New York State Department of Environmental Conservation

Division of Water
Standard Operating Procedure:

Collection of
Stream Water Column Samples for the
Rotating Integrated Basin Studies (RIBS) Program
as part of the Statewide Ambient Water Quality Monitoring Strategy

In consideration of the ongoing COVID-19 pandemic, please follow the Division of Water Guidance for Field Work During COVID-19 Pandemic (SOP #603-20).

April 2021

Approval Signatures

Preparation/Revision: Gavin Lemley 04/06/2021
Date

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QA Review: Rose Ann Garry 04/05/2021
DOW Quality Assurance Officer *Date*

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Note: Division of Water (DOW) SOP revisions from year 2016 forward will only capture the current year parties involved with drafting/revising/approving the SOP on the cover page. The dated signatures of those parties will be captured here as well. The historical log of all SOP updates and revisions (past & present) will immediately follow the cover page.

SOP AMB-210 Update Log[1]

Prepared/Revised By:	Date	Approved By	Revision No:	Summary of Changes
John Donlon	04/2010	Rose Ann Garry	210-11 -1	
DOW Staff	03/2014	Jason Fagel	210-14 -1	
DOW Staff	03/2015	Rose Ann Garry	210-15 -1	
DOW Staff	04/2016	Rose Ann Garry	210-16 -1	Removed artifacts from historical procedures about timing duration of trips; updated mercury sample collection procedures; update of staff titles to provide consistency with QAPP
Alexander J. Smith	04/2017	Rose Ann Garry	210-18 -1	Update to include a new section on the collection of grab samples for general water column constituents at RIBS screening network sites
Alexander J. Smith	03/2018	Rose Ann Garry	210-18 -1	Updates to sample ID number and corresponding SOP and QAPP references. Fixed inaccuracies in Mercury preservation and bottle volume. Inserted contact information for new toxicity testing laboratory.
Jeff Lojpersberger, Gavin Lemley	04/2019	Rose Ann Garry	210-19-1	Inserted HABs Sampling language
Jason Fagel	05/2019	Rose Ann Garry	210-19-2	Updates to CH/DH Hg sampling procedures
Brian Duffy, Gavin Lemley, SMAS staff	04/2020	Rose Ann Garry	210-20.COV-1.0	Updates for COVID-19 procedural changes. Removed mention of field duplicate samples. Updated mercury preservation and holding time to reflect changes in 2019. Other minor updates for accuracy and consistency.
Gavin Lemley	05/2020	Rose Ann Garry	210-20.COV-1.1	Added sequential duplicate sampling information. Added note about rounding sampling times.
Gavin Lemley, Brian Duffy	02/2021	Rose Ann Garry	V21-1	Added “Stream” to doc title. Added definition of sampling season window. Revamped LL Hg sampling section for clarity and accuracy. Clarified equipment and pump rinsing process. Added reference to SOP 222, CEC sampling. Various language, clarity, and formatting cleanup.
Gavin Lemley	03/2021	Rose Ann Garry	V21-2	Updated Table 1 holding times. Added Field Blank to section 11.11. Added noted about CEC vs Hg field blank method difference and SOP 222 reference. Rebuilt document numbering and TOC.

[1] The detailed ‘Update Log’ for DOW SOPs was adopted in 2016. The log may not be complete for updates conducted prior to 2016.

[2] ‘No substantive changes’ include updating references, correcting typographical errors, and clarifying certain language to make the document more useful and effective.

Table of Contents

1. Scope and Applicability

1.1 This standard operating procedure covers the collection of representative ambient flowing water column samples for the purpose of chemical, biological and physical analysis in the assessment of stream water quality for the Rotating Integrated Basin Studies (RIBS). It includes samples collected from streams and rivers of various depths and velocities using depth-integrating samplers, discrete -depth samplers, single grab samples, compositing and non-compositing techniques, field measurements, sample preservation, and quality assurance.

1.2 This document does not cover guidelines for planning water quality activities, the design of monitoring programs or data assessment.

1.3 This SOP is to be followed unless project objectives or physical conditions make it inappropriate. In such a case, the exact procedures followed, or deviations from the SOP must be documented on the field sheet or in the field logbook, and the information submitted to the Division of Water Quality Assurance Officer for possible incorporation into future updates to this SOP.

1.4 Special health and safety considerations for COVID-19 are to be followed. Modifications to outlined procedures are to be in accordance with Division of Water Guidance for Field Work During COVID-19 Pandemic (SOP #603-20).

2. Summary of Method

2.1 The RIBS program sampling procedures are designed to provide the most representative samples, given time, staff and resource constraints.

2.2 A RIBS Quality Assurance Project Plan (QAPP) must be approved by the Division of Water's Quality Assurance Officer before any samples are collected.

2.3 Two distinct water quality sampling networks (screening network and routine network) exist in the RIBS program requiring different levels of rigor for sample collection method based on the network objectives.

2.4 Water chemistry sampling conducted at screening network locations is meant only to enhance macroinvertebrate assessments of water quality by providing some indication of possible sources of impact. Water column constituent data from the screening network is not meant to provide an exhaustive representation of in-stream condition over any length of time. Therefore, at screening network locations a direct grab sample is employed and considered adequate for the intended purposes of the network.

2.5 The routine network provides information on an annual basis for a large range of waterbodies statewide. Water column chemistry samples are collected four times, annually. These sites are co-located with United States Geological Survey (USGS) gage stations to facilitate loading calculations for TMDL development and other watershed planning initiatives. Therefore, given the anticipated use of these data

greater representation of in-stream conditions is required of the sampling protocol. As a result, sampling methods at routine sites utilize a composite sample collected from a cross section of the stream's width and depth for parameters that are amenable to compositing.

2.6 The collection of water column samples at multiple depths at routine sites is accomplished through the use of specially designed discrete depth water collection equipment such as Kemmerer water samplers, and flow-orienting depth integrating suspended-sediment samplers. Water column samples collected across a stream's depth and width are composited in a sample splitting churn. These methods may also be applied from time to time in special surveys of water quality where greater rigor than a direct grab sample is warranted. The details of these special surveys are typically contained in project specific quality assurance project plans (QAPPs) and are not covered here. However, the sampling methods used in these types of surveys may call upon the information contained within this SOP.

2.7 Parameters that may have their composition and proportions altered by compositing (e.g., phenols) are not to be field composited. Collection of water column samples for these parameters must be achieved through direct grabs similar to that used in the RIBS screening network or other special handling methods. Refer to the Procedures section of this SOP for specific water collection practices.

2.8 This SOP should be used in conjunction with SOP-GEN-101_V21-1. - Sample Handling, Transport, and Chain of Custody (COC), SOP-GEN-103_V21-1 - Equipment Cleaning, SOP-AMB-211_v21-1 - Calibration, Maintenance, and Storage of Multi-probe Meters used in Field Sampling and SOP-AMB-212_V21-1 Collection of Harmful Algal Bloom Samples (or most current versions).

3. Definitions

3.1 Composite sample: A sample that is made up of a number of grab samples that are collected from across a section of a stream's width and depth.

3.2 Depth-integrating suspended sediment sampler: A depth-integrating suspended sampler is designed to accumulate a water/suspended sediment sample from a stream vertical at such a rate that the velocity in the nozzle is nearly identical to that of the stream. This results in the collection of a sample that has a water/suspended sediment ratio similar to that of the stream.

3.3 Dip: One complete cycle of the depth-integrating suspended sampler from the water surface to the bottom and back again.

3.4 Field Blank: To assess the potential for contamination from field conditions during sampling. A container of deionized/distilled water is included with the supplies for a sampling event. For mercury field blanks, the field crew opens the designated container of field blank water brought into the field. The deionized/distilled water is exposed to the air for approximately the same amount of time that it takes to collect a sample then pours the water directly into parameter specific sample bottles. The field blank is

processed along with the environmental samples. CEC field blanks follow a different procedure, which is detailed in SOP-AMB-222_V21-1.

3.5 Grab sample: A single discrete sample taken from a specific point and collected in the shortest time possible not to exceed 15 minutes.

3.6 Discrete Depth sampler: A device, such as a Kemmerer designed to collect water samples at designated points in the water column. The sampler is lowered to the desired depth by a rope with a weighted messenger attached. The silicone end seals are tripped closed with the messenger, sealing the bottle contents from any further contact with the stream water. See section 11.4 for detailed procedures on use.

3.7 Quality Assurance Project Plan (QAPP): A document that describes project-specific plans for sampling, analysis and quality assurance, quality control, to ensure the results of a project generate data of a quality necessary to address the project objectives

3.8 Representative sample: a small quantity from the population being studied that has the same biological, chemical, and physical composition and proportions as those present in the population being studied. It represents in time and space the conditions that are determined by the objectives and scope of the study.

3.9 Stream depth: The stream depth is the vertical height of the water column from the existing water surface level to the channel bottom.

3.10 Stream wetted width: The stream wetted width is the horizontal distance along a line from shore to shore.

3.11 Transect line: A line delineated by two points on opposite streambanks, used as a location reference in collecting multiple samples across a river or stream.

3.12 Transect: Sampling conducted at a point along the transect line across a river or stream.

3.13 Trip: A unit that refers to the number of times the depth-integrating suspended sampler and sample bottle are brought above the water surface and the collected water is emptied into a sample splitting churn.

3.14 Water column: The vertical section of water between the waterbody surface and the stream bottom.

4. Health and Safety Warnings

4.1 This standard does not address all safety concerns associated with conducting field sampling and the handling of chemical reagents. Staff are directed to follow the appropriate health and safety practices covered in the Division of Water Health and Safety Program Safety is more important than the task. Regardless of the reason, if conditions at the monitoring site are considered unsafe, suspend sampling, and leave

the site. Be aware of and assess potential safety concerns at each sampling location before beginning to collect a sample.

4.2 COVID-19: Special health and safety considerations for COVID-19 are to be followed. Modifications to outlined procedures are to be in accordance with Division of Water Guidance for Field Work During COVID-19 Pandemic (SOP #603-20).

4.3 Always work with at least one partner when collecting ambient water quality samples.

4.4 Never wade in swift or high water. Use a wading rod to steady yourself and to test for deep water, debris, and muck.

4.5 Know what is upstream of a sampling site before entering the stream. An unexpected dam release could leave a sample collector stranded and in trouble in the stream.

4.6 Do not sample near or from power sources; power lines, and boat motors.

4.7 Wear and maintain assigned personal protective equipment. A reflective vest must be worn when sampling from a bridge.

4.8 Bridges with high railings must be sampled using proper equipment that allow samplers to maintain footing on the roadbed. Contact the sampling coordinator if you need to obtain this equipment.

4.9 Cover all cuts and abrasions before sampling.

4.10 Wear proper field clothing to prevent hypothermia, heat exhaustion, sunstroke, drowning, or other dangers.

4.11 Be fully aware of all lines of communication in case of an emergency. When working in remote areas, either on little traveled roads or away from roads, always carry a cell phone or other emergency communication device (if cell phone coverage is lacking or questionable), as described in the Division of Water Health and Safety Program. Refer to SOP-ADMN-602_V21-1 for detailed field communication procedures.

4.12 When sampling from a boat, the field team should follow the boating safety procedures described in the Division of Water Boating Safety Program.

5. Personnel Qualifications

5.1 All staff responsible for collecting water quality samples for the RIBS project shall be familiar with the procedures outlined in this SOP, the RIBS Quality Assurance Project Plan and the Division of Water Health and Safety Program, prior to conducting water quality sampling, and shall receive training as detailed in the RIBS QAPP.

6. Equipment and Supplies

The equipment needed for the collection of ambient water quality samples includes, but is not limited to the following:

6.1 Point samplers Kemmerer Water Sampler Depth-integrating suspended sediment sampler (Flow-orienting, US DH- 81 Adapter, or other similar DH model) and bottles.

6.2 Rod for use with DH-81.

6.3 Expandable Open Water Sampling Pole ("swing sampler")

6.4 Sample collection bottles (1-quart Mason jars, 1-Liter plastic bottle or similar).

6.5 Sample containers as provided by analytical laboratories, ALS Environmental, NYSDEC Toxicity Testing lab or bacteriological laboratories.

6.6 Line and messengers

6.7 Rope

6.8 Sample splitting churn

6.9 Stainless steel pail

6.10 Maps

6.11 Personal protective equipment, including but not limited to; non-powdered Nitrile or latex gloves, boots and reflective vest, first aid kit, cell phone, and/or another emergency communication device.

6.12 Field sheets/log book, Chain of Custody forms (COC), pens, pencils, clipboard, and labels.

6.13 Global Positioning System (GPS)

6.14 Approved QAPP

6.15 Multi-parameter meter to measure pH, dissolved oxygen, specific conductance, temperature, and barometric pressure (YSI 556, Pro-Plus, or ProDSS, meter manual and/or quick calibration reference, copy of SOP, and calibration equipment). Chlorophyll-*a* and phycocyanin will be recorded when using a YSI ProDSS.

6.16 For filtering metals and DOC: GeoTech Peristaltic pump w/ 0.45 Micron Versapor dispos-a-filter™ and tubing for filtering soluble constituents prior to chemical analysis.

6.17 For filtering orthophosphate: 60 CC Syringes w/ Luer tip (ex. Krackeler 24-8881560224-CS) with syringe filters 0.45 µm (ex. Cole-Parmer EW-02915-92) for orthophosphate samples.

6.18 Tap water, Wet wipes for hand cleaning or hand sanitizer, Kim wipes or paper towels, garbage bags, waste container or bag

6.19 Deionized or distilled water

6.20 Coolers, wet ice, shipping tape and Zip-lock bags.

6.21 Pocket knife for HABs rock scrape sample (if needed)

7. Prevention of Sample Contamination

7.1 Never eat, drink, or smoke when collecting and handling samples.

7.2 Always clean hands (soap and water, wet wipes, antiseptic cleaner) before and after collecting or handling samples. Sampling personnel should wear new, clean gloves at each sampling site. If gloves become contaminated, they must be replaced.

7.3 Protect sampling equipment from damage and ambient contaminants both during transport and sampling efforts. Contact with stream embankments, objects in streams, bridge rails, sides of boats and other objects, may compromise the integrity of equipment. And sample*s. Extra care must be used when handling equipment made of brittle material to prevent breakage*

7.4 Sample integrity is critical in obtaining meaningful data from water quality samples. Introduction of contaminants into the sample from sampling equipment, sample preparation, sample handling, improper collection methods and the location of the sampling site can influence sample constituents. Following proper collection and handling procedures will help ensure sample integrity.

7.5 When collecting and transferring samples, one person (clean hands) is responsible for handling the sample bottles and ensuring that the sample is not contaminated by incidental contact with sampling equipment or other materials. The second person (dirty hands) is responsible for all activities that do not involve direct contact with the samples.

7.6 Following proper storage, cleaning, and handling of all sampling equipment will minimize the introduction of contaminants to the sample. Refer to the Division of Water SOP-GEN-101_V21-1 - Sample Handling, Transport, and Custody and SOP-GEN-103_V21-1 Equipment Cleaning (or most current versions) for proper procedures.

7.7 New sample splitting churns are to be washed with phosphate free liquid detergent (Liqui-Nox ®) prior to first use.

7.8 Avoid introducing more suspended sediment into the sample than is normally present in the water column. If the sampler hits the stream bottom, sediments that are stirred up may result in larger amounts of sediment in the sample than are present in the water column, resulting in erroneous data. Always enter a river or stream downstream of the

sampling site and use caution when lowering sampling collection equipment to avoid stirring up bottom sediments.

8. Preparation for Sample Collection

The analysis of water column samples involves the detection of substances in low concentrations. It is important that the most appropriate sampling device be used to collect the water sample, and that sample integrity be maintained from the time of collection through analysis in order to reduce the possibility of sample contamination.

8.1 Prior to sample collection check bottle set received from the analytical laboratory to verify all required bottles are included and not broken. Contact the Sampling Coordinator (see current RIBS QAPP for staff assignments and contact information) if there are any issues with the bottle set.

8.2 A representative stream sample is essential as water constituents may vary over the cross section of a stream. Groundwater influence, point and nonpoint discharges, tributary inflows and channel characteristics are a few of the factors that influence water quality. Proper sampling site location and following appropriate sample collection procedures help ensure a representative sample is collected.

8.3 Since many pollutants adhere to suspended sediment particles in the stream, a representative water column stream sample must contain a representative proportion of sediment particles. This is accomplished by properly deploying the appropriate sampling device.

8.4 Do not rinse the sample bottles with the sampling medium unless directed specifically to do so. Bottles provided by the analytical laboratory are certified and pre-cleaned and do not require rinsing.

8.5 Avoid sampling near river or stream banks, piers, man-made obstructions, in stagnant water, or from an eddy, which may create variations in flow patterns.

8.6 Determination of the appropriate sampling method and device is based on stream type and parameters to be analyzed. The goal is to minimize loss or introduction of the parameter being analyzed and to ensure that the water sample is representative of the chemical, biological and physical characteristics of the stream being studied. See Section 9 for detailed procedures for selecting the appropriate sampling method.

8.7 Determine what special collection requirements, if any, are needed to maintain the integrity of the parameters to be analyzed. For example, a water sample cannot be aerated when collecting for volatile organics. If there is a question about special requirements, check with The Sampling Coordinator (see current RIBS QAPP for staff assignments and contact information) for verification of parameter specific information.

8.8 Based on the parameters to be analyzed and quality control samples to be collected, determine the quantity (volume) of water that must be collected. An additional two (2) liters of water is required to allow for proper rinsing of and mixing in the sample splitting

churn. Refer to SOP-GEN-101_V21-1 Sample Handling, Transport, and Chain-of-Custody (or the most current version) for sub-sampling requirements from the sample splitting churn (filling of individual bottles to be filled for various parameters).

8.9 Assess the site's physical characteristics such as stream velocity, depth, width, sources of inflows and accessibility. Determine the number and location of sampling transects based on stream uniformity of flow (discharge) and field parameters (such as pH, water temperature, specific conductance, and dissolved oxygen). At a minimum five transects should be collected across the stream width. All transects should be equally spaced. In general, uniform streams require fewer transects while streams showing wider variations between flow and field parameters require more transects. To ensure a representative sample establish more transects with fewer trips/ dips.

8.10 Regardless of the method of collection, all sampling equipment employed should be free from contaminants prior to sampling. Refer to SOP-GEN-103_V21-1 Equipment Cleaning (or the most current version).

8.11 Assemble the necessary sampling equipment and set up a clean work space away from automobile and boat emissions.

8.12 The first water sample collected at a sampling site is used to rinse the sampling devices and sample splitting churn.

8.13 When using depth-integrating suspended sediment sampler (DH-81), glass bottle containers, if possible, should be site-dedicated. Clean the nozzle according to SOP-GEN-103_V21-1 Equipment Cleaning (or most current version).

9. Selection of Sampling Devices

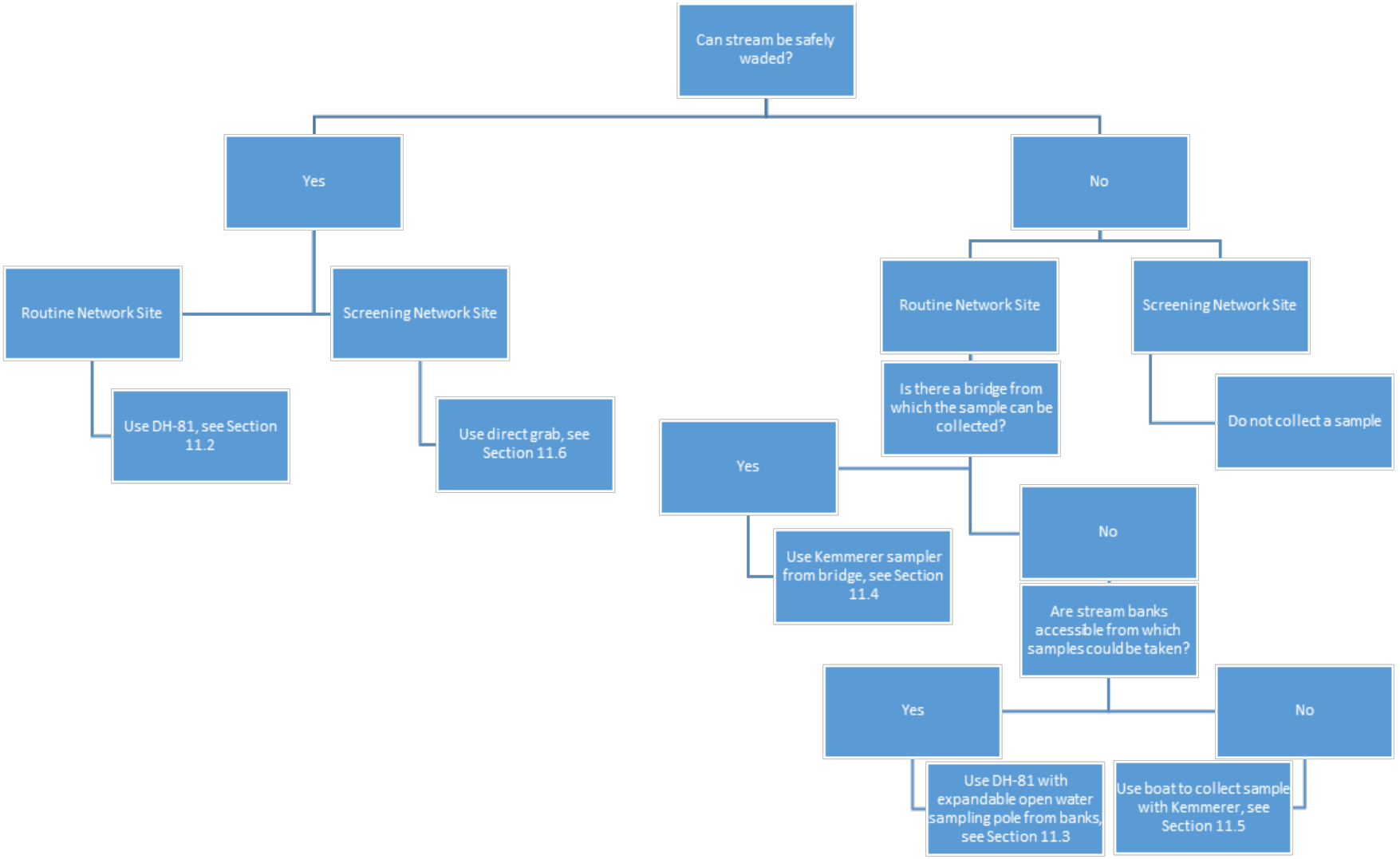
For many sampling locations, selection of the sampling device must be done on arrival, since conditions vary throughout the sampling season. Some streams can be waded most of the year except for during high flows in the spring, so the sampling device may be different for different sampling events (see Figure 1).

9.1 Assess whether the river or stream can be safely waded. If it can be waded and the site is part of the routine network, use a hand-held depth-integrating suspended sediment sampler (DH-81 or similar model) to collect surface water samples. If it can be waded and the site is part of the screening network use a 1L glass or plastic sample bottle for a direct grab to collect surface water samples. These methods apply to collection of surface water for standard chemical parameters only (special collection methods for toxicity testing, phenolic samples, toxicity testing, filtering samples and quality control samples are detailed in sections 11.7-11.10).

9.2 In the case of a routine network site, if the stream cannot be waded then samples are to be collected using the Kemmerer sampler from a bridge. Where current speed is strong, a weight should be attached to allow the sampler to drop straight down through the water column. In the case of a screening network site that cannot be waded, sample collection should not be attempted.

9.3 For routine network sites, if there is no bridge at the site, either a boat must be employed to collect samples, see Section 11.5 for boat use with depth-integrating or point samplers or use the DH-81 with the expandable open water sampling pole from both banks, see section 11.3 for detailed procedures

Figure 1. Selection of Appropriate Sampling Device



10. Collection of Field Parameters

Field parameter measurements (temperature, pH, conductance, dissolved oxygen, chlorophyll-a [ProDSS only] and phycocyanin [ProDSS only]) should be taken directly from the water column whenever possible, in the part of the stream that has a flowing volume of water. Do not sample in quiet waters near shore. If this is not possible because of a short cable or other problems with direct access to the water, collect water from the stream in a polypropylene bucket and place the probe into the bucket to measure the parameters. See SOP-AMB-211_V21-1 Calibration, Maintenance, and Storage of Multi-probe Meters used in Field Sampling for calibration requirements.

10.1 Dissolved Oxygen (D.O) – Use a multi-parameter probe or a dissolved oxygen meter. Make sure that the equipment has been calibrated following the manufacturer's specifications or procedures in SOP-AMB-211_V21-1. Record both dissolved oxygen and percent saturation. Make certain the meter is recording the parameter in units that correspond to the units printed on the field sheet. If not, the meter must be reprogrammed for the units on the field sheet.

10.2 Specific conductance – Use a multi-parameter probe or an appropriate specific conductance meter. Make sure that the equipment has been appropriately calibrated following the manufacturer's specifications.

10.3 pH – Use a multi-parameter probe or a pH meter. When calibrating the meter, select a high and low pH buffer that reflect the expected pH range of the stream. Make sure that the equipment has been appropriately calibrated following the manufacturer's specifications. Record the pH value and if the meter being used is a YSI Model 556, record the millivolt output of the sensor on the field sheet.

10.4 Water Temperature – Use a multi-parameter probe. Temperature is a factory-calibrated parameter.

10.5 Barometric Pressure - Record the barometric pressure for the sampling date from a barometer, local airport or weather station report. Some multi-parameter meters have built-in barometers.

10.6 Chlorophyll-a and phycocyanin – Use a YSI ProDSS multi-parameter probe. Refer to SOP-AMB-211_V21-1 for details. These parameters are currently only collected during RIBS screening sampling.

11. Collection of Water Samples

Sample collection methodology for the **2021 Pilot on Contaminants of Emerging concern (CECs)** in RIBS Routine is documented in SOP-AMB-222_V21-1.

11.1 Samples for Low-level Mercury Analysis

11.1.1 With the exception of contaminants of emerging concern (CECs), collect trace mercury samples before all other activities at site. Refer to SOP-AMB-222_V21-1 for CEC sampling procedures.

11.1.2 If performing QAQC sampling at the site, confirm that you have sufficient bottles as soon as they are received from the lab. A site with QAQC will need 4 additional LL Hg bottle kits (MS, MSD, and sequential duplicate [SEQ]) plus one LL-Hg Field Blank (FB) kit, which comes from the lab pre-filled with DI water (total of 5 bottle kits). Each QAQC bottle kit (bag) must be labeled with their respective QAQC sample type code (*i.e.,* MS, MSD, SEQ, FB). These labels are provided by the RIBS sampling coordinator.

11.1.3 Before beginning sample collection, assess the area around the sampling site for potential sources of trace metal contamination. Consider the proximity to vehicle exhaust, corroded or rusted bridges, pipes, poles or wires and the prevalence of airborne dust/dirt. If possible, adjust sampling location to be out of influence of trace metal contamination. Note any potential contamination sources on field sheets.

11.1.4 Do not smoke immediately before or during the collection and processing of samples. Avoid directly breathing on the sample bottle/container.

11.1.5 Designate one person to be “clean hands” (CH). CH, once gloved in mercury free gloves, has the responsibility to handle only the LL Hg sample bottle and to collect the LL Hg sample. Designate the other sampler to be “dirty hands” (DH). DH has responsibility for handling everything except for the sample bottle and contents of the outer bag. Members of the sampling team are to maintain the same CH/DH roles through the entire day of sample collection.

11.1.6 There are two types of gloves used in the LL Hg sample collection process:

1) LL Hg free gloves, which will be provided by the laboratory in the LL Hg bottle kit, and

2) Powder free general use nitrile sampling gloves, which are provided by DOW and stored in a dedicated PPE container. Clean Hands (CH) will wear the lab-provided LL Hg free gloves while Dirty Hands (DH) will wear only powder free general use nitrile sampling gloves.

11.1.7 <u>Steps for sampling LL Hg:</u>

11.1.7.1 Put on waders and any other site-specific safety gear except for gloves and other "clean" items. Only CH may require waders.

11.1.7.2 Bring the cooler and the personal protective equipment (PPE) storage container/bag to the water's edge. Place cooler and PPE storage container on a stable area away from potential contamination sources. These containers are always to remain covered/closed except for when retrieving items from or placing items inside. When the lid of the cooler or PPE container is removed, always position the 'inside' of the lid so that it will not contact any other surfaces.

11.1.7.3 DH opens the PPE storage container (ensuring that the inside of the lid does not contact the ground) and puts on two pairs (i.e., two layers) of powder free general use nitrile sampling gloves. CH puts on a single pair of the same gloves. DH replaces the lid on the PPE storage container.

Note: the purpose for using double gloves is to minimize time needed to re-glove if during the sample collection process an outer pair of gloves becomes contaminated or compromised (ripped). Either CH or DH can remove the outer pair in this case and continue sampling.

11.1.7.4 DH removes LL Hg bottle kit from the cooler and replaces the cooler lid.

11.1.7.5 DH unseals outer bag, holds open for CH. CH carefully removes the laboratory-provided gloves from the outer bag and puts them on over the single pair of nitrile gloves they are already wearing. CH then opens the inner bag and removes the sample bottle and folds over (no need to seal) the inner bag and tucks it closed.

- CH should verify that the sample bottle does not contain preservative (the cap should not have tape around it). If sampler does not notice this in time to obtain new bottles from the lab, samplers should collect the sample regardless and clearly note the issue on the COC. Sampler should also communicate this with the sampling coordinator or lab as soon as possible.

- From the time the sample bottle is removed from the inner bag, until the time it is returned, CH should make a reasonable effort to keep the container away from their body and clothing. Both samplers are to avoid breathing directly on the inner bag, sample container, or sample.

11.1.7.6 DH reseals outer bag, places it back into cooler and replaces lid.

11.1.7.7 CH wades out to sampling location, approaching the sample point from downstream.

11.1.7.8 Facing and reaching upstream, CH plunges the still capped, empty sampling container underwater to the desired depth (4-6" below the surface), taking care to avoid any surface scum or sheens.

11.1.7.9 Holding the bottle away from their body, with the opening facing upstream, CH uncaps the bottle underwater, allows it to fill to the shoulder, and re-caps the bottle underwater (keeping cap underwater during filling).

11.1.7.10 CH wades back to the bank and staging area.

11.1.7.11 DH removes bag from cooler and holds open outer bag for CH.

11.1.7.12 CH places sample bottle in the inner bag and re-seals.

11.1.7.13 DH re-seals outer bag and records details of the sample collection on the Sample Label that is secured to the outer bag.

11.1.7.14 DH promptly returns bagged sample bottle to the cooler.

11.1.7.15 **Steps for collecting QC samples** (if not applicable, skip to 11.1.7.16):

11.1.7.15.1 All LL Hg QC samples must be performed at the same site.

11.1.7.15.2 Both DH and CH change gloves prior to performing each QC sample bottle collection. In most cases, changing only outer gloves is sufficient (*i.e.*, DH applies new outer pair of nitrile and CH applies new lab-provided pair as in step 11.1.7.5).

11.1.7.15.3 Perform **Sequential Duplicate (SEQ)** sample collection with the appropriately labeled bottle kit using the sampling procedures from steps 11.1.7.3 through 11.1.7.14 above.

11.1.7.15.4 Perform **Matrix Spike (MS)** and **Matrix Spike Duplicate (MSD)** sample collection with the appropriately labeled bottle kit. The sampling procedures from 11.1.7.3 through 11.1.7.14 above are repeated for each of the designated MS and MSD sample bottles.

- Note that MS and MSD samples for LL Hg are collected consecutively using two separate bottle kits, as opposed to the combined MS/MSD bottle set for the typical (non-Hg) RIBS Routine suite.

11.1.7.15.5 Perform **Field Blank (FB)** procedure as follows:

11.1.7.15.5.1 Both DH and CH change gloves prior to performing FB.

11.1.7.15.5.2 DH opens cooler and removes bagged FB kit (provided by the lab; similar to the normal sample kit but the bottle is pre-filled with DI water).

11.1.7.15.5.3 DH opens outer bag and holds open for CH. CH removes lab-provided gloves from inside the outer bag and puts them on.

11.1.7.15.5.4 CH opens inner bag and removes FB bottle, folds inner bag over, and tucks it closed.

11.1.7.15.5.5 DH reseals outer bag and returns it to the cooler

11.1.7.15.5.6 Standing facing into the wind, CH holds the FB away from his or her body, removes the cap to expose the DI water to the atmosphere, while holding the cap in a manner so that it does not come in contact with clothing or any other object. The exposure time should be roughly equal to the time it took to perform the sample collection. The FB is recapped at the conclusion of the exposure period.

11.1.7.15.5.7 DH removes the FB bag from the cooler and holds open for CH.

11.1.7.15.5.8 CH places the FB inside the inner bag and reseals.

11.1.7.15.5.9 DH reseals the outer bag and records sampling information on the sample label secured to the outer bag.

11.1.7.15.5.10 DH promptly places the FB in the cooler and returns the cooler to the vehicle.

11.1.7.16 Team removes PPE.

11.1.7.17 Complete any remaining sample notes/paperwork for LL Hg collection.

11.1.7.18 Continue collection of other samples and readings at site.

11.2 Depth-Integrating Suspended Sediment Sampler - Wading (DH-81 or similar model)

11.2.1 This sampling method allows the collection of a water sample to be collected continuously through a vertical column of the stream depth.

11.2.2 After applying gloves, assemble the wading rod and nozzle head and secure the site dedicated collection bottle into the nozzle head.

11.2.3 Enter the water downstream from where the sample will be collected so as not to stir up bottom sediments at the sampling site.

11.2.4 Select the first transect point in the portion of the stream that appears to have the highest flowing volume of water.

11.2.5 The first water collected is used to rinse the sample splitting churn and determine the rate of descent/ascent and the number of dips. A uniform rate of descent/ascent should be maintained while raising and lowering the sampler through the water column. The transit rate is a function of the type of collection bottle or bag, size of sampler nozzle, and the desired sample volume.

11.2.6 After rinsing the sample splitting churn thoroughly discard the water downstream from the sample collection site.

11.2.7 Orient sampler with nozzle facing upstream and into the flow while standing downstream of sampler.

11.2.8 Lower the sampler through the water column to the bottom of the stream without disturbing the bottom sediment. Stirred up bottom sediments may enter through the nozzle, resulting in erroneous data. When sampling streams during low flow conditions (less than 8 inches deep), remove the glass jar from the DH-81 nozzle and dip directly into the water column, taking care not to disturb the stream bottom. Note on the field sheet under sampling equipment “bottle” to reflect the collection method used.

11.2.9 Raise sampler to the water surface level. A uniform rate of descent/ascent (typical rate should be 1 ft/sec) should be maintained while raising and lowering the sampler through the water column.

11.2.10 One complete cycle from the water surface level to the stream bottom and back again is referred to as a "dip."

11.2.11 Repeat dips until the sample bottle is about 75% full and keep track of the number of dips on a field sheet. Do not fill the sample bottle more than 75%, as it will act as a sediment trap.

11.2.12 Each time the sampler and sample bottle is brought up and emptied into the churn is considered a "trip." A trip is made up of the same number of dips along each transect.

11.2.13 The number of trips to be collected at each transect is determined by the total volume of water that is required to fill all bottles and the number of transects.

11.2.14 The number of dips per trip depends upon the stream depth and the speed with which the sample bottle fills.

11.2.15 To ensure a representative sample establish more transects and fewer trips/ dips. Minimum 5 transects, typically 10 depending on stream width with 5-10 dips per trip to ensure representative sample.

11.2.16 Move to the next transect and continue the sample collection using the same number of trips and dips as was established at the first transect. The trips and dips must remain constant at all transects.

11.2.17 The number of transects, trips and dips should remain consistent for subsequent sampling events at the site and under similar conditions.

11.2.18 After sampling is complete, record the number of transects, trips, and dips, and any deviations from standard sampling procedures on field sheets or in a logbook.

11.2.19 Rinse the sampling equipment, including the site dedicated collection bottle and filtering equipment twice with distilled/deionized (DI) water. The pumping system will have its own dedicated DI container to use for rinsing (see section 11.9.1.9 for details). After the two initial rinses, wipe the water-contacted surfaces of the sampling churn and sampling device with a Kimwipe®. Check to make sure there is no slime or residue remaining on the sampling devise or inside of the churn. Perform a third DI water rinse. The DI water rinse is to be done between each sampling site and at the end of the sampling day. Samplers may omit one of the initial two rinses if DI water is limited in supply, but a total of three rinses is preferable.

11.2.20 Refer to SOP-GEN-103_V21-1 (NYSDEC, 2021) for more details on equipment cleaning procedures.

11.3 Depth-Integrating Suspended Sediment Sampler-with expandable open water sampling pole (DH-81 model)

11.3.1 This sampling method allows the collection of a water sample to be collected continuously through a vertical column of the stream depth, while standing on the stream banks.

11.3.2 Assemble the pole and nozzle head and secure the site dedicated collection bottle into the nozzle head.

11.3.3 Follow remaining steps as above in section 11.2.

11.4 Discrete Depth Point sampler--Kemmerer Sampler

11.4.1 Determine the number of discrete depths to be sampled using a Kemmerer sampler by following the guidance in Section 8.9. The more homogeneous the stream flow the fewer discrete depth samples are needed, at a minimum, three depths--top, middle and bottom-- are required at each sampling transect. Take the sample from the deepest depth first then move up the water column to the middle section, and finally to the top section. When lowering the sampler to the deepest depth use caution not to stir up bottom sediments.

11.4.2 Set sampler to the open position by following the manufacturer's instructions for setting the end seals. This is done by either pulling the trip head into the trip plate or by holding the top and bottom stoppers and giving a short, hard pull to the bottom stopper.

11.4.3 Lower the sampler to desired depth while holding the messenger and feeding the sampler cord through the sampler. Release the messenger or trip mechanism used to close both of the end seals.

11.4.4 Raise the sampler, remove the lid from the sample splitting churn, and pour water from the drain valve or one of the sampler ends into the churn. Replace the churn lid between pours to prevent debris from contaminating the sample.

11.4.5 Rinse the sampler and sample splitting churn with the first collected water.

11.4.6 Repeat the above steps at each of the desired depths and transects across the stream for actual sample collection (see Section 8.8).

11.4.7 After sampling at a site is completed, rinse the equipment with distilled/deionized water twice. After the initial two DI rinses, wipe churn or sampling device with a Kimwipe, then rinse again with DI water. After churn is rinsed run DI water thru the filtering set-up; tube, filter and pump for 30-60 seconds until thoroughly flushed. DI water rinse is to be done between sample sites.

11.4.8 After sampling is completed for the day, rinse the point sampler with distilled/deionized water, let dry in the "opened" position and store the sampler in the "closed" position.

11.5 Boat Sampling – Depth-Integrating or Point Sampler

11.5.1 Follow steps as outlined for discrete depth sampler with the following precautions.

11.5.2 Field team must follow the boating safety procedures as described in the Division of Water's Boat Safety program.

11.5.3 When possible turn off the boat motor and anchor properly before sampling.

11.5.4 Designate one person to run the boat and a second to collect the sample to avoid possible contamination from boating operations.

11.5.5 Take care to prevent sampling equipment from swinging into the sides of the boat or any nearby structures such as piers or docks.

11.6 Direct Grab

A single grab sample taken directly in the stream is the most efficient way of collecting water column samples for screening network sampling locations or at routine network locations when the nature of the parameter to be analyzed is not amenable to field compositing collection techniques. If a direct sample cannot be collected, the sample collection equipment must be constructed of an inert material or material compatible with the parameter being analyzed. Ropes or extension poles can be used to lower collection equipment into the water column. Detailed procedures for the most commonly collected parameters are listed below.

11.6.1 Enter the water downstream from where the sample will be collected.

11.6.2 Select the area of the stream having the representative flow.

11.6.3 Face upstream and into the flow.

11.6.4 Orient a site dedicated collection bottle (1-L plastic or 1-quart Mason jar) with the opening towards the flow and in front of you. For some grab samples where compositing is not preferred, for example samples for phenols, mercury, or bacteria,

the collection bottle will double as the sample bottle used for shipment to the laboratory.

11.6.5 To avoid introducing surface scum keep the collection bottle or sample container capped, and invert the sample container before submerging.

11.6.6 Lower the collection bottle or sample container 6 to 10 inches below the water surface.

11.6.7 Uncap the collection bottle or sample container underwater to avoid introducing surface scum into the bottle.

11.6.8 Tilt the collection bottle or sample container to a 45-degree angle with the flow and hold it steady. Avoid agitation or aeration to the sample.

11.6.9 Allow the collection bottle or sample container to fill with water.

11.6.10 Cap the collection bottle or sample container while it is still submerged underwater. For non-composite sample, collection is complete.

11.6.11 For general water chemistry parameters, excluding phenols and mercury, empty the contents of the collection bottle into the sample splitting churn. Use of the sample splitting churn facilitates the collection and mixing of an adequate volume of water to fill all required sample containers. The mixing provided by the churn ensures that each of the sample containers represents the entire volume of water collected at each site. Follow the procedures for preparing and handling the sample splitting churn (Sections 11.2). Continue to add additional grab samples from the collection bottle to the churn until sufficient volume has been obtained for the sample analyses required. Using the churn, split sample among necessary sample bottles following methods defined in depth integrated suspended sediment and discrete depth point sampling (Sections 11.2, 11.3, and 11.4 respectively).

11.6.12 As in the procedures outlined for depth-integrated sample collection (Sections 11.2), follow rinsing procedures for collection bottles and sample splitting churn.

11.7 Phenolic Compounds

11.7.1 Phenol Direct Grab - Do not composite sample.

11.7.1.1 Select the area of the stream having the representative flow.

11.7.1.2 Continue by following procedures in Section 11.6 for a direct grab sample. Collect a grab water sample directly into a glass sample container. Note: These sample bottles contain preservatives, do not rinse or overfill bottle

11.7.2 Phenol Alternative Method –Expandable Open Water Sampling Pole (“swing sampler”).

11.7.2.1 Do not composite sample.

11.7.2.2 Use Expandable Open Water Sampling Pole ("swing sampler") with glass bottle attached.

11.7.2.3 Select area of the stream with the representative flow that can be accessed safely.

11.7.2.4 Collect a grab water sample with swing sampler. Minimize agitating the sample.

11.7.2.5 Fill the phenol bottle directly from this collection bottle.

11.8 Toxicity Testing – Bridge and Wading

11.8.1 Sampling from a bridge

11.8.1.1 Composite sample following the procedures outlined in Section 11.4.

11.8.1.2 ***Note: These bottles must be rinsed***. Rinse the sample container three times with the site water.

11.8.1.3 Fill the sample bottle to the neck with the composite sample that was collected into the churn.

11.8.2 Sampling - Wading

11.8.2.1 For streams wider than 15 ft composite sample directly into sample bottle taking a portion of sample from a number of transects across the stream. Collecting an equal volume from each transect. For streams less than 15ft wide select the area of the stream's most representative flow (i.e., mid-stream and at mid-depth).

11.8.2.2 Face upstream into the flow

11.8.2.3 Rinse the sample container three times with site water.

11.8.2.4 Orient sample container in front of you and with the opening towards the flow

11.8.2.5 Uncap the sample container. Invert the uncapped sample container and allow the container to fill with water.

11.8.2.6 Fill the sample container to the neck and cap.

11.9 Filtered Samples—dissolved metals, dissolved organic carbon, orthophosphate

11.9.1 For dissolved metals and dissolved organic carbon samples, water should be drawn from the sample splitting churn and filtered through a 0.45 micron filter. To

ensure consistency throughout the RIBS program, filtering equipment will be provided by the Central Office staff and consist of (1) Geo-pump Peristaltic Pump Series I, (2) Tygon tubing, and (3) Versapor Filter capsule with 0.45µm- Dispos-A-Filter.

11.9.1.1 The filter capsules are designed to filter large volumes of water and should be sufficient to process all sampling locations for dissolved metals analysis for one day. If flow conditions are such that the filter becomes visibly clouded or the flow becomes diminished during filtering, the cartridge should be replaced immediately and noted on sample field sheets.

11.9.1.2 It is not necessary to continue churning during filtration since filtered samples are to be drawn after the collection of whole water samples (unfiltered, raw water).

11.9.1.3 Set up pump in a clean area in the sampling vehicle. Attach the pump to a power source in the sampling vehicle.

11.9.1.4 Put on a pair of clean disposable gloves. Obtain a filter capsule and the appropriate laboratory bottle with an affixed label with the dissolved notation.

11.9.1.5 Remove the protective cap from one end of the filtration tubing and place the end of the tubing into the sample water in the churn. Make sure the cap is kept clean.

11.9.1.6 Remove the plastic packaging from the filter capsule. Store filter capsule in original packaging between sampling sites to minimize cross-contamination.

11.9.1.7 Remove the adapter from its plastic container. Attach the threaded end of the adapter to the appropriate end of the filter. Note the arrow indicating the path of flow on the filter.

11.9.1.8 Attach the barbed end of the adapter to the other end of the filtration tubing (after removing the protective cap). Remove the bottle top from the sample container. Place the cap in a clean spot.

11.9.1.9 Turn on the pump. Rinse* the filtering system (tubing and filter) for at least 30 seconds before beginning collection of filtered sample. This is a rinse and is to be discarded. Check filter for the presence of air bubbles. If any bubbles are seen, gently shake the filter to eliminate bubbles before continuing to collect the sample.

11.9.1.10 *In order to minimize cross-contamination of DI water between sites, samplers will be provided with an additional vessel of DI water to dedicate just for rinsing the pump system. Additionally, the outside of pump's inlet tubing (the portion submerged in the churn) shall be rinsed prior to submersion in the dedicated DI water.

11.9.1.11 Continue to filter filling the dissolved parameter sample containers.

11.9.1.12 Shut off pump.

11.9.1.13 Place the bottle into the shipping cooler.

11.9.1.14 Remove the tubing from the sample water contained in the churn

11.9.1.15 Purge the filter and tubing by turning on the pump allowing the water in the tubing and filter to empty. Elevate the end of the tubing from the churn, keeping the filter lower than the pump to expedite the process. When finished, rinse the tubing and the filter with DI water. The tubing and filter are stored in a plastic bag between sites.

11.9.1.16 Replace the protective cap on both ends of the filtration tubing and the packaging over the filter. Filters are high volume and may be reused at other sites sampled the same day. Filters are to be discarded after each day of sample collection. Do not reuse this filter if you believe the current site will carry over contaminants into the water sample of the next sampling site, or if flow has been substantially reduced due to a clogged filter.

11.9.1.17 Unplug pump. Cover unit to keep it free from dust and debris in its carrying case.

11.9.1.18 At the end of the day, discard the filter. Make sure the tubing is free of sample water; rinse with distilled/deionized water.

11.9.1.19 Place the adapter in the plastic container and make sure the protective caps are put on the ends of the filtration tubing.

11.9.2 For the Ortho P filter process obtain a 60 CC single use disposable Luer tip syringe and 0.45 µm disposable filter

11.9.2.1 With clean gloved hands extract water from sampling churn by submerging tip of syringe in churn water, hold syringe body with one hand pull plunger with free hand until syringe is full.

11.9.2.2 Insert disposable filter on syringe and discharge water through filter directly in to lab supplied bottle for Ortho P, discard syringe and filter.

11.10 Harmful Algal Bloom Samples

The type of HAB sample to be collected (shorebloom, river sample or rock scrape) and the specific methods to be utilized will depend on the project specifications and should be detailed in the project-specific QAPP and conditions present at the site at the time of collection. The procedures are established in SOP-AMB-212_V21-1 Collection of Harmful Algal Bloom Samples. The three most common HABs sample types used to be collected in rivers are below.

11.10.1 Shorebloom (SB): To be collected when HABs are visually apparent, SB samples are collected at the location along the shoreline with the perceived densest

concentration of HABs, often at the windward shoreline or along the shore in protected coves, where material can accumulate and tends not to mix. SB samples are direct grab samples that that are collected by skimming the water surface to collect HABs material. Samples are to be collected directly into sample bottles.

11.10.1.1 Label the bottle with the sample date and time, location/site names, and name of sample collector per project-specific QAPP.

11.10.1.2 While wearing disposable vinyl gloves, skim the bottle just below the surface of the bloom, capturing both water and bloom material.

11.10.1.3 Allow the bottle to fill with water and bloom material.

11.10.1.4 Cap the bottle, rinse off any algae or other materials deposited on the outside of the bottle.

11.10.1.5 Dispose of vinyl gloves**.**

11.10.1.6 Record the sample information per project-specific QAPP.

11.10.2 Raw water (R): R samples are direct grab samples collected in flowing water systems in areas where a HAB is not visually apparent. Follow direct grab procedures outlined in section 11.6 for the collection of raw water HABs samples.

11.10.3 Rock Scape (S): S samples are collected by compositing discrete collections of epiphytic material taken from several rocks throughout the site. These procedures are slightly modified from those established in SOP-208_V21-1 Biological Monitoring of Surface Waters in New York State

11.10.3.1 Samplers will target visible accumulations of benthic algal growth, but if none is apparent, up to 4 rocks (pebbles, cobbles or boulders) will be collected from throughout the site and their surfaces will be scraped with a sharp knife into the sample bottle.

11.10.3.2 Ambient water can be added to the bottle to aid in washing off the knife or scraper.

11.11 Quality Control Samples

11.11.1 Equipment Blanks: Equipment blanks are collected to determine if sample contamination for any parameter might be occurring via contaminated sampling equipment. Therefore, deionized/distilled water must be run through all the equipment used to collect the environmental samples. After rinsing all equipment with DI water, fill the sampler with DI water, swirl it gently to make certain the water contacts all inner surfaces, then pour into the churn. Approximately 10 liters of the deionized/ distilled water are needed. After filling the churn, process as a normal RIBS sample. Equipment blanks will have the suffix ‘EB’ added to the sample ID.

11.11.2 Field Blanks: To assess the potential for contamination from field conditions during sampling. A container of deionized/distilled water is included with the supplies for a sampling event. For mercury field blanks, the field crew opens the designated container of field blank water brought into the field. The deionized/distilled water is exposed to the air for approximately the same amount of time that it takes to collect a sample then pours the water directly into parameter specific sample bottles. The field blank is processed along with the environmental samples. CEC field blanks follow a different procedure, which is detailed in SOP-AMB-222_V21-1.

11.11.3 Matrix Spikes/Matrix Spike Duplicates (MS/MSD): Due to the larger volume of sample required by the analytical laboratory, collect approximately 10 liters of sample water, and process an additional bottle set as a regular sample. All MS/MSD bottles must be labeled as such.

11.11.4 Sequential Duplicates: Collected for assessing sampling method precision (ability to reproduce the same result). Sequential duplicate samples are collected sequentially after the initial site sample. Sampling is performed as if a new site is being visited after the initial (parent) sample has been collected, processed, and placed on ice. Equipment shall be cleaned with DI water beforehand and a secondary set of YSI readings must be taken and recorded on the RIBS Sequential Duplicate field sheet (see Figure 4). The percent difference between the parent and sequential duplicate must satisfy precision criteria as detailed in the RIBS QAPP (NYSDEC 202).

11.11.5 *Note for mercury sampling*: To retain proper bottle filling order (see Table 2), all mercury samples including QC) shall be completed consecutively before moving onto the remaining RIBS bottle set.

12. Troubleshooting

12.1 Sampling schedule - Adhere to the sampling schedule whenever possible. Based on yearly agreements, the analytical laboratories expect a specific number of samples each week as part of a sample delivery group (SDG), which is a group of samples that all move together through the analytical processes in the lab. If all scheduled samples cannot be collected during the assigned week, contact Sampling Coordinator (see current RIBS QAPP for staff assignments and contact information). This may involve sending someone from Central Office to sample or a rescheduling of sampling. The Sample Coordinator must also contact the analytical laboratory if rescheduling is to occur.

12.2 Construction - If a sampling bridge is found to be under construction or repair, the possibility of sample contamination due to these activities must be considered, and a decision made whether to proceed with sampling. If possible, talk with the work crew to find out the length of time the bridge will be under construction. If the bridge is closed to traffic, you may still be able to walk out and collect the sample. If the construction activities have altered the flow of the river or stream through temporary dams or supports, such alterations must be noted on the field sheets. If the bridge is under

major repair, sampling may have to be cancelled for a period of time, or the site moved. Contact the Sampling Coordinator for resolution.

12.3 Broken equipment or supplies

12.3.1 Try not to cancel sampling. Improvise but remember not to compromise the collection of a representative water column sample. **Note ALL modifications from standard procedures on the field sheet**.

12.3.2 Recalibrate the multiprobe meter if you suspect the validity of any reading. For dissolved oxygen, recalibrate if there is any significant change in barometric pressure or altitude. If the multiprobe meter is not functioning, continue collecting water samples.

12.3.3 If pump filter or tubing are clogged or otherwise not working, and thus, the dissolved metals containers cannot be filled, collect the remainder of the samples where the container is filled directly from the churn. Contact the Sampling Coordinator immediately upon return to office for replacement parts. Make note on the Chain of Custody to the lab that all or some of the dissolved metals samples have not been filtered.

12.3.4 If there are any problems with the functioning of the churn, contact the Sampling Coordinator immediately upon return to office for replacement or replacement parts.

12.3.5 If there is a missing or broken container from the set of bottles sent by the analytical laboratory, collect the remainder of samples. **Note on the field sheet and chain of custody which parameters were not collected**.

12.3.6 Notify the Sampling Coordinator of broken equipment or to replenish supplies. If equipment needs to be repaired, coordinate with the Sampling Coordinator to send equipment to the manufacturer for repairs. The Sampling Coordinator may supply spare equipment to use in the interim.

13. Post-Sampling Procedures

13.1 Discrete Depth samplers should be rinsed with distilled/deionized water after sample collection is completed at the end of each day and allowed to dry in the “open” position.

13.2 The sample splitting churn should be rinsed thoroughly with distilled/deionized water after sample collection is completed at the end of each day.

14. Sample Handling, Transport, and Chain-of-Custody

14.1 Samples must be handled in accordance with SOP-GEN-101_V21-1 Sample Handling, Transport, and Chain-of-Custody.

14.2 Chain of Custody Record/Laboratory Request Form (Figure 1) must be completed by sampling personnel and submitted to the analytical laboratory with the samples. Complete the form as follows:

14.2.1 Project Name: RIBS Routine

14.2.2 Contact: [Current Sampling Coordinator, See current RIBS QAPP for staff assignments]

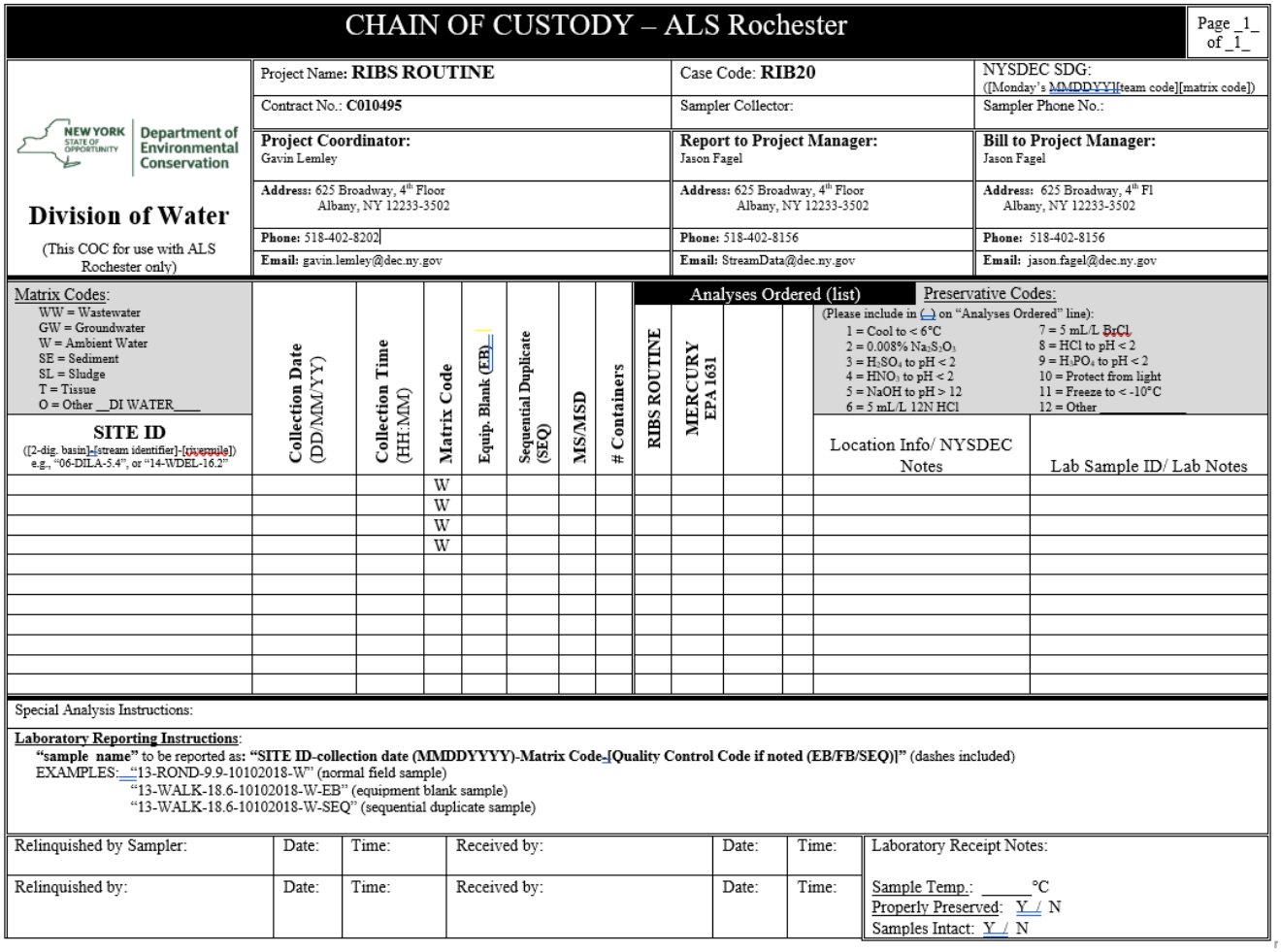
14.2.3 Sample ID/Date/Time:
Water column samples are assigned sample ID numbers that are a combination of three - four elements depending on the type of sample, i.e. water sample or QAQC water sample:
Station_ID (NYSDEC assigned) + MMDDYYYY (date) +W (for "Water" matrix), for a water chemistry sample. For QAQC water samples, one of the following codes are added to the end of the sample ID: "SEQ" for sequential duplicate, "EB" for equipment blank, "FB" for field blank, is added to the end of the sample ID. These groupings create a unique element for each station visit, required by the Stream Monitoring and Assessment Section Database.

For example, the ID consists of the following components, in this exact order, and separated by a "-" for an equipment blank QAQC water sample from a tributary to the Lower Hudson River: 12-LHUD_T2-1.3-MMDDYYYY-W-EB:

- Station_ID
  - Basin Number (ex: 12)
  - LOCATION ID (ex: LHUD_T2)
  - Date (MMDDYYYY)
  - River mile (ex: 1.3)
- Matrix medium abbreviation (ex: W)
- Quality Control Identifiers (ex: EB)

In exception to SOP-GEN-101_V21-1, sample times recorded on COCs and sample bottles are to be rounded to the nearest 15 minutes. QC samples are to have unique sampling times from normal samples (*i.e.,* 15 minutes later) as a backup precaution to help resolve labeling issues or laboratory mix-ups.

14.2.4 Analysis Requested: Indicate in the appropriate columns of the form which groups of parameters are to be analyzed (e.g., RIBS Routine or Screening suite, Mercury 1631, etc.). Also indicate whether the sample has been acidified.



CHAIN OF CUSTODY – ALS Rochester

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NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

Division of Water

(This COC for use with ALS Rochester only)

Project Name: **RIBS ROUTINE**	Case Code: **RIB20**	NYSDEC SDG: ([Monday's MMDDYY][team code][matrix code])
Contract No.: **C010495**	Sampler Collector:	Sampler Phone No.:
Project Coordinator: Gavin Lemley	**Report to Project Manager:** Jason Fagel	**Bill to Project Manager:** Jason Fagel
Address: 625 Broadway, 4th Floor Albany, NY 12233-3502	**Address:** 625 Broadway, 4th Floor Albany, NY 12233-3502	**Address:** 625 Broadway, 4th Fl Albany, NY 12233-3502
Phone: 518-402-8202	**Phone:** 518-402-8156	**Phone:** 518-402-8156
Email: gavin.lemley@dec.ny.gov	**Email:** StreamData@dec.ny.gov	**Email:** jason.fagel@dec.ny.gov

Matrix Codes:
WW = Wastewater
GW = Groundwater
W = Ambient Water
SE = Sediment
SL = Sludge
T = Tissue
O = Other __DI WATER____

Analyses Ordered (list)

Preservative Codes:
(Please include in (…) on "Analyses Ordered" line):
1 = Cool to < 6°C
2 = 0.008% $Na_2S_2O_3$
3 = H_2SO_4 to pH < 2
4 = HNO_3 to pH < 2
5 = NaOH to pH > 12
6 = 5 mL/L 12N HCl
7 = 5 mL/L BrCl
8 = HCl to pH < 2
9 = H_3PO_4 to pH < 2
10 = Protect from light
11 = Freeze to < -10°C
12 = Other _____

SITE ID ([2-dig. basin]-[stream identifier]-[rivermile]) e.g., "06-DILA-5.4", or "14-WDEL-16.2"	Collection Date (DD/MM/YY)	Collection Time (HH:MM)	Matrix Code	Equip. Blank (EB)	Sequential Duplicate (SEQ)	MS/MSD	# Containers	RIBS ROUTINE	MERCURY EPA 1631			Location Info/ NYSDEC Notes	Lab Sample ID/ Lab Notes
			W										
			W										
			W										
			W										

Special Analysis Instructions:

Laboratory Reporting Instructions:
"sample name" to be reported as: **"SITE ID-collection date (MMDDYYYY)-Matrix Code-[Quality Control Code if noted (EB/FB/SEQ)]"** (dashes included)
EXAMPLES: "13-ROND-9.9-10102018-W" (normal field sample)
"13-WALK-18.6-10102018-W-EB" (equipment blank sample)
"13-WALK-18.6-10102018-W-SEQ" (sequential duplicate sample)

Relinquished by Sampler:	Date:	Time:	Received by:	Date:	Time:	Laboratory Receipt Notes:
Relinquished by:	Date:	Time:	Received by:	Date:	Time:	Sample Temp.: _____ °C Properly Preserved: Y / N Samples Intact: Y / N

Figure 2. Analytical Laboratory Services Chain of Custody/Sample Submission Form.

14.3 Shipping Procedures

To safely ship samples please follow the guidelines as described in SOP-GEN-101_V21-1 and note the following conditions:

14.3.1 During the summer, coolers may be pre-chilled by placing wet ice or ice packs into the coolers prior to adding the bottles with collected samples. Samples should be shipped only with "wet" ice and not with ice packs ("blue" ice).

14.3.2 Group all containers from the same site together in a labeled plastic zipper bag inside the same cooler. The lab will separate the samples upon their arrival. All bottles should be placed in an upright position.

14.3.3 All samples must be shipped on the day of collection due to short holding times of many parameters.

14.3.4 **Do not mail samples on a Friday or when the following day is a holiday.** They will not be unpacked until the following Monday, and some parameters will be beyond the holding time.

14.3.5 Mailing addresses for RIBS Sampling Program analytical laboratories for water samples are as indicated below:

ALS Environmental (for chemistry samples)
ATTN: Janice Jaeger
1565 Jefferson Road, Building 300, Suite 360
Rochester, NY 14623
Telephone: (585) 288-5380

AquaTOX Research, Inc. (for toxicity testing samples)
ATTN: Frank Doherty
1201 E. Fayette Street
Syracuse, NY 13210
Telephone: (315)479-1499

Upstate Freshwater Institute (for HABs SB and R samples)
ATTM: Gina Kehoe
224 Midler Park Drive
Syracuse, NY 13206
Telephone: (315) 431-4962 ext. 115

SUNY ESF (for HABs R and RS samples)
Boyer Lab
Attn: Dominique Derminio
307 Stadium Place
341 Jahn Lab
Syracuse, NY 13210

14.3.6 Sample coolers will be shipped by UPS. Telephone the courier service for sample pick up or drop coolers off at a shipping facility If problems arise, contact the Sampling Coordinator. Use preprinted UPS labels and ship according to Central Office instructions received at the beginning of the sampling season.

15. Data and Records Management

15.1 Field sheets (Table 3) provide a record of each sampling event. It is very important that field sheets are filled out completely. The information is necessary use of the data (for example, when results are put into the database, sampling equipment must be recorded. If the field sheet does not indicate which sampling device was used, the information in the database will be incomplete. Field sheets are used to record:

15.1.1 A description of the sampling site including latitude and longitude;

15.1.2 *In-situ* measurements of water quality with appropriate units--water temperature, dissolved oxygen, pH, specific conductance, and algal parameters as well as barometric pressure used in calibrating the multiprobe meters;

15.1.3 Field observations sufficient to reconstruct the sampling event without relying on the sample collectors' memories, including sample collectors' names, date and time of sample collection, and weather conditions; and flow observation

15.1.4 The specific samples that were collected, including the type of analyses requested and the number of transects, trips and dips.

15.2 If for any reason changes are made to the sampling procedures as stated in SOP, record the change on the field sheets.

15.3 Central Office staff will supply field sheets to sampling teams with the sampling location and station ID pre-printed. Sampling teams are to copy the "master" sheet and fill in the date and time the sample is collected for each sampling event. **The date and time on the field sheet must match the date and time recorded on the lab sheets and labels**. **The sample delivery group (SDG) number and the names of the sampling staff must also be entered on the field sheets**. Refer to RIBS QAPP (NYSDEC, 2021) for more details on SDG designations. A copy of each completed RIBS field sheet (Figure 2) must be sent to the Central Office within 30 days of sample collection by US mail or scanned and emailed to StreamData@dec.ny.gov with "RIBS Routine field sheet" and the region (e.g., R7) in the subject line.

15.4 Each set of equipment includes a logbook that serves as the record of calibration checks, repair work, routine maintenance and cleaning performed on the instrument. Dates, times, comments, and names of individuals performing the work are to be noted in the logbooks. The recording of the calibration data, maintenance, and repair work is necessary to counter challenges to the quality, integrity and acceptability of the field data.

16. Quality Assurance/Quality Control

16.1 The samples that are collected for analyses must accurately represent the stream being sampled and be unaffected by the collection procedures. The objective of this quality assurance methodology is to establish and maintain standards that will ensure the integrity of the water samples collected.

16.1.1 Prior to use, check all equipment to ensure good operating condition and cleanliness.

16.1.2 Follow manufacturer's specifications in carrying out routine maintenance on sampling equipment.

16.1.3 To the extent possible and practical, backup equipment should be available.

16.1.4 All sampling equipment (buckets, churn, sampler, etc.) should be cleaned and rinsed with distilled (de-ionized) water. Refer to SOP-GEN-103_V21-1 Equipment Cleaning.

16.1.5 At each sampling site, equipment should be rinsed with ambient water before a sample is collected and rinsed with distilled water after sampling is completed for the day.

16.1.6 After sampling a site that has known or suspected contamination problems, sampling equipment should be washed with a phosphate free detergent, then scrubbed with water, and finally rinsed with distilled water.

16.1.7 A record of equipment cleaning, and calibration should be maintained in a dedicated equipment log book.

16.1.8 Whenever possible, use site-dedicated sample collection equipment; if this is done, note on the field sheet.

16.1.9 Whenever possible, over the course of the day, sampling should progress from the sites with the best water quality to the poorest.

16.1.10 The sample equipment must be appropriate for the samples being analyzed.

16.1.11 All instruments used in the field must be calibrated according to SOP-AMB-211_V21-1, Calibration, Maintenance, and Storage of Multi-probe Meters used in Field Sampling (NYSDEC, 2021).

16.1.12 Sampling equipment should be replaced when the equipment is damaged (scratches, nicks or dents) exposed to highly contaminated waters, or when routine equipment cleaning is impaired.

16.1.13 All sampling equipment should be stored covered or wrapped and maintained in a manner that minimizes or prevents contamination from ambient sources.

17. References

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Table 1. Sample Handling Specifications for water column samples.

Parameter	Sample Type	Sample Container	Bottle Filling	Preservation Method	Holding Time
Alkalinity	Composite or Grab w/ mixing (collect from churn)	Plastic; Glass	NO HEADSPACE or air bubbles; do not aerate	Chill to ≤6ºC	14 days
Ammonia	Composite or Grab w/ mixing	Plastic; Glass	Fill to neck	H2SO4 Chill to ≤6ºC	28 days
Chloride	Composite or Grab w/ mixing	Plastic; Glass	Fill to neck	Chill to ≤6ºC	28 days
Carbon, *total organic*	Composite or Grab w/ mixing	Glass	To top	H2SO4 Chill to ≤6ºC	28 days
Carbon, *dissolved organic*	Composite or Grab w/ mixing, Filtered	Glass	To top	H2SO4 Chill to ≤6ºC	28 days
Chlorophyll-*a*	Composite or Grab w/ mixing	Amber glass	Fill to neck	Chill to ≤6ºC	48 hours (lab-filtered)
Chlorophyll-*a direct field measurement*	In-situ	none	N/A	N/A	N/A
Conductance-*direct field measurement*	In-situ	none	N/A	N/A	N/A
Conductance-*laboratory measurement*	Composite or Grab w/ mixing	Plastic	Fill to neck	Chill to ≤6ºC	28 days
Dissolved Oxygen-*direct field measurement*	In-situ	none	N/A	N/A	N/A
Fluoride	Composite or Grab w/ mixing	Plastic only	Fill to neck	Chill to ≤6ºC	28 days
Hardness	Composite or Grab w/ mixing	Plastic; Glass	Fill to neck	HNO3 Chill to ≤6ºC	6 months
Harmful Algal Blooms	SB or R: Grab	Plastic; Glass	Fill to neck	None	48 hours
Metals, *Total Recoverable*	Composite or Grab w/ mixing	Plastic; Glass	Fill to neck	HNO3 Chill to ≤6ºC	6 months
Metals, *Dissolved*	Composite or Grab w/ mixing, Filtered	Plastic; Glass	Filter	HNO3 Chill to ≤6ºC	6 months
Mercury[1], *Total Low Level*	Grab	Glass; Teflon	Fill to shoulder	No preservative* / Chill to ≤6ºC	48 hours (lab digestion)

[1] RIBS LL Hg sampling uses a modified version of standard method 1631.

Parameter	Sample Type	Sample Container	Bottle Filling	Preservation Method	Holding Time
Nitrate-Nitrite	Composite or Grab w/ mixing	Plastic; Glass	Fill to neck	H2SO4 Chill to ≤6ºC	48 hours
Nitrate	Composite or Grab w/ mixing	Plastic; Glass	Calculated value	--	48 hours
Nitrogen, Kjeldahl	Composite or Grab w/ mixing	Plastic; Glass	Fill to neck	H2SO4 Chill to ≤6ºC	28 days
pH-*direct field measurement*	In-situ	none	N/A	N/A	N/A
pH-*laboratory measurement*	Composite or Grab w/ mixing	Plastic	Fill to neck	Chill to ≤6ºC	48 hours
Phenolic Compounds	Grab	Amber Glass only	Fill to Top	H2SO4 Chill to ≤6ºC	48 hours
Phosphorous, *Orthophosphate*	Composite or Grab w/ mixing, Filter	Plastic; Glass	Filter, Fill to neck	Chill to ≤6ºC	48 hours
Phosphorous, Total	Composite or Grab w/ mixing	Plastic; Glass	Fill to neck	H2SO4 Chill to ≤6ºC	28 days
Phycocyanin-*direct field measurement*	In-situ	none	N/A	N/A	N/A
Solids: Total	Composite or Grab w/ mixing	Plastic; Glass	Fill to neck	Chill to ≤6ºC	7 days
Solids: Total Dissolved	Composite or Grab w/ mixing	Plastic; Glass	Fill to neck	Chill to ≤6ºC	7 days
Solids: Total Suspended	Composite or Grab w/ mixing	Plastic; Glass	Fill to neck	Chill to ≤6ºC	7 days
Solids: Total Volatile	Composite or Grab w/ mixing	Plastic; Glass	Fill to neck	Chill to ≤6ºC	7 days
Sulfate	Composite or Grab w/ mixing	Plastic; Glass	Fill to neck	Chill to ≤6ºC	48 hours
Toxicity Testing Sample	Composite or Grab w/ mixing	Plastic	Pre rinse before filling to neck	Chill to ≤6ºC	48 hours
Turbidity	Composite or Grab w/ mixing	Plastic; Glass	Fill to neck	Chill to ≤6ºC	48 hours

Table 2. Bottle type and filling order.

Parameter[2]	Sample Container/ Preservation	Filling Order
Grab Samples (not from churn)		
CECs	(Refer to SOP-AMB-222_V21-1 for CEC sampling procedures)	**1**
Mercury[3], *Total Low Level*	1 - 500 ml amber glass (fill to shoulder) / Ice	**2**
Harmful Algal Bloom, SB, R or RS	Plastic or glass bottle / Ice	**3**
From Sample Splitting Churn		
Alkalinity	1 – 250 ml plastic (no head space) / Ice	**4**
Chlorophyll-*a*	1 – 1 liter amber glass / Ice	**5**
TDS, NO2, Cl, F, SO4	1 -250 ml plastic / Ice	**6**
Turbidity	1- 125 ml plastic screw top jar / Ice	**7**
NH3, TKN, TPO4, NO3 – NO2	1 – 250ml plastic / H2SO4 / Ice	**8**
Total Metals	1- 125ml plastic / HNO3 /Ice	**9**
Dissolved Metals	1 – 125ml plastic / cannister filtered / HNO3 / Ice	**10**
Dissolved Organic Carbon	3 – 40ml glass vials / cannister filtered with H_2SO_4 / Ice	**11**
Dissolved OPO4	1 - 250 ml plastic, syringe filter/ Ice	**12**
Toxicity Testing Sample (if scheduled)	2 liter plastic / Ice	**13**

[2] Some parameters are grouped together in one bottle.
[3] RIBS LL Hg sampling uses a modified version of standard method 1631.

NYSDEC Division of Water **RIBS Field Sheet** **Region ___ – Week of _____**

General Information and Sample Types:

Sampling Date:	Station ID:
Sampling Time:	Location:
Samplers:	SDG: MMDDYYR__W (fill in for this week's Monday and region #)
Sampled from: Bridge Waded Other*	Equip: DH-81 Kemmerer/Van Dorn Poly-pro/Medora Other*
Sampling Specifics: # of Transects: _____	# of Dips (per transect): _____ # of Trips: _____
Dissolved Oxygen (mg/L):	Dissolved Oxygen (% sat.):
Specific Conductance (µS/cm):	Water Temperature (°C):
pH:	Flow characterization: Low Normal High
Additional sampling: ◻ Toxicity ◻ CECs – PFAS (TestAmerica) ◻ CECs – PPCPs/Hormones (ALS Kelso)	
RIBS QAQC: ◻ Seq. Dup. (SEQ) ◻ Equip. Blank (EB) ◻ Field Blank (Hg) ◻ MS/MSD	
CEC QAQC: ◻ Field Blank (Hg) ◻ MS/MSD	

Other observations/comments/method exceptions*: _____

*Note why "other" location/equipment selected.

Assessment of Recreational User Perception:

Circle the one answer which best describes your ability to participate in **primary** contact recreation:

a) Beautiful. Could not be nicer. Ability to swim, wade, dive water ski etc. fully attained.
b) Minor aesthetic problems, but still excellent for primary recreation.
c) Primary contact recreation slightly impacted.
d) Desire to participate in primary contact recreation substantially reduced.
e) Awful! Primary contact recreation impossible.
f) Not applicable (headwater/high flows/dry, etc.).

Circle the one answer which best describes your ability to participate in **secondary** contact recreation:

a) Beautiful. Could not be nicer. Ability to fish and boat fully attained.
b) Minor aesthetic problems, but still excellent for secondary contact recreation.
c) Secondary contact recreation slightly impacted.
d) Desire to participate in secondary contact recreation substantially reduced.
e) Awful! secondary contact recreation impossible.
f) Not applicable (headwater/high flows/dry, etc.)

Weather Conditions (Current): Sun Rain Clouds Weather Conditions (Past 24 hours): Sun Rain Clouds

Water Clarity:	0	1	2	3	4	5	6	7	8	9	10
	Clear					Intermediate					Turbid
Phytoplankton: (suspended)	0	1	2	3	4	5	6	7	8	9	10
	Natural					Intermediate					Severe
Periphyton: cover	0	1	2	3	4	5	6	7	8	9	10
	Natural					Intermediate					Severe
Macrophyte: cover	0	1	2	3	4	5	6	7	8	9	10
	Natural					Intermediate					Severe
Odor:	0	1	2	3	4	5	6	7	8	9	10
	Natural					Intermediate					Noxious
Trash:	0	1	2	3	4	5	6	7	8	9	10
	None					Intermediate					Landfill
Discharges/Pipes:	0	1	2	3	4	5	6	7	8	9	10
	None					Intermediate					Dominant

Circle all the variables that negatively affect your opinion of recreational use of the waterbody today:

Water Clarity Phytoplankton Periphyton Macrophytes Odor Trash Discharges/Pipes

None Other: _____

Please scan and email completed field sheet to: StreamData@dec.ny.gov

Figure 3. Water Chemistry Field Sheet Example.

NYSDEC Division of Water **RIBS Field Sheet – Sequential Duplicate**

Sequential Duplicate Sampling Information:

Sampler(s):	
Sampling Date:	Station ID:
Initial Sample Time:	Waterbody Name:
Sequential Duplicate Sample Time:	-----
Sampled from: Bridge Waded Shoreline*	Equip: Kemmerer Depth-Integrated Pail* Bottle*
Sampling Specifics: # of Transects: _____	# of Dips (per transect): _____ # of Trips: _____
Flow characterization: Low Normal High	

Sequential Duplicate YSI readings:

Dissolved Oxygen (mg/L):	Dissolved Oxygen (% sat.):
Specific Conductance (µS/cm):	Water Temperature (°C):
pH:	

Other observations/comments/exceptions: _____

_____

Please scan in consecutive order with associated site field sheet and email to:
StreamData@dec.ny.gov

Figure 4. Water Chemistry Sequential Duplicate Field Sheet Example