I. PROJECT MANAGEMENT

1.0 Title and Approval Page

Quality Assurance Project Plan (QAPP) QA#24102

Rhode Island Freshwater Harmful Algal Bloom (HAB) Monitoring
Rhode Island Department of Environmental Management (RIDEM)
Office of Water Resources (OWR)

Approval Signatures:

Brian Zalewsky — Digitally signed by Brian Zalewsky Date: 2024.05.16 08:59:32 -04'00'

Brian Zalewsky, Project Lead, RIDEM OWR — Date

Jane Sawyers — Digitally signed by Jane Sawyers Date: 2024.05.16 12:51:07 -04'00'

Jane Sawyers, Program Supervisor, Project QA Officer RIDEM OWR — Date

Jillian Chopy — 5/22/24

Jillian Chopy, Health Advisories, RIDOH Center for Healthy Homes and Environment — Date

Evan Philo — 5/21/24

Evan Philo, Laboratory/Analysis Lead, RIDOH Laboratory — Date

Richard Enander — 5-17-24

Richard Enander, QA Officer, RIDEM — Date

EMMA SKUMURSKI — Digitally signed by EMMA SKUMURSKI Date: 2024.05.23 09:25:42 -04'00'

Emma Skumurski, QA Reviewer, EPA — Date

Hilary Snook — Digitally signed by Hilary Snook Date: 2024.05.23 09:36:45 -04'00'

Hilary Snook, Technical Lead, USEPA — Date

ZACHARY DEGLER — Digitally signed by ZACHARY DEGLER Date: 2024.05.23 13:32:15 -04'00'

Zachary Delger, Project Officer, USEPA — Date

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APPENDIX A
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RI State Health Laboratory SOPs

3.0 Distribution List

QAPP Recipient	Responsibilities	Organization
Emma Skumurski	USEPA QA Reviewer	United States Environmental Protection Agency New England Region 1 Laboratory 11 Technology Drive N. Chelmsford, MA 01863 Phone: 617-918-8312 skumurski.emma@epa.gov
Hilary Snook	USEPA Technical Lead	United States Environmental Protection Agency New England Region 1 Laboratory 11 Technology Drive N. Chelmsford, MA 01863 Phone: 617-918-8309 snook.hilary@epa.gov
Zachary Delger	USEPA Project Officer	United States Environmental Protection Agency delger.zachary@epa.gov
Richard Enander	RIDEM Quality Assurance Manager	RI Department of Environmental Management Office of Customer and Technical Assistance 235 Promenade Street Providence, RI 02908 Phone: 401-537-4012 richard.enander@dem.ri.gov
Jane Sawyers	RIDEM Program Manager	RI Department of Environmental Management Office of Water Resources 235 Promenade St. Providence, RI 02908 Phone: 401-537-4160 jane.sawyers@dem.ri.gov
Brian Zalewsky	RIDEM Project Lead	RI Department of Environmental Management Office of Water Resources 235 Promenade St. Providence, RI 02908 Phone: 401-537-4195 brian.zalewsky@dem.ri.gov
Jillian Chopy	Health Advisories	RI Department of Health Center for Healthy Homes and Environment 3 Capitol Hill Providence, RI 02908 Phone: 401-222-7727 Jillian.Chopy@health.ri.gov
Evan Philo	Laboratory/Analysis Lead	RI State Health Laboratories 50 Orms Street Providence, RI 02904 Phone: 401-222-5553 Evan.Philo@health.ri.gov

4.0 Project Task/Organization

The Rhode Island Department of Environmental Management (RIDEM) Office of Water Resources (OWR) and the Rhode Island Department of Health (RIDOH) jointly administer the cyanobacteria monitoring program. The Rhode Island State Health Laboratory will conduct laboratory analyses for this project. The people listed in Table 1 will participate in this project. This project is funded by EPA PPG 99125708 FY20-23.

Table 1: Personnel involved in HAB monitoring and evaluation.

Personnel	Affiliation & Contact Information	Project Responsibilities
Seasonal Intern	Seasonal Intern, TMDL, RIDEM (401) 222-4700	Field Reconnaissance Sample Collection Sampling Logistics
Brian Zalewsky	Environmental Scientist III, TMDL, RIDEM (401) 537-4195 brian.zalewsky@dem.ri.gov	Project Lead/Consultation on HAB advisories Seasonal intern oversight
Jane Sawyers	Environmental Scientist IV, Monitoring Assessment, Standards, and TMDL Supervisor, RIDEM (401) 537-4160 jane.sawyers@dem.ri.gov	Program Supervisor/Project QA Officer, Consultation on HAB Advisories Seasonal intern oversight
Evan Philo	Principal Laboratory Scientist, RIDOH (401) 222-5553 evan.philo@health.ri.gov	Lead Laboratory/ Toxin Analysis
Jillian Chopy	Assistant Health Program Administrator, RIDOH (401) 222-7727 jillian.chopy@health.ri.gov	Health Advisories/ Consultation on HAB advisories/ Issuance of advisories
Emma Skumurski	Quality Assurance Project Plan Coordinator USEPA Region 1- New England Regional Laboratory 617-918-8312 skumurski.emma@epa.gov	Approval of QAPP

Project Lead

The Project Lead is responsible for:

- Developing a QAPP and distributing to all project personnel,
- Ensuring overall goal and requirements of the QAPP are met through effective planning and organizing,
- Updating the QAPP as needed,
- Developing the annual QAPP addendum,
- Establishing adequate lines of communication,
- Ensuring Standard Operating Procedures (SOPs) that outline current practices are written, approved, and distributed to project personnel,
- Assuring all data products are reviewed and approved according to accepted policies and guidelines before release,
- Ordering, accepting, and inspecting project supplies,
- Providing field and sample collection training and equipment to seasonal personnel.

Program Supervisor/Project QA Officer

The Program Supervisor/Project QA Officer's responsibilities include:

- Assuring the project is properly organized and has adequate lines of communication,
- Ensuring that program roles are clearly understood,
- Ensuring Standard Operating Procedures (SOPs) that outline current practices are written, approved, and distributed to project personnel,
- Completing program-level corrective actions on an as-needed basis,
- Deciding how to proceed when DQOs are not met and whether corrective action is needed,
- Reviewing reports to ensure quality assurance (QA) goals are met.

Field Monitoring Staff

A seasonal intern will conduct field reconnaissance and be responsible for following field/sampling SOPs and project QAPPs. All collection and delivery of samples will be performed by intern as well. Responsibilities include:

- Ensuring the sampling schedule is maintained,
- Completing the monitoring staff commitments for all surveys,
- Ensuring adequate lines of communication,
- Following all quality QA/QC requirements,
- Managing the bi-weekly field sampling activities to ensure field procedures and activities conform to the requirements of the applicable SOPs,
- Resolving day-to-day problems in the implementation of the monitoring program,
- Auditing records and field data for accuracy, validity, and completeness,
- Communicating problems to Project Lead,
- Organization/filing of results electronically,
- Developing and maintaining database of results.

5.0 Problem Definition/Background

A. QAPP Objective

The objective of this Quality Assurance Project Plan (QAPP) is to present the organization, objectives, and specific quality assurance/quality control (QA/QC) procedures associated with the harmful algal bloom monitoring and evaluation program that is conducted annually from approximately May through December by RIDEM and RIDOH. The program includes waterbody evaluation, water sample collection, and sample analysis for various algal toxins as well as cyanobacteria ID and enumeration.

This QAPP will be valid for a period of 5 years. A QAPP addendum will be produced each year to address any annual changes and updates and will be distributed to project personnel listed in Table 1. This program will follow the procedures and guidance listed in the RIDEM Quality Management Plan (2022).

B. Project Description

The Rhode Island Department of Environmental Management (RIDEM) and the Rhode Island Department of Health (RIDOH) work cooperatively to detect the presence of freshwater cyanobacteria blooms, evaluate the potential risks to the public, and when necessary, issue recreational/health advisories notifying the public of health concerns. The agencies jointly issue health/recreational advisories when any of the following three guidelines are met:

- Evidence of a visible cyanobacteria scum or mat or lake/pond-wide cyanobacteria bloom.
- Total Cyanobacteria cell count exceeding 70,000 cells/mL.
- Toxin (Microcystin-LR) level of lysed cells meeting or exceeding 4 ppb (µg/l).

Advisories instruct individuals to avoid all contact with the affected waterbody, including recreational activities such as swimming, boating, or fishing. People are also advised to not eat fish from the affected waterbody or to allow pets to wade or swim in or drink untreated water from the affected waters. Health advisories generally remain in effect until follow-up sampling by RIDEM or a city, town, or third party indicate that the advisory can be lifted.

RIDEM's Office of Water Resources (OWR) receives reports annually about nuisance algal conditions and cyanobacteria blooms from municipal staff, lake and watershed associations, and the broader public. Most reports come in via the cyanobacteria bloom reporting email address, DEM.OWRCyano@dem.ri.gov. RIDEM also conducts biweekly monitoring of waterbodies that frequently experience cyanobacteria blooms. From 2011 to 2023, a total of 45 waterbodies have had recreational/health advisories issued with an average of 15 waterbodies per year. Nine (9) of the 45 waterbodies are public drinking water supplies and nearly all the remaining waterbodies have a public

boat/canoe launch, are routinely used for recreational activities or have a well-known public access point.

C. Study/Monitoring Objectives

This monitoring program is designed to address the following objectives:

- Routinely evaluate the occurrence and extent of harmful algal blooms (HABs) in waterbodies with a known history of frequent cyanobacteria health/recreational advisories, toxin production, and/or exceedances of cyanobacteria cell count advisory threshold. These waterbodies are selected each year based on a history of frequent cyanobacteria blooms and will be listed in a QAPP addendum at the beginning of each monitoring season.
- Evaluate toxin concentrations and conduct cyanobacteria identification/enumeration in waterbodies with active HABs throughout the sampling season (bi-weekly from approximately May-December).
- Compare toxin concentrations with visual observations of blooms.
- Provide adequate information for both issuance and rescindment of health advisories.
- Respond to and evaluate reports of cyanobacteria blooms from the public and other agencies.

II. DATA GENERATION AND ACQUISITION

1.0 Sampling Methods

RIDEM evaluates selected waterbodies for the presence of cyanobacteria blooms on a bi-weekly basis from approximately May through November. These waterbodies are selected for biweekly monitoring based on having an established history of cyanobacteria blooms, as evidenced by multiple health/recreational advisories issued since the start of the monitoring program in 2011. The waterbodies selected for biweekly monitoring will be noted in a QAPP addendum at the beginning of each monitoring season. Waterbodies may be added or removed from the list of routinely monitored waterbodies annually as deemed appropriate by RIDEM/RIDOH after an evaluation of the previous year's results. In addition to the biweekly monitoring, waterbodies are evaluated for cyanobacteria in response to calls or emails from the public when deemed appropriate by RIDEM/RIDOH.

The evaluation consists of a site visit and visual examination of as much of the waterbody as possible from the shoreline of public access areas and/or private property if no public access is available and permission is granted by the property owner. A field sheet is filled out and photographs are taken at each site regardless of the presence or absence of a bloom to keep continuous records of RIDEM visits. Field sheets document the location, extent and physical appearance of blooms, weather conditions, any active recreation occurring on the waterbody, the presence/absence of dead or distressed wildlife, and if a sample is collected. If a cyanobacteria bloom is evident (scum, dense mat, extensive clumps, spilled paint or pea soup appearance, streaking, etc.), a sample is

collected following QA/QC methods and submitted to the State Health Laboratory for cyanotoxin analysis and identification/enumeration by colony count of cyanobacteria genera.

A health/recreational advisory is jointly issued by RIDEM and RIDOH when any of the following three thresholds are met:

- Evidence of a visible cyanobacteria scum, mat, or pond/lake-wide cyanobacteria bloom.
- Cyanobacteria cell count exceeding 70,000 cells/mL.
- Toxin (Microcystins-LR) level of lysed cells meeting or exceeding 4.0 ppb (µg/L)

OWR staff estimate cyanobacteria cell counts from colony counts using conversion factors provided in Hartman and Graffius (1960) (Table 2). Since there are no criteria for issuing an advisory based on colony counts, estimating cell counts from colony counts allows for more thorough identification of potentially harmful blooms.

The advisories recommend that individuals avoid contact with the affected waterbody, including recreational activities such as swimming, boating, or fishing. People are also advised to not eat fish from the affected waterbody or to allow pets to wade in, swim in, or drink untreated water from the affected waters.

Advisories generally remain in place until two successive and representative sampling rounds conducted at least one week apart achieve cell count and toxin levels below the threshold concentrations. When an advisory is placed on a waterbody, it will be added to the biweekly monitoring schedule if it is not already included. RIDEM will continue to visit waterbodies with advisories in place on the regular biweekly monitoring schedule. RIDEM may conduct sampling on a weekly basis to lift advisories when resources are available to do so. Samples to lift an advisory will be collected from the original location of the sample that triggered the advisory. After an advisory is lifted, the waterbody will continue to be monitored on the regularly biweekly monitoring schedule for the remainder of the season.

After the end of the season when most forms of recreation typically occur (typically early December), visual assessments will be conducted to lift the remaining advisories in place. If the visual assessment indicates that the bloom has subsided, the advisory will be lifted; however, there is no guarantee that toxins are not present without confirmatory sampling. The public are therefore advised to continue to exercise caution around these waters.

Table 2: Conversion of cyanobacteria genera colony count to cell count.

Cell Count Estimation						
	Anabaena	**Aphanizomenon (Single)**	**Aphanizomenon (Bundle)**	**Microcystis**	**Planktothrix**	**Woronichinia**
Conversion Factor[1]	X 23	X 28	X 280	X 140	X 28	X 250

[1] Multiply number of colonies by conversion to get estimate of cell count.

A. Field Protocol

Photographs

Photographs are taken during each site visit regardless of the presence of a bloom. Photographs serve the purpose of capturing the range of conditions present, including conditions near shore, percent coverage of bloom, and other general observations. Pictures are generally taken from the same area during each visit for comparison purposes. Photos are downloaded to a designated network drive and folder for storage.

Field Sheets

The cyanobacteria bloom field sheet (**Appendix A**) will be filled out completely during each site visit, regardless of bloom presence. Field sheets are scanned and uploaded to a designated network drive for storage and future reference while hard copies are filed in the Office of Water Resources at RIDEM.

Sample Collection

All public access areas along waterbodies such as boat ramps, fishing access, and beach areas will be evaluated and sampled if necessary. Water samples are analyzed for various algal toxins and enumeration/ID is conducted to determine genera of cyanobacteria forming bloom, and qualitative estimates of colony density, as detailed below. Cyanotoxin samples will be collected in 50mL amber glass vials obtained from the State Health Laboratory with the use of a sampling stick. Samples are taken from the densest portion of the bloom while making sure to not uptake floating debris. Vials are inverted on the surface of the water and turned upright to collect a sample. Samples are then labeled (with date, time, waterbody name, location of the sample and office division) and kept in a cooler on ice for transport to the State Health Laboratory. All analyses will be run from a single unpreserved 50 mL vial for each sampling site. The sampling stick is rinsed with water between samples to remove any lingering residue.

Sample Handling and Custody

Proper handling of samples and procedures protect the integrity of samples from the initial sampling time, through transport, sample receipt, preparation, and analysis. All samples will be transported to the State Health Laboratory with a completed and signed Chain of Custody form (**Appendix A**). The RIDEM OWR employee who drops off the samples and the RIDOH receiving personnel will sign the Chain of Custody form to verify the bottle exchange. RIDOH will retain the original Chain of Custody forms, and RIDEM

will take copies that will be stored on a designated network drive as well as filed in hard copy in the Office of Water Resources at RIDEM.

Samples will be logged into the RIDOH tracking system. Sample maximum holding times prior to analysis are noted in Table 3. At the end of the sampling day, all equipment (coolers, sampling stick, etc.) will be rinsed and left to dry in the RIDEM OWR Sampling Center. Other materials will be put away, paperwork will be filed, and digital photographs will be downloaded, renamed and organized into folders at the end of the sampling day, or soon thereafter.

B. Analytical Methods

The Rhode Island State Health Laboratory analyzes samples for algal toxins following the State Health Lab's Standard Operating Procedure (SOP) for Select Cyanobacterial Toxins by Direct Aqueous Injection, UPLC/MS/MS (Appendix B). Samples are analyzed for the following toxins: Total Microcystins (Microcystin-YR, Microcystin-RR and -LR (Desmethylated), Microcystin-WR, Microcystin-RR, Microcystin-LY, Microcystin-LW, Microcystin-LR, Microcystin-LF, Microcystin-LA), Cylindrospermopsin, Anatoxin, and Nodularin. Table 3 provides analytical methods and reporting limits for all algal toxins.

The State Health Laboratory also conducts enumeration/ID to evaluate the genera of the cyanobacteria forming bloom following the State Health Lab's SOP for Cyanobacteria Harmful Algal Bloom Identification and Enumeration (Appendix B). The State Health Laboratory screens for the following genera in ID and enumeration of samples: *Anabaena, Aphanizomenon, Cylindrospermopsis, Microcystis, Nodularia, Planktothrix, and Woronochinia.*

Table 3: Analytical methods and reporting limits for algal toxin analysis.

Parameter	Analytical Method	Reporting Limit (µg/L)	Holding Times (Days)
Total Microcystin	Direct Aqueous Injection UPLC/MS/MS	1 µg/L	28
Microcystin-YR	Direct Aqueous Injection UPLC/MS/MS	1 µg/L	28
Microcystin-RR (desmethylated)	Direct Aqueous Injection UPLC/MS/MS	1 µg/L	28
Microcystin-LR (desmethylated)	Direct Aqueous Injection UPLC/MS/MS	1 µg/L	28
Microcystin-WR	Direct Aqueous Injection UPLC/MS/MS	1 µg/L	28
Microcystin-RR	Direct Aqueous Injection UPLC/MS/MS	1 µg/L	28
Microcystin-LY	Direct Aqueous Injection UPLC/MS/MS	1 µg/L	28
Microcystin-LW	Direct Aqueous Injection UPLC/MS/MS	1 µg/L	28

Microcystin-LR	Direct Aqueous Injection UPLC/MS/MS	1 µg/L	28
Microcystin-LF	Direct Aqueous Injection UPLC/MS/MS	1 µg/L	28
Cylindrospermopsin	Direct Aqueous Injection UPLC/MS/MS	0.5 µg/L	28
Anatoxin	Direct Aqueous Injection UPLC/MS/MS	0.5 µg/L	28
Nodularin	Direct Aqueous Injection UPLC/MS/MS	1 µg/L	28
Microcystin-LA	Direct Aqueous Injection UPLC/MS/MS	1 µg/L	28

III. Quality Control and Quality Assurance

1.0 Data Quality Objectives

Data Quality Objectives (DQOs) are qualitative and quantitative statements that clarify the intended use of the data, define which purposes the data may be used for, and specify tolerable levels of potential decision errors that will be used as the basis for establishing the quality and quantity of data needed to support decisions. DQOs delineate the type of data needed to support decisions, identify the conditions under which data should be collected, and state what requirements must be met to use the data for its intended purpose. The field monitoring staff will review field and analytical results to identify data that do not meet the DQOs. If data does not meet DQOs, the Project QA Officer will decide how to proceed and if corrective action is needed (i.e., resampling or reanalysis).

The intended purpose of data collection under the HAB Monitoring Program is to evaluate toxin concentration and cyanobacteria identification/enumeration against the threshold criteria in order to provide adequate information for issuance and rescindment of recreational/health advisories.

This QAPP and associated SOP documents outline the proper data collection methods, procedures, and measurements to be utilized to reduce sources, magnitude, and frequency of errors during data generation. By outlining and following these steps, uncertainties in the data will be reduced and data quality will be assured. To meet the data quality objectives, the following quality assurance measures will be employed to verify the use of proper, consistent field procedures, handling measures, and laboratory analyses.

- The field sampling protocol listed in this QAPP will be implemented during sampling and field data collection.
- EPA-approved, standardized methods will be adhered to for all laboratory analysis procedures.

- Qualified, trained personnel will perform the sample collection and laboratory analyses.
- Chain of Custody forms will be completed when handling samples and transferring custody from field crew to the State Health Laboratories (**Appendix A**).

2.0 Data Quality Indicators

Data quality indicators (DQI) are the quantitative statistics and qualitative descriptors used to evaluate data quality and determine if the data are acceptable to the user. The principal data quality indicators are precision, accuracy, bias, representativeness, completeness, and comparability. To determine that the data meet quality objectives, the data quality indicators are compared against predetermined standards or measurement performance criteria as discussed below for each DQI.

3.0 Precision

Precision is the measure of agreement among repeated measurements of the same property under similar conditions. Given that this project is a rapid response/early warning protocol, evaluation of precision by collection of field duplicates or field blanks is not appropriate. Laboratory blanks are considered part of the Lab QA/QC protocols and are described in the RIDOH toxin analysis SOP.

4.0 Accuracy

Accuracy is the agreement of a measurement to a known value, and standard methods of measurement have a known accuracy. Use of standardized, repeatable sample collection methods and chemical analysis procedures will be used to ensure accuracy. The accuracy of each analytical method is established by laboratory studies and is reported as the method detection limit (MDL) and the quantitation level (QL). MDL studies are kept on record with the State Health Laboratory. A quantitation limit is the minimum concentration of a substance that can be reliably identified, measured, and reported with confidence that it is accurate. The method detection limit is the lowest concentration of a substance that can reliably be measured and reported with a degree of confidence that the substance is greater than zero.

5.0 Bias

Bias is the persistent distortion of a measurement process that causes errors in one direction, either over-estimating or under-estimating the true value. Standardized, repeatable sample collection methods and chemical analysis procedures will be used for each sample to avoid bias.

6.0 Data Representativeness

Representativeness is the degree to which data accurately and precisely represent an environmental condition. Data is considered representative if it can be used to adequately evaluate risk to the public. All public access areas along waterbody such as boat ramps, fishing access, and beach areas will be evaluated and sampled if necessary.

Samples are collected from the densest portion of the bloom in order to evaluate the highest level of risk.

7.0 Data Completeness

Completeness is the measure of the amount of valid data collected compared to the total amount of data that was planned to be collected. The project is considered complete when all waterbodies have been visited according to the established schedule, as safety and weather allows.

8.0 Data Comparability

Data comparability refers to how well one dataset matches up to another. Results will be compared to EPA-recommended benchmarks for recreational guidance for harmful algal blooms and to previous years' results.

9.0 Training

All fieldwork will be performed by the Seasonal Intern or other trained staff. The field intern will be trained in sample collection technique and handling procedures by the Project Lead prior to the start of the monitoring season.

All laboratory work will be performed under the supervision of the Laboratory Lead at the Rhode Island Department of Health State Health Laboratory. Laboratory workers will receive training supervised by the Laboratory Lead or a qualified trainer prior to work being performed.

10.0 Corrective Action

Field staff will maintain close communication with the Project Lead. Changes to the sampling schedule, or any other aspects of the study, will only be made in accordance with the Project Lead. All field and laboratory personnel are responsible for notifying the Project Lead of circumstances that may necessitate any changes. Changes will be documented in the QAPP or QAPP addendum, as necessary.

In the event that data is determined to not meet DQOs, the Project QA Officer will decide if resampling or reanalysis must occur.

IV. Data Validation and Usability

1.0 Data Review, Verification and Validation

The field monitoring personnel will review all data for completeness and accuracy. Field notes and Chain of Custody forms will be reviewed by field personnel at the end of each day of sampling. Data entry will be checked for errors at the end of each sampling season and corrected as necessary by field monitoring personnel.

Laboratory results will be reviewed by RIDOH using their own procedures to verify that values and data quality indicators meet criteria and are within the acceptable ranges for each parameter. MDLs are statistically derived values. New MDL studies are conducted annually by the RIDOH State Health Laboratories to demonstrate the statistical limits of detection. The MDLs are updated annually based on the studies.

RIDEM and RIDOH staff will jointly compare sample results to the advisory threshold criteria. If the threshold criteria are exceeded, a recreational/health advisory will be issued for the waterbody. Best professional judgement may be used to issue an advisory or keep an advisory in place even if threshold criteria are not exceeded, in order to protect public health. In the event that sample results do not meet DQOs, the Project QA officer will determine if resampling or reanalysis must occur. Data verification and validation will be conducted following the RIDEM OWR Summary Guidance for Reviewing Environmental Monitoring Data SOP (2007).

2.0 Data Management

All field sheets and Chain of Custody (COC) forms will be maintained in the respective hard copy folders. Scanned copies of field sheets and Certificates of Analysis are saved electronically. An excel file records all results for toxin analysis and identification/enumeration. All field sheets, COC forms, and Certificates of Analysis will be retained permanently in accordance with the RIDEM Office of Water Resources Records Retention Schedule (2019).

3.0 Final Report

A report will be prepared by the Seasonal Intern to summarize field and analytical results from the sampling year. The report is posted annually on the RIDEM cyanobacteria website at dem.ri.gov/bluegreen.

V. REFERENCES

Rhode Island Department of Environmental Management. 2007. Summary Guidance for Reviewing Environmental Monitoring Data. RIDEM/OWR SOP BEP-WR-1. Providence, RI. http://www.dem.ri.gov/pubs/sops/datarevw.pdf

Rhode Island Department of Environmental Management. Office of Water Resources 2019. Records Retention Schedule. Providence, RI.

Rhode Island Department of Environmental Management. Office of Customer and Technical Assistance. 2023. Quality Management Plan. Providence RI. https://dem.ri.gov/media/9831/download

Rhode Island State Health Laboratories. 2018. Cyanobacteria Harmful Algal Bloom Identification and Enumeration. ID No. 10839 Revision 1, Providence RI.

Rhode Island State Health Laboratories. 2022. Select Cyanobacterial Toxins by Direction Aqueous Injection UPLC/MS/MS. ID No. 4249 Revision 10, Providence RI.

APPENDIX A

Harmful Algal Bloom Field Data Sheet and Chain of Custody Form

Cyanobacteria Bloom Fieldsheet

Date

Collector(s)

Name of Waterbody

City/Town

Describe where on the lake you see the bloom. (If none, write none)

Currently Under Advisory?

☐ Yes ☐ No

Closest address or landmark to bloom

Are signs posted?

☐ Yes ☐ No

Which sections of the lake have a bloom? (Select all that apply)

☐ North ☐ East ☐ North East ☐ South East

☐ South ☐ West ☐ North West ☐ South West

Weather conditions (Select all that apply)

☐ Raining ☐ Sunny ☐ Windy*

☐ Cloudy ☐ Overcast ☐ Humid

GPS coordinates of the bloom location
(Please use Deicmal Degree format. e.g. 42.652721, -73.748582)

Latitude

Longitude

If windy, direction and approximate speed:

Is the bloom near a public beach?

☐ Yes

☐ No

☐ Unknown

Are people actively swimming, boating, or fishing in the bloom?

☐ Yes ☐ No ☐ Unknown

Are there any dead fish, birds, or other animals?

☐ Yes ☐ No

Is the bloom near a state boat ramp/fishing dock?

☐ Yes

☐ No

☐ Unknown

Describe extent and type of dead organisms:

Does the water look like any of the descriptions below? (Select all that appy)

☐ Bubbling scum on surface of the water Color:

☐ Hairy, silky strands on rocks, plants, or water Color:

☐ Dots/clumps on or in the water Color:

☐ Streaks on the water surface Color:

☐ Pea soup appearance within the water Color:

☐ Spilled paint appearance on surface of the water Color:

☐ Other

Extent of cyanobacteria bloom on open water:

☐ No bloom (clear water)

☐ Very limited (some coves, limited shoreline)

☐ < 50% cover

☐ Between 50 & 75% cover

☐ > 75% (lake wide)

Were samples taken? If yes, how many samples; when and where were they collected?

☐ Yes

☐ No

Additional notes:

X ICED FOR TRANSPORT

Legal Sample | |

Sample Submission Form/Chain of Custody
Rhode Island Department of Health Laboratories
50 Orms Street, Providence, RI 02904

Sample Submission Number

Client: DEM - _____ □ Collected by DEM _____

KEY for Sample Submission
A: Client ID #: **C: Station ID**
B: Water System Name **D: Type = Grab / Composite**

A Client ID#: << -------- >> Run #: <<RUN>>
<<CONTACT>>

Mail Report To: _____
Street: _____
City: _____
Report To (Agency/Person) :

Collected By: _____ Collected Date: _____ Time: _____ Matrix: Water **X** Other

Source# **C.** Station ID **D.** Type Grab

Collection Point Address: _____
Name **Street** **City**

FIELD TESTS:

(Circle One)
Sample Type: **(GRAB / COMPOSITE)** Orig#: _____ pH: _____ Temp: _____ CL Residual: _____

Inorganics Lab	DUP	Metals and Minerals	DUP	Organics Lab	FB	Sanitary Microbiology
Inorganic Tests		**Metals for New Systems**		__ PE4–CARB (531.1)		___SM3 – SPC
___WL1 Turbidity		___WL66 Full Set (200.8)		__ PE12–Pest/PCB (608)		
___WL4 True Color		____WL75 Antimony		__ PE14–EBD/DBCP (504)		___SM34–Coliform (TCR) Colilert
___WL7 Total Suspended Solids		____WL76 Arsenic		__ PE21–HERB/ (515.3)		___SM53–Coliform (TCR) Colisure
___WL11 Cyanide (335.4)		____WL77 Barium		__ PE22–Pest/PCB+ (508)		___SM37 Freshwater- Enterolert
___WL12 Total Phosphorus		____WL78 Beryllium		__ PE31–Pest/PCB+ (505)		___SM37 – Enterolert
___WL13 pH		____WL79 Cadmium		__PE40–Endrin (505)		___SM38 – A-1 MPN
						___SM43 – Male Sp. Coliphage
___WL16 Nitrate (353.2)		____WL81 Chromium		__ PE_____		___SM48 – MTEC (1603)
___WL17 ortho-phosphate		____WL64 Copper				
___WL18 Alkalinity (2320B)		____WL82 Iron		__ TO2–THM (524.2)		___SM1 – MPN
___WL20 Chloride (300.0)		____WL63 Lead		__ TO3–PWVOC (524.2)		# of Tubes __ Dil.__ Thru___
___WL21 Fluoride (300.0)		____WL83 Manganese		__ TO4–PET HCS & TO3		
___WL22 Hardness (2340B)		____WL84 Nickel		__ TO11–UFVOC (624/603)		
___WL41 Specific Conductance		____WL85 Selenium		__ TO12–WQVOC (524.2)		
___WL56 Nitrite (353.2)		____WL86 Silver		__ TO14–USR Fee B/N Ext		
___WLUFC Chlorine				__ TO17–PET HC & TO12		
___WL19 DOC **subcontract**		____WL87 Thallium		__ TO19–Total EXTR (625)		
___WL Ammonia - N **subcontract**		___WL88 Zinc		___ TO27–AGR SVOC (525.2)		
___WL Total Kjeldahl-N **subcontract**				___TO40–WQ SEMI (525.2)		
		Metals Routine Set		___TO20 PFOA PFOS		
DEM Total Metals		___WL68 Full Set (200.8)				
___WL62Al Total Aluminum		____WL78 Beryllium				
___WL62Fe Total Iron - DEM		____WL81 Chromium				
___WL62 Total Metals (Cu,Cd,Pb&Zn)		____WL84 Nickel				
For individual metals check below		____WL76 Arsenic				
Total Copper ___WL62 TOT Cu		____WL85 Selenium				
Total Cadmium ___WL62 TOT Cd		____WL79 Cadmium				
Total Lead ___WL62 TOT Pb		____WL75 Antimony		____TO32 Chlorophyll a – (446) DEM		
Total Zinc ___WL62 TOT Zn		____WL77 Barium				**Harmful Algal Blooms**
		____WL87 Thallium				___SM28 Cyanobacteria Count
DEM Dissolved Metals		___WL36 Mercury (245.1)				
___ WL62Fe Dissolved Iron		___WL65 Lead & Copper(200.8)				**Cyanotoxins**
___WL62Al Dissolved Aluminum		**Minerals**				___HAB01 TOXIN LCMS DEM
___WL62 Metals Diss (Cu,Cd,Pb&Zn)		___WL67 Minerals Full Set(200.8)				
For individual metals check below		____WL69 Magnesium				
Diss Copper ___WL62 DISS Cu		___WL70 Potassium				
Diss Cadmium ___WL62DISS Cd		____WL71 Sodium				
Diss Lead ___WL62 DISS Pb		____WL72 Calcium				
Diss Zinc ___WL62 DISS Zn		___WL73 Sodium Composite(200.8)				

Must Be Completed For Legal Sample	Container		Preservative Added		
Test Code	Number	Type	By Lab	By Collector	Special Instructions
					submit to:
					submit to

Chain of Custody

Relinquished By	Date	Time	Received By	Date	Time	Comments

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APPENDIX B

RI State Health Laboratory SOPs (full documents attached separately)

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1. **Title**: Cyanobacteria Harmful Algal Bloom Identification and Enumeration.

2. **References**:
   2.1. STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, 22nd EDITION, 10-17.

3. **Scope and Principle of the Analysis**:
   3.1. Fresh water samples are analyzed for the identification and enumeration of potentially harmful cyanobacteria species. The cyanobacteria genera of interest include: *Anabaena*, *Microcystis*, *Aphanizomenon*, and *Planktothrix*, with a screen for other potentially toxic organisms. Freshwater samples will be taken from drinking water reservoirs and recreational freshwater then identification will be performed using a visual identification key. Cyanobacteria will be identified, and enumerated as units/mL by using a Sedgewick Rafter counting chamber for calculations.

   Our results will supplement those of cyanobacteria toxin monitoring performed by Food Chemistry to be utilized by RIDEM and HEALTH to determine appropriate public health action.

4. **Safety Issues**:
   4.1. The samples may contain cyanotoxins. These potent toxins are easily absorbed through the skin and can cause damage to humans. Each sample should be treated as though it contains dangerous levels of cyanotoxin.
   4.2. Gloves should be worn when handling the samples.
   4.3. Samples are disposed of in a histology bucket after the read.

5. **Interferences**:
   5.1. There are "look-alike" species that may be frequently mistaken for certain harmful species and must be distinguished for the count.
   5.2. Photos of harmful species, used for reference, will be taken by the Nikon Eclipse E400 camera microscope. Each photo will be labeled with the location site of the sample and archived digitally in a folder on the L: drive sorted and named by the sample's date and Element work order number.

6. **Glassware**:
   6.1 1.0mL Sedgewick Rafter counting chamber.
   6.2 24x50mm coverslip.

7. **Instrumentation**:
   7.1 Microscope equipped with 10X and 40X lenses.
   7.2 Nikon Eclipse E400 camera.

8 **Sample Collection, Preservation and Storage**:
   8.1 Collect samples in amber 40mL glass vials and transport on ice.
   8.2 Analyze samples immediately.