

AUTHORIZATIONS

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QUALITY CONTROL/QUALITY ASSURANCE DOCUMENTATION

Title: Collecting a Water Sample for Algal Toxin Analysis
 Type: Standard Operation Procedure #X
 Version: 1
 Date: 12/10/2020
 Author: Joe Nett

REVISION HISTORY

Revision	Change Description	Date	Authorization
0	Document Creation; Document Control Initiated	2020-04-13	

ACKNOWLEDGEMENTS

(Place to acknowledge peer reviewer)

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TABLE OF CONTENTS

1.0 SCOPE AND APPLICABILITY	2
2.0 SUMMARY OF METHOD	2
3.0 HEALTH AND SAFETY WARNING	2
4.0 CAUTIONS.....	3
5.0 INTERFERENCES.....	3
6.0 FIELD PERSONNEL QUALIFICAITONS/RESPONSIBILITIES.....	3
7.0 EQUIPMENT AND SUPPLIES.....	3
8.0 PROCEDURE	3
9.0 DATA AND RECORD MANAGEMENT	4
10.0 QUALITY ASSURANCE AND QUALITY CONTROL	4
11.00 REFERENCES.....	4
APPENDIX A. Sample Log	
APPENDIX B. Field Observation Form	
APPENDIX C. SOP Acknowledgement and Training Form	

1.0 SCOPE AND APPLICABILITY

This document presents the North Dakota Department of Environmental Quality (NDDEQ), Division of Water Quality's (DWQ) Standard Operating Procedure (SOP) for collecting a water sample for algal toxin analysis. This SOP applies to all DWQ field staff, non-DWQ cooperators, and citizen volunteers. Cyanobacteria, also known as blue-green algae, are efficient at utilizing nutrients and light and often outcompete other species of algae during the summer months. Dense growth of these cyanobacteria, also referred to as a bloom, can affect dissolved oxygen cycles, shade-out other algal species, cause skin irritation and produce harmful toxins. These toxins (referred to as cyanotoxins) can affect wildlife, livestock, pets and humans. These toxins are produced intra-cellularly and are then release when the cell lyses (or breaks). Different species of cyanobacteria can produce different types of cyanotoxins, and different cyanotoxins effects an organism's body in a different way (e.g., neurotoxins affecting the brain, hepatotoxins affecting the liver). Understanding the type of bloom that is present can help a sampler in determining what to sample for.

2.0 SUMMARY OF METHOD

The sampler shall take a sample from the densest part of the bloom, with public safety, as well as livestock and wildlife health, in mind. Samples shall be collected by partially submerging the bottle in the bloom and filling the bottle to the shoulder. Samples should be immediately put on ice. When all sampling is completed, samples should either be frozen or shipped immediately.

3.0 HEALTH AND SAFETY WARNING

Field personnel should take appropriate precautions when operating watercraft and working on, in, or around water. All boats should be equipped with safety equipment such as personal flotation devices (PFD's), oars, air horn, etc. North Dakota's boating laws and rules shall be followed by all field personnel.

Field personnel should be aware that hazardous conditions potentially exist at every waterbody. If unfavorable conditions are present at the time of sampling, the sample visit is recommended to be rescheduled. If hazardous weather conditions arise during sampling, such as lightning or high winds, personnel should cease sampling and move to a safe location.

As noted earlier, cyanotoxins are harmful to humans. The sampler should take care to always wear gloves when collecting a sample, as cells getting on your skin can lead to irritation or via ingestion if hands are not cleaned properly.

4.0 CAUTIONS

Care should be taken to use correct sampling bottles, as some bottles (e.g., Nalgene) have been documented as causing invalid results.

5.0 INTERFERENCES

Time of day can affect the quality of sample. Cyanobacteria can alter their buoyancy (vertically) depending on light intensity or time of day, so being mindful of environmental conditions is necessary. Cyanobacteria movement horizontally is common depending on the prevailing winds. Understanding present wind condition as well as that of the leading days is necessary to determining bloom condition.

6.0 PERSONNEL QUALIFICATIONS/RESPONSIBILITIES

All personnel taking water samples for algal toxin analysis must read this SOP annually and acknowledge they have done so via a signature page (see Appendix B). New field personnel must also demonstrate successful performance of the method. The signature page will be signed by both trainee and trainer to confirm that training was successfully completed and that the new monitor is competent in carrying out this SOP. The signature page will be kept on-file at DWQ along with the official hard copy of this SOP.

7.0 EQUIPMENT AND SUPPLIES

- _____ Copy of this SOP
- _____ Sample Log (Appendix A)
- _____ Field Observation Form (Appendix B)
- _____ PETG bottle(s) (Insert catalog number)
- _____ Nitrile gloves
- _____ Camera
- _____ GPS
- _____ Batteries
- _____ Sample Label(s)
- _____ Clear Packing Tape
- _____ Pens, pencils and sharpies
- _____ Advisory and Warning signs
- _____ Hardware kit for sign installation
- _____ Zip ties
- _____ Cooler with ice
- _____ Cyanotoxin test strips
- _____ 500 mL plastic bottle (if a nutrient sample is to be collected)
- _____ Sulfuric acid for preservation (if a nutrient sample is to be collected)

8.0 PROCEDURE

Most sites to be sampled for potential algal toxins are reported to the NDDEQ from the public or other government agencies. These sites are sampled with public safety and the health of livestock and wildlife in mind.

- 1) Once the sampler has arrived at the reported waterbody, the sampler should locate the reported area of the bloom.
- 2) The sampler should not only assess the reported location of the bloom, but also investigate bloom at other public access points (e.g., boat ramp, swimming beach, fishing piers).
- 3) As bloom conditions can change rapidly in terms of location and severity, the sampler should take care to collect their sample from the densest part of the bloom.
- 4) The sampler should use the Field Observation Form to record condition at the sampled site(s).
- 5) Complete sample label for the site with lake or river name, site description, date collected, time collected and sampler name. Affix the label to the sample bottle and secure the label to the bottle with clear packing tape.
- 6) Since cyanobacteria blooms tend to proliferate at the surface, partially submerge the mouth of the sample bottle in the water, filling the bottle to the “shoulder” (**Provide a picture**). Note: Filling beyond the shoulder will increase the possibility that the bottle may break during freezing.
- 7) Take pictures of the bloom area.
- 8) Place sample bottle on ice and proceed to next site at the waterbody, if necessary. Repeat steps 2 through 7 if more samples are necessary.
- 9) If staff are to use an algal toxin strip, follow directions provided in the package of strips or in the HABs sampling binder.
- 10) Following all sampling, samples should either be shipped immediately or frozen for batch shipping.

9.0 DATA AND RECORDS MANAGEMENT

Observations and test strip results will be recorded on the Field Observation Form (Appendix B). Once personnel reach the office, data recorded on the field form are entered into the DEQ HABTracker Database. In the HABTracker Database, the sampler should enter visit information (Visit Info > Visit Information) from the visual observation sheet and attach pictures taken during each visit. Also, the sampler should update the workflow for each lake for samples collected, signs put up or taken down, visual observations, etc. (Visit Info > Workflow Tracking System).

10.0 QUALITY ASSURANCE AND QUALITY CONTROL

There are limited Quality Assurance and Quality Control (QA/QC) procedures for collecting water samples for algal toxin analysis. Duplicate samples may be collected, if desired, from the same location. Further, split samples may be collected, if desired, and sent to different laboratories to check accuracy of analysis.

11.0 REFERENCES

Related DWQ SOPs

Standard Operating Procedures for the Collection of Lake Water Quality Samples

APPENDIX A
Sample Log

APPENDIX B
Field Observation Form

Approved by: _____

NAME: _____
DATE: _____
LAKE: _____
LOC. DESC. _____
LOC. TYPE: _____

TIME: _____
LAT: _____
LONG: _____
VISIT REASON: _____

DESCRIPTION AND EXTENT:

WEATHER:	SUNNY	WIND SPEED AND DIRECTION:	NO WIND	N	COLOR:	NONE
	PARTLY CLOUDY		SLIGHT	S		GREEN
	OVERCAST		BREEZY	E		TURQUOISE
	DARK CLOUDS		STORMY	W		REDDISH
	RAINING			OTHER:		YELLOW
					OTHER:	

APPEARANCE:	SCUM/FILM PRESENT	GREEN COTTAGE CHEESE
	CRUST/PUFF BALLS PRESENT	SPILLED GREEN PAINT
	GRASS CLIPPINGS	SMALL LEAVES
	DOTS	

STRIPS:		
STRIP A	STRIP B	STRIP C

STRIP A TOXIN:
RESULT:
1) < REPORTING LIMIT
2) > REPORTING LIMIT
3) RESULT INCONCLUSIVE
4) STRIP FAILED

STRIP B TOXIN:
RESULT:
1) < REPORTING LIMIT
2) > REPORTING LIMIT
3) RESULT INCONCLUSIVE
4) STRIP FAILED

STRIP C TOXIN:
RESULT:
1) < REPORTING LIMIT
2) > REPORTING LIMIT
3) RESULT INCONCLUSIVE
4) STRIP FAILED

FILE LOCATION: Y:\WATER\SURFACE\11_HarmfulAlgalBlooms_____

*Photos should be named as LakeName_SiteName_YYYYMMDD (e.g., MoonLake_BoatRamp_20200804)

APPENDIX C
BSA Environmental Chain of Custody Form



BSA Environmental Services, Inc.
 23400 Mercantile Rd., Suite 8
 Beachwood, OH 44122
 P: 216-765-0582 F: 216-765-0583
 Email: j.beaver@bsaenv.com

CHAIN OF CUSTODY

Client Information				Invoice Information			
Client Name: ND Dept of Environmental Quality				Invoice To:			
Address: 918 East Divide Ave, 4th Floor				Address:			
City: Bismarck		State: ND	Zip: 58501	City:		State:	Zip:
Contact: Aaron Larsen				Contact:			
Phone Number: 701-328-5230		Fax Number: 701-328-5200		Phone Number:		Fax Number:	
Email: allarsen@nd.gov				Email:			

Project Name: ND HABs Monitoring	
Project Number:	
Special Instructions:	

Sample ID/Number	Site Name	Sample Date	Sample Time	Analysis Requested	Other Sample Information

Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:

COMMENTS:

APPENDIX D
SOP Acknowledgement and Training Form

