



SAMPLING FOR CYANOBACTERIA BLOOMS

INTRODUCTION: The sample collection procedures described below are appropriate for municipalities who wish to collect water samples to be analyzed for cyanobacterial composition (enumeration and identification) and cyano-toxins for the purpose of lifting or rescinding an existing Harmful Algal Bloom (HAB) advisory issued by the RI Dept. of Health (HEALTH). Any questions regarding these procedures or can be directed to Brian Zalewsky or Jane Sawyers at RIDEM Office of Water Resources at 222.4700.

SAMPLING METHODOLOGY GOAL: To monitor public health risks, water samples should be collected at locations used for public access and recreation. The concept behind the sample collection procedures is to focus on collecting samples that represent the potential toxin exposure across areas where people swim, boat, jet-ski, water-ski, or where people pursue other in or near water recreational activities. Higher cyanobacteria levels and cyano-toxin concentrations are commonly found near shore, especially on the downwind side of a lake, pond, or reservoir. The municipality should contact the appropriate staff member at RIDEM for information regarding the initial HAB sampling location, any field observational data, and sample analytical results from the affected waterbody.

EQUIPMENT AND SUPPLIES: Have clean, appropriately sized containers with no defects for collecting samples. Different analytical laboratories require different sized sampling containers but typically polyethylene bottles sized 500-1000ml are sufficient for both algal enumeration/identification and toxicity analysis. The analytical laboratory should be contacted for specific sampling container requirements.

Other supplies include shoulder-length gloves, which provide the most protection when sampling HABs. At a minimum, latex gloves should be worn when collecting samples. Chest waders or hip boots should also be worn when wading off the shore to protect skin from contact with toxins. Photographs of both the sampling site and the bloom should be taken if possible. If possible, field notes should be taken documenting observational data such as: water color and clarity, current and 3-4 day prior meteorological conditions, presence of visible algae, presence of surface accumulations or scums of cyanobacteria, the occurrence of any recent inflow events, lake level, recent public use, etc.

SAMPLING PROCEDURE:

The sample bottle should be labeled properly with date, time, waterbody, and location of sample collection. The sampler should wade slowly (as to not disturb the bottom substrate) to the sampling location(s). Avoid collecting suspended sediment that may be kicked up while accessing the sampling point. Ankle-deep water samples should be collected approximately 15 cm below the water surface. Knee- and hip-deep water samples should be collected approximately 30 cm below the surface. The sample bottle

should be inverted upon contact with the surface water to the appropriate depth and then scooped upward. Cap the sample immediately and place in a cooler.

PRESERVATION: Samples for cyanobacteria toxin and algal enumeration and ID analysis should immediately be placed in a cooler on wet ice. Samples should be stored in the dark. Once an analytical laboratory has been chosen, they can provide additional detail regarding sample preservation, packaging, and shipment.

ANALYTICAL LABORATORIES: Attachment 1 is provided as a resource to identify methods, laboratories, and manufacturers of test kits that allow for the detection of cyanobacteria and their toxins. The inclusion of a company or individual on this list does not imply endorsement or recommendation by RIDEM. RIDEM makes no endorsement, express or implied, of any links to or from this list, nor is it responsible for the content or activities of any linked sites. Any questions regarding a product or service should be directed to the company or individual. To date, RIDEM has relied on both Greenwater Laboratories in Pataska, Florida and Northeast Laboratories, Inc. in Berlin, CT for algal identification, enumeration, and toxicity analysis.

RESULTS: Analytical results, as well as any ancillary data collection and field observations, should be submitted to both RIDEM and HEALTH. These results will be utilized such that a current health advisory for an affected waterbody may be either rescinded or continued.

RIDEM and HEALTH recommend that follow-up sampling be conducted every two weeks; advisories may be lifted after two successive and representative sampling rounds two weeks apart demonstrating that:

- all threshold conditions have been met: i.e. no evidence of an algal scum or mat, and cyanobacteria cell counts and toxin levels below threshold concentrations, and
- if routine monitoring is being conducted, that cyanobacteria cell counts and microcystin concentrations are either declining or stable (ie not showing increasing trend toward threshold levels).

ATTACHMENT 1

Laboratory Methods That Are Available For Cyanotoxin Measurement:

Biological Assays:

- Animal Tests (e.g. Mice)
- Enzyme-Linked Immunosorbent Assays (ELISA)
- Protein Phosphatase Inhibition Assays (PPIA)
- Neurochemical assays (e.g. acetylcholinesterase-based)

Chromatographic Methods:

- Gas Chromatography with Flame Ionization Detection (GC/FID) or Mass Spectrometry (GC/MS)
- Thin Layer Chromatography (TLC)
- Liquid Chromatography / Ultraviolet-Visible Detection (HPLC or LC/UV)
- Liquid Chromatography / Fluorescence (LC/FL) – usually with post column oxidation prior to detection
- Liquid Chromatography Ion Trap Mass Spectrometry (LC/IT MS)
- Liquid Chromatography Time-of-Flight Mass Spectrometry (LC/TOF MS)
- Liquid Chromatography Single Quadrupole Mass Spectrometry (LC/MS)
- Liquid Chromatography Triple Quadrupole Mass Spectrometry (LC/MS)

Analytical Laboratories

Dr. Greg Boyer, Professor of Biochemistry

SUNY-ESF

Syracuse NY 13210

315-470-6825

glboyer@esf.edu

Capable of analyzing for many cyanobacteria toxins: Microcystins and nodularins -80 congeners; Paralytic shellfish toxins 56 congeners; anatoxin-a (6 congeners), anatoxin-a(S) 1 variant and cylindrospermopsin (3 congeners).

Fee schedule <http://www.esf.edu/merhab/services.asp>

Academy of Natural Sciences – Phycology Section

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phytoplankton counts, including cyanobacteria

EcoAnalysts, Inc.

15 North Market Street

Selinsgrove, PA 17870

Tel: 1-570-374-2100

Fax: 1-570-374-8580

Main Office Email: info@ecoanalysts.com

phytoplankton counts, including cyanobacteria

GreenWater Laboratories/CyanoLab

205 Zeagler Drive, Suite 302

Palatka, FL 32177

Tel: 1-386-328-0882/1-877-869-2542

Fax: 1-386-328-9646

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MWH Laboratories

750 Royal Oaks Drive #100

Monrovia, CA 91016

(800) 566-LABS

Fax: (626) 386-1101

mwhlabs@mwhglobal.com

http://www.mwhlabs.com/news_template.asp?newsID=44

Lab and Test Kits

PhycoTech, Inc.

620 Broad Street, Suite 100

St. Joseph, MI 49085

Tel: 1-269-983-3654

Fax: 1-866-728-5579/1-269-983-3653

Email: info@phycotech.com

phytoplankton counts, including cyanobacteria

State Hygienic Laboratory at the University of Iowa – Iowa City Lab

UI Research Park – Coralville

Iowa City, IA 52242-5002

Tel: 1-319-335-4500/1-800-421-IOWA (4692)

Fax: 1-319-335-4555

Conducts cyanobacteria counts/biovolume and may still do microcystin analysis.

Northeast Laboratories Inc.

Berlin Office
129 Mill Street, Suite 11
Berlin, CT 06037
CT 860.828.9787 or 800.826.0105
outside CT 800.654.1230
<http://nelabsct.com/>

Test Kits

Abraxis, LLC

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ELISA test kit/test strips

EnviroLogix Inc.

500 Riverside Industrial Parkway
Portland, Maine 04103-1486
207-797-0300 or toll free at: 1-866-408-4597

Beacon Analytical Systems, Inc.

Saco, Maine
(207) 761-2199
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EBPI Environmental Bio-detection Products, Inc

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