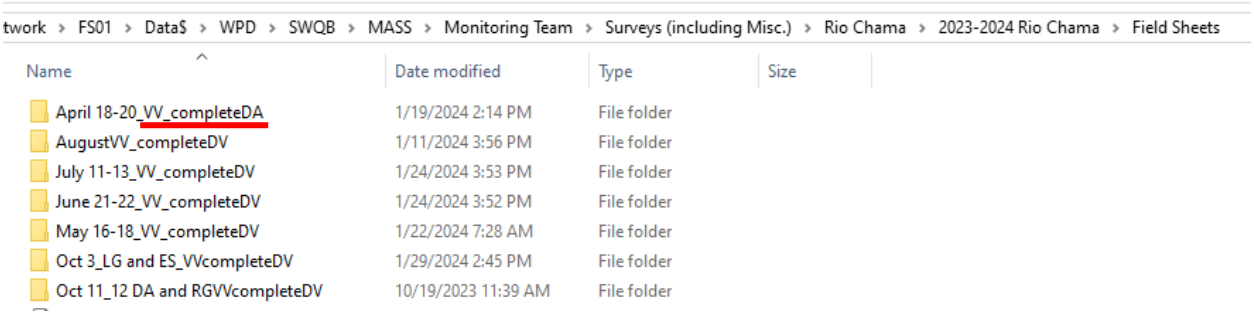

Figure 2. Management of Stream/Reiver Field Data Form

Stream/River Field Data Form file naming convention and shared folder location:

- Field sheets will be named automatically when published the naming convention is station number_date of sampling example 48DogCan002.7_2023-04-13. Files must be saved in the Field Sheets Folder in applicable survey. Each run will have a subfolder named based on the dates of the run. Example April 11-14. See Figure 2 for example of folder structure.
- A Bacteria Upload file is automatically generated and named by the macro-enabled submittal form. The File naming convention should be Bacteria_UL_date. The date is taken from the first tab of the submittal form. See Figure 3 for an example of where the date is pulled from. Ensure the file is saved in the Bacteria Folder in applicable survey.

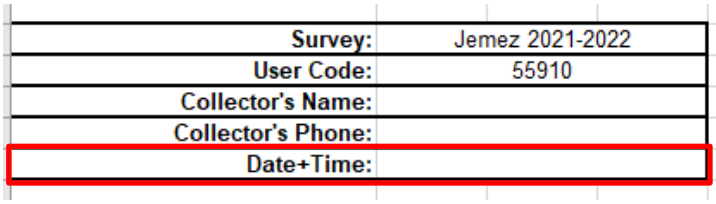

Figure 3. SLD Submittal Form-Date and Time

- Upload data files are created for upload into SQUID by copying the data in the Combined Data tab of the submittal form to a blank spreadsheet. The naming convention must include UL_survey abbreviation_date submittal_initials. The initial should be the person who made the form example UL_SMW_11May2023_ES. Saved upload file in the Upload Folder in applicable survey.
- SLD Submittal spreadsheet must be saved in the applicable survey folder in the Submittal Folder. The naming convention must include survey abbreviation_SLD_Submittal_your initals_date created. Example SMW_SLD_Submittal_JF_2023-01-02.

7.1 Uploading Chemical Sampling Event into Squid

To upload chemical sampling event data for a chemical sample station either upload the data manually or use the macro-enabled Excel spreadsheet.

7.1.2 Upload Chemical Sampling Event into SQUID Using Macro-enabled SLD Submittal Form

- Locate the most recent version of the macro-enabled SLD Submittal Form (available on the SWQB SOP website).
- Insert the correct survey name and year, user code for the survey (listed in the "lists" tab) and the collectors contact information as well as the date and approximate time of laboratory submittal.
- Make sure that all chemical sampling event data sheets for the sampling run are complete and published.
- In the SLD Submittal form instructions tab select "Select Files" and navigate to the project folder containing the published final drafts of the chemical sampling (Stream/River Field Data Form). Select all applicable chemical sampling events and flow events for upload.
- In the SLD Submittal form instructions tab select "create submittals." The resulting submittals in the chemical suite tabs are the forms that are submitted to SLD when chemical samples are delivered for analysis. Each chemical suite sheet should contain the sample RID and a corresponding barcode (requires special computer software listed on the instructions tab), the collection date and time, the conductivity, and all appropriate header information.
- After sample RIDs are confirmed and successfully submitted to the laboratory for analysis, proceed with the chemical sampling event data upload in SQUID.
- Ensure that all data is complete and create a .xlsx file from the combined data tab in the SLD Submittal form.
- In SQUID, select the "data management" tab at the upper left corner of the database, and select "imports" from the drop-down menu. In the "imports" sub-menu select "sampling event data."
- The Import Sampling Event Data page should open. Select the applicable project from the project field menu, and then select "choose file." Navigate to the .csv version of the sampling event data and then select "open." In SQUID, select "upload file."
- Ensure that there are no invalid records found with error messages. Error messages will appear as a red exclamation point in the "valid" column along with the message "X invalid records found." Correct errors if invalid records are found. Once there are no invalid records, select "import all valid records." A notification that upload was successful should appear. Most common error occurs if column AU

(10_Micron_Filter_Used) is left blank. Change all blanks in column AU to FALSE to fix this error.

- Navigate to the project folder and select a station to ensure that the sampling events were successfully uploaded.

7.1.2. UPLOAD CHEMICAL SAMPLING EVENT DATA MANUALLY TO SQUID

- Navigate to the applicable project folder in SQUID by selecting the "project" tab on the navigation bar, then selecting the appropriate folder icon with a green arrow under the "View/Add Monitoring Locations" column.
- All stations that have been added to the selected project folder should appear. To upload a chemical sampling event to a particular station, select the folder icon with a green arrow under the "sampling events" column for that sampling station.
- In the Sampling Events page, select "add a new sampling event" in the top navigational bar. Select a sampling event type from the drop-down menu. For River/Stream chemical sampling event data select "RIVER/STREAM-CHEMICAL." Select the "add new sampling event."
- A sampling event details box will appear. Populate the fields in the general tab with the appropriate data.
- In the RIDS tab, enter the number of RIDs associated with that station. Enter the RID and select each corresponding Analyte Suite from the drop-down menu.
- In the Field Measurements tab, enter all sonde data that was collected at the time of sampling. Indicate a flow condition rating associated with the event. This rating should correspond to the rating from the flow section of the Stream/River Field Data Form. **Note: that a flow event will not be created when chemical sampling events are manually uploaded and will have to be created for the station separately
- Select "save." The chemical sampling event and associated RIDs should appear under the sampling events.
- Navigate to the project folder and select a station to ensure that the sampling events were successfully uploaded.

7.2 Upload of Chemical Analytical Results

The QAO uploads all chemical results completed by the State Laboratory Division and any other contracted laboratory. See QAO for additional details regarding result upload procedure.

8.0 Quality Control and Quality Assurance

The SWQB controls the quality of chemical sampling in lotic environments by using standardized methods that are documented in this SOP. All personnel who collect conduct chemical sampling in lotic environments or process samples for lotic environments must be familiar with these protocols, sign acknowledgment form associated with this specific SOP and collect data in accordance with the procedures as they are defined in this SOP and all other applicable SOPs. In addition to standardized methods, proper training of field personnel represents a critical aspect of meeting the data quality objectives to fulfill the goals of the SWQB's QAPP (NMED/SWQB. 2024). Different types of quality control samples are collected to check for contamination and background levels of analytes that may be introduced through exposure to the environment, sampling containers, reagents and acids, and laboratory equipment used to collect and analyze the various types of samples.

Assurance of field data collection for chemical samplings is done through adherence to the procedure detailed in this and other applicable SOPs and oversight of the process by the QAO. If at any time the QAO determines this process is not being adhered to, the QAO has the authority to cease activities specific to this SOP with prior support and approval by the SWQB Bureau Chief and MASS Program Manager, until such a time that the issue can be resolved.

9.0 Related Forms

Stream/River Field Data Form
Chemical Sampling Equipment Checklist
Total Residual Chlorine Data Upload Form
SLD submittal forms
Equal Width Increment and Depth Integrated Samples

10.0 Revision History

Original. March 12, 2011.

Revision 1. January 23, 2012. Minor edits throughout SOP.

Revision 2. December 20, 2012. Updated Table 3 and additional language regarding total recoverable aluminum.

Revision 3. April 2, 2013. Minor edits to language and some clarification regarding preservation.

Revision 4. April 15, 2015. Changes to blank definitions and types. Added TSS/TDS/Cl/SO_4 blanks.
Vacant, QAO; Douglas Eib, SME; Shelly Lemon, MASS Program Manager

Revision 5. March 14, 2022. Removed blank for SVOCs to follow QAPP; changed formatting to be consistent with SOP 1.1; added SLD submittal forms for organics and radionuclides; Removed discussion on compliance sampling because it is covered in SOP 8.3. Added details regarding the addition of chemical sampling data event in SQUID. Clarity and details added to the step-by-step procedure. Added steps for field sheet completion. Added DOC sampling methods.
Miguel Montoya, QAO; Chuck Dentino, SME; Kristopher Barrios, MASS Program Manager

Revision 6. May 2, 2022. Addressed minor grammatical mistakes, inconsistencies with SOP format numbering, and updated the next revision date to be consistent with details in SOP 1.1 Creation and Maintenance of SOPs. Staff who have signed the acknowledgment statement for the SOP for Chemical Sampling in Lotic Environments, Revision 5, are not required to sign the acknowledgment statement for SOP for Chemical Sampling in Lotic Environments, Revision 6 due to no substantive changes to objectives, procedures, or equipment detailed in SOP.

Revision 7. April 19, 2024. Addressed minor grammatical mistakes. Field blank requirement removed for the collection of nutrients, TSS, TDS, alkalinity, CL, and SO_4. The methods used to analyze specific parameters (i.e., nutrients, TSS, TDS, alkalinity, CL, and $SO_{4)}$ do not require the use of a field blank during

sample collection. Added microcystin sample collection to SOP. Updated procedure for the collection of equipment blanks for DOC. The process for data and records management was updated for clarity and file naming convention was added. Table 2 was deleted. Table 3 is now Table 2. Removed SME from approval page, all monitoring team staff are required to be SME for procedures detailed in this SOP.

Revision 8. April 11, 2025. Addressed minor grammatical mistakes. Updated procedure for the collection of equipment blanks and environmental samples for DOC. Added PCBs sample collection, preservatives and hold time. Microcystin preservation and hold time updated. Addition of Cylindrospermopsin sample collection.

11.0 References

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