Northeast Ohio Regional Sewer District

Level 3 Project Study Plan

2021 Lake Erie Beach Monitoring

Table of Contents

List of Acronyms

CSO	Combined Sewer Overflow
DO	Dissolved Oxygen
EMSC	Environmental and Maintenance Service Center
EPA	Environmental Protection Agency
GIS	Geographic Information System
GPS	Global Positioning System
HUC	Hydrologic Unit Code
MPN	Most-Probable Number
NELAC	National Environmental Laboratory Accreditation Conference
NEORSD	Northeast Ohio Regional Sewer District
ODH	Ohio Department of Health
PFD	Personal Flotation Device
QDC	Qualified Data Collector
RM	River Mile
SOP	Standard Operating Procedure
USGS	United States Geological Survey
WQIS	Water Quality & Industrial Surveillance

(1) Objective

The purpose of this study is to monitor water quality in Lake Erie at Edgewater, Euclid, and Villa Angela beaches in order to communicate beach conditions to the public and to evaluate water quality standards attainment.

Microorganisms from urban runoff, combined sewer overflows (CSOs), wildlife, bather shedding, and non-point sources can be a contributing factor to illnesses for individuals utilizing the beaches. The U.S. Environmental Protection Agency has adopted *Escherichia coli* (*E. coli*) as one of the best indicator organisms at freshwater bathing beaches because its presence has been correlated to other pathogenic microorganisms that can cause illnesses. During this study, *E. coli* densities will be monitored, weather permitting, at these three beaches throughout the recreation season. Sampling will be conducted by the Northeast Ohio Regional Sewer District's (NEORSD) Water Quality and Industrial Surveillance (WQIS) division and may occur between May 1, 2021 and October 31, 2021. NEORSD's Analytical Services division will perform sample analysis. WQIS will evaluate the collected data and distribute the daily results. The data obtained from this sampling will be reported to the Ohio Department of Health (ODH) and used for public notification of water quality advisories. WQIS will be responsible for evaluating the results to determine water quality standards attainment.

In addition to water quality sampling at the beaches, water samples will also be collected from Euclid Creek, which, historically, has had elevated bacteriological densities that may be adversely impacting Villa Angela and Euclid Beaches. NEORSD will compare the results to the applicable water quality standards to determine the attainment status of Euclid Creek.

(2) Non-point/Point Sources

Point Sources	Non-point Sources
Publicly Owned Treatment Works	Stormwater runoff
CSOs	Sand
Storm sewers	
Bathers	
Feces (birds, dogs, wildlife)	

A map has been provided in Appendix A to show potential point sources that may be influencing the water quality at each sample location. These sources of pollution, along with the non-point sources listed in the table above, may be negatively impacting the water quality conditions at the beaches. Other factors that may

influence water quality and bacteriological densities during the study may include wet weather, wind, wave action, and beach morphology.

(3) Parameters Covered

Samples collected will be analyzed for *E. coli* densities as outlined by NEORSD's most current Standard Operating Procedures (SOP) for *Total Coliform and E. coli by Colilert®, Enterococci by Enterolert ®* or *Determination of E. coli by Membrane Filtration*. Field parameters to be measured during the study will include pH, water temperature, conductivity and turbidity (Appendix B). In addition, a field assessment of the beach will be conducted following the procedures outlined in NEORSD's *Beach Sampling* SOP (Appendix C). Observations such as number of swimmers and birds, wave height, average and maximum wind speed, wind direction, water color, clarity, odor and surface coating, lake surface conditions, and weather conditions may be recorded on a field sheet or in electronic format using an Apple iPad equipped with GIS data entry software. Examples of *Beach Sampling Field Data Forms* can be found in Appendix D.

(4) Field Collection and Data Assessment Techniques

Individual bacteriological samples will be collected from one site on Euclid Creek (River Mile (RM) 0.55), and at each of the three beaches (east location) in at least a 250-milliliter sterilized polypropylene container and up to a 2000-milliliter sterilized polypropylene container, depending on the needs of NEORSD's Analytical Services. A 473-milliliter plastic bottle will be used to collect a water sample from each site to be analyzed for turbidity.

Field blanks are not required by method 1603 or by the National Environmental Laboratory Accreditation Conference (NELAC) for bacteria analysis. NEORSD's Analytical Services has procedures in place which are required by NELAC to demonstrate that the sample containers are clean and sterile. If the sterility check comes back positive, all equipment is re-cleaned and sterilized. Additionally, bacteriological field duplicates will be collected from a randomly chosen site at a frequency not less than 5% of the total samples collected.

All samples will be collected as grab samples where the total depth of water at each beach sample site is approximately three feet. Samples will be collected approximately 6-12 inches below the water surface, as stated in Appendix C. At the time of collection, field parameters (pH, conductivity and temperature) will be measured directly in the lake or creek. Field analyses will include the use of the following meters to measure pH, water temperature and conductivity: Hanna HI 98129, YSI 600XL Sonde, YSI EXO1 Sonde, or YSI EXO2 Sonde. Turbidity samples will be collected with a 473-milliliter container and measured using one of

the following portable field turbidity meters: the Hach 2100Q or Hach 2100P Turbidimeter. Specifications for the meters are included in Appendix E.

If weather conditions prevent the sampler from safely wading out to a depth of three feet, a sampling pole will be used to collect a bacteriological sample and turbidity sample from Lake Erie. If weather conditions do not permit the use of a sampling pole, no samples will be collected. Additionally, if sampling at the Euclid Creek site is deemed unsafe due to high flow or other conditions, samples will not be collected. Refer to section 7.6 of Appendix C for an explanation of sample collection during inclement weather.

Notes and observations pertaining to the beach and water conditions will be recorded using the NEORSD *Beach Sampling Field Data Form* (refer to Appendix D for an example form) or recorded in electronic format using an Apple iPad equipped with GIS data entry software. In the case of electronic data submission, daily field sheets may still be electronically generated upon request. Electronic data submission will allow beach modeling experts at the NEORSD WQIS division to enter data into Virtual Beach v3.0 modeling software prior to the return of the sampling team. Implementation of the electronic field data submission should expedite water quality predictions and public beach water quality advisory postings.

All water samples and field parameters will be collected as specified in NEORSD's *Beach Sampling* SOP located in Appendix C and Ohio EPA's *Surface Water Field Sampling Manual for water column chemistry, bacteria and flows* (2019). All bacteriological sample results will be compared to the State of Ohio Water Quality Standards to determine whether any exceedances of the applicable water quality criteria have occurred.

NEORSD will collect additional samples at Edgewater Beach in the event of a discharge from Combined Sewer Overflow (CSO) 069 (Permit Number 3PA0002069), in accordance with its Emergency Response Plan. CSO 069 (41.487253, -81.744972) is a stormwater outlet for the Northwest Interceptor, located on the western edge of the beach. CSO 069 is located near a highly utilized public recreation area; therefore, such sampling is necessary when a CSO discharge occurs during the recreation season. These samples will be collected at three locations on the west side of Edgewater beach, near the CSO outfall and at several near shore and far shore locations to determine the impact of the CSO discharge on the water quality at Edgewater Beach. An outline for actions and sampling during a discharge at CSO 069 is located in NEORSD Emergency Response Plan 2.2.4, Edgewater Overflow. All samples will be collected as specified in Ohio EPA's *Surface Water Field Sampling Manual for water column chemistry, bacteria and flows* (2019). All samples will be analyzed using approved EPA methods as

specified in NEORSD's Analytical Services' most current *Quality Assurance Manual* (effective May 15, 2020).

If unusual water quality conditions are noted at the beaches, the NEORSD may collect additional water samples during the field season.

(5) Stream Flow Measurements
Not applicable.

(6) Sampling Locations

One location at the eastern section of Edgewater, Villa Angela and Euclid Beaches in Cleveland will be sampled for the duration of the study. An additional sample will be collected from Euclid Creek at RM 0.55. The locations of the sampling sites are shown on the map given in Appendix A. The following table details the sampling locations with respect to latitude/longitude, general location description, U.S. geological survey HUC 8 name and number, and purpose. Additional pictures and maps of the locations can be found in Appendix 1 of Appendix C.

Water Body	Site	Latitude	Longitude	Location Information	USGS HUC 8 Number-Name	Purpose
Edgewater Beach	East	41.4897	-81.7391	Eastern half of the beach. In line with the brick stack on the other side of the freeway.	04120200-Lake Erie	Public notification of water quality conditions at bathing beaches, determination of water quality standards attainment, and determination of the impact of point and non-point sources.
Villa Angela Beach	East	41.5862	-81.5667	Eastern half of beach mid-distance between the 3rd and 4th break walls.		
Euclid Beach	East	41.5842	-81.5687	In front of the pile of stones on the east side of the beach.		
Euclid Creek	RM 0.55	41.5835	-81.5595	Downstream of Lakeshore Boulevard.	04110003-Ashtabula-Chagrin	

(7) Schedule

Beach monitoring is expected to begin on May 3, 2021, and end on September 30, 2021 (Appendix F). From May 3 through May 20, bacteriological water samples from all sites listed in section 6 will be collected four days a week (Monday through Thursday). Beginning May 24, and lasting through September 6, bacteriological water quality samples will be collected seven days a week from all sites. From September 6 through September 30, bacteriological water quality sampling at the beach sites is expected to return to four days a week (Monday through Thursday). Additional sampling may take place in October. All sampling will be dependent on weather conditions. Samples will be collected as scheduled, unless surface water conditions are deemed unsafe or there is inadequate staffing availability.

(8) QA/QC

All samples will be collected, labeled and immediately placed on ice inside of a sample cooler. Upon completion of a sampling event at the beach or creek, the sample cooler will be stored inside the field truck. The field truck will remain locked at all times when not occupied or visible. Sampling activities, including sample time and condition of surface water sampled, will be entered in a log book and on the *Beach Sampling Field Data Form* (see Appendix D for examples). The samples will then be delivered immediately to the NEORSD Analytical Services cooler and transferred to the custody of Analytical Services. The NEORSD's Analytical Services *Quality Assurance Manual* (effective date: May 15, 2020) and associated SOPs are on file with Ohio EPA. The Quality Assurance Officer at Analytical Services will send updates, revisions, and any information on document control to Ohio EPA as needed.

(9) Work Products

Reports summarizing, interpreting, graphically presenting and discussing the bacteriological data and any excursions from water quality standards will be submitted to the Ohio EPA or an Ohio EPA approved data warehouse as well as to the Ohio Department of Health. Field parameters and bacteriological data will be used internally, to update a predictive model created using Virtual Beach v.3.0. Results of the predictive modeling will be reported daily to the Cleveland Metroparks for the purpose of posting water quality advisories.

Pictures will be taken during each sampling event by the samplers to document the conditions at the beach. Daily photos will be electronically delivered from the field crew's iPads to an electronic photo catalog. Copies of the *Beach Sampling Field*

Data Form and summary reports will also be stored electronically. Additionally, field observations will also be entered into the Environmental Information Management System (EIMS).

(10) Qualified Data Collectors

The following Level 3 Qualified Data Collectors (QDC) certified by Ohio EPA in Chemical Water Quality Assessment may be involved with this study.

Name	QDC Number	Address	Email Address	Phone Number
John W. Rhoades	00008	4747 E. 49th St., Cuyahoga Heights, OH 44125	rhoadesj@neorsd.org	216-641-6000
Seth Hothem*	00010	4747 E. 49th St., Cuyahoga Heights, OH 44125	hothems@neorsd.org	216-641-6000
Eric Soehnlen	01030	4747 E. 49th St., Cuyahoga Heights, OH 44125	soehnlene@neorsd.org	216-641-6000
Hannah Boesinger**	01374	4747 E. 49th St., Cuyahoga Heights, OH 44125	boesingerh@neorsd.org	216-641-6000
Jillian Knittle	00512	4747 E. 49th St., Cuyahoga Heights, OH 44125	knittlej@neorsd.org	216-641-6000
Ron Maichle	00145	4747 E. 49th St., Cuyahoga Heights, OH 44125	maichler@neorsd.org	216-641-6000
Mark Matteson	01020	4747 E. 49th St., Cuyahoga Heights, OH 44125	mattesonm@neorsd.org	216-641-6000
Denise Phillips	01203	4747 E. 49th St., Cuyahoga Heights, OH 44125	phillipsd@neorsd.org	216-641-6000
Francisco Rivera	00262	4747 E. 49th St., Cuyahoga Heights, OH 44125	riveraf@neorsd.org	216-641-6000
Justin Telep	01304	4747 E. 49th St., Cuyahoga Heights, OH 44125	telepj@neorsd.org	216-641-6000

*Project Manager
**Project Leader

All non-QDC samplers will receive training that consists of reviewing all pertinent SOPs and completion of required demonstrations of capabilities for parameters measured in the field. Training on sampling techniques and field analysis will be conducted by having the samplers assist a QDC at the sites while the techniques are being demonstrated. The non-QDC samplers will then get an opportunity to conduct sampling, and the QDC will determine their proficiency with the techniques by observing sampling being performed and assessing the samplers' techniques. All samplers must meet and complete all requirements satisfactorily to be permitted to sample on their own. A complete checklist of training is provided in Appendix G (*Beach Sampling Training Checklist*). Once samplers have met the outlined criteria, they will be permitted to sample without the direct supervision of a QDC. The QDCs will perform monthly audits of the sampling, using a *Beach Sampling Audit Form* (Appendix H), and correct deficiencies through re-training, if

necessary. Re-training will consist of accompaniment to the sampling site, instruction and observation by a QDC until deficiencies are no longer noted.

Official certification letters for the Level 3 Chemical Water Quality Assessment QDC approvals are on file with Ohio EPA.

The following is a list of persons not qualified as Level 3 data collectors who may also be involved in the project. Project leaders, with assistance from the QDCs, will provide training on sampling methodology and conduct the monthly audits. The project manager and leaders will be responsible for the final review of all reports and data analysis prepared prior to completion.

Name	Address	Email Address	Phone Number
Lindsay Baker	4747 E. 49th St., Cuyahoga Heights, OH 44125	bakerl@neorsd.org	216-641-6000
Rae Grant	4747 E. 49th St., Cuyahoga Heights, OH 44125	grantr@neorsd.org	216-641-6000
Alex Johnson	4747 E. 49th St., Cuyahoga Heights, OH 44125	johnsonalex@neorsd.org	216-641-6000
Matthew Johnson	4747 E. 49th St., Cuyahoga Heights, OH 44125	johnsonmattew@neorsd.org	216-641-6000
Kevin Fitzgibbons	4747 E. 49th St., Cuyahoga Heights, OH 44125	fitzgibbonsk@neorsd.org	216-641-6000
Mario Meany	4747 E. 49th St., Cuyahoga Heights, OH 44125	meanym@neorsd.org	216-641-6000
Carrie Millward	4747 E. 49th St., Cuyahoga Heights, OH 44125	millwardc@neorsd.org	216-641-6000
Daniel Neelon	4747 E. 49th St., Cuyahoga Heights, OH 44125	neelond@neorsd.org	216-641-6000
Joseph Schiel	4747 E. 49th St., Cuyahoga Heights, OH 44125	schielj@neorsd.org	216-641-6000
Frank Schuschu	4747 E. 49th St., Cuyahoga Heights, OH 44125	schuschuf@neorsd.org	216-641-6000
William Stanford	4747 E. 49th St., Cuyahoga Heights, OH 44125	standfordw@neorsd.org	216-641-6000
Wolfram von Kiparski	4747 E. 49th St., Cuyahoga Heights, OH 44125	vonkiparskiw@neorsd.org	216-641-6000
Theresa Walsh	4747 E. 49th St., Cuyahoga Heights, OH 44125	walsht@neorsd.org	216-641-6000
Paraprofessional Intern (TBD)	4747 E. 49th St., Cuyahoga Heights, OH 44125	@neorsd.org	216-641-6000
Paraprofessional Intern (TBD)	4747 E. 49th St., Cuyahoga Heights, OH 44125	@neorsd.org	216-641-6000
B-STEM Intern (TBD)	4747 E. 49th St., Cuyahoga Heights, OH 44125	@neorsd.org	216-641-6000

Name	Address	Email Address	Phone Number
B-STEM Intern (TBD)	4747 E. 49th St., Cuyahoga Heights, OH 44125	@neorsd.org	216-641-6000

(11) Contract Laboratory

All bacteriological and/or chemical sample analysis will be completed by NEORSD's Analytical Services Division. Evidence of NEORSD's Analytical Services current accreditation and method dates can be found in Appendix I. The contact information for NEORSD's Analytical Service Division is:

Cheryl Soltis-Muth
4747 E. 49th Street
Cuyahoga Heights, Ohio 44056
Soltis-MuthC@neorsd.org
216-641-6000

(12) Scientific Collectors Permit
Not applicable.

(13) Digital Catalog Statement
A digital photo catalog of all sampling locations will be maintained for 10 years and will include photos of the specific sampling location(s), the riparian zone adjacent to the sampling location(s) and the general land use in the immediate vicinity of the sampling location(s).

Print/Signature: Seth Hothem / Seth Hothem Date: 3/31/21

(14) Voucher Statement

Not applicable.

(15) Sample Location(s) Statement

I attest that I will make available any and all sampling location information, including but not limited to; the name of the water body sampled, sampling location latitude and longitude, sampling location river mile where possible, general location

information, the U.S. geological survey HUC 8 number and name, and the purpose for data collection at each sampling location.

Print/Signature: Seth Hothem / Seth Hothem Date: 3/31/21

(16) Additional Data Type Signed Statement

The Lead Project Manager for all locations is approved for all project data types.

Print/Signature: Seth Hothem / Seth Hothem Date: 3/31/21

(17) Trespassing Statement

I have not been convicted or pleaded guilty to a Violation of section 2911.21 of the Revised Code (criminal trespass) or a substantially similar municipal ordinance within the previous five years.

Print/Signature: Hannah Boesinger / Hannah Boesinger Date: 3/17/2021

Print/Signature: Seth Hothem / Seth Hothem Date: 3/17/21

Print/Signature: Jill Knittle / Jill Knittle Date: 3/23/21

Print/Signature: Ron Maichle / R. Maichle Date: 03-18-21

Print/Signature: Mark Matteson Mark Matteson Date: 3/23/21

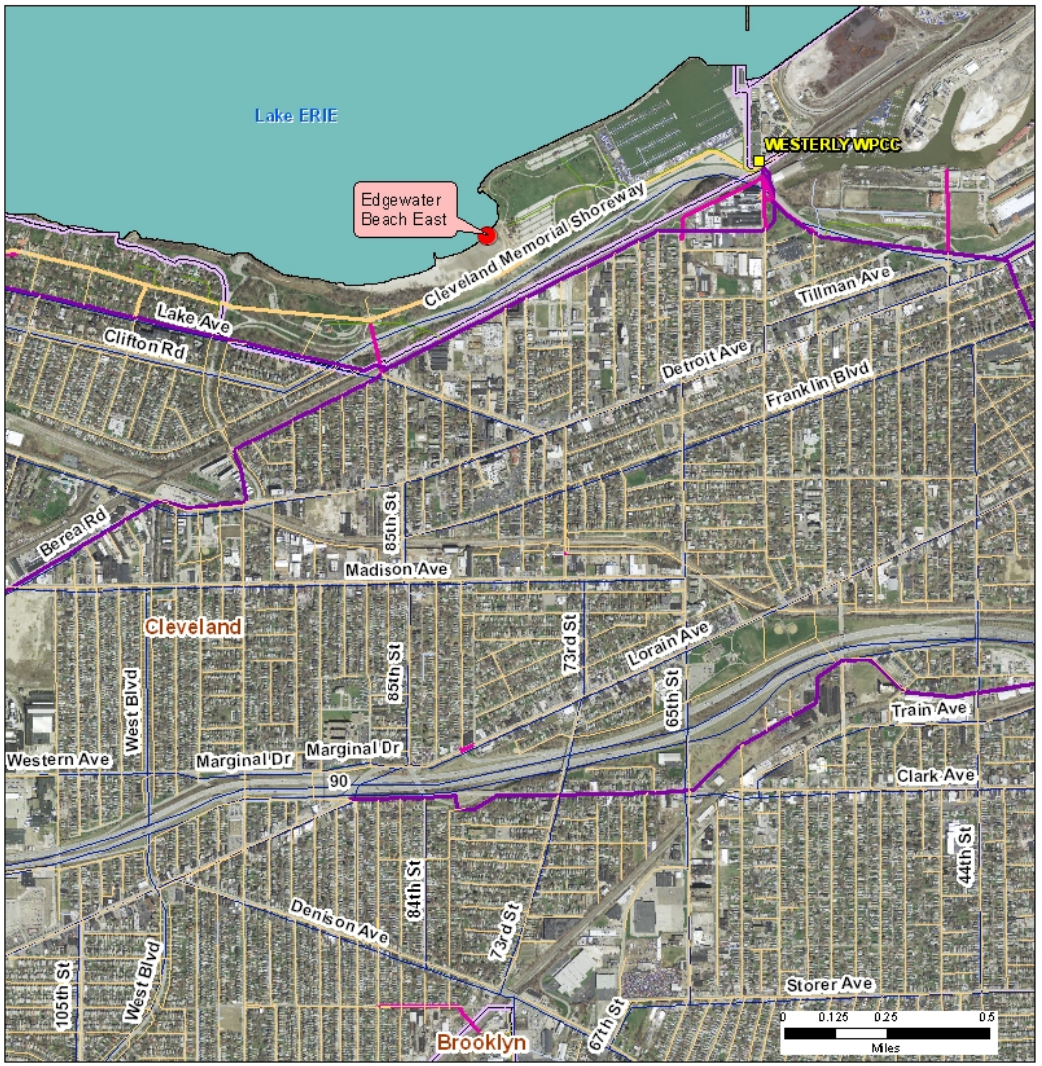
Print/Signature: Denise Phillips / Denise Phillips Date: 3/09/21

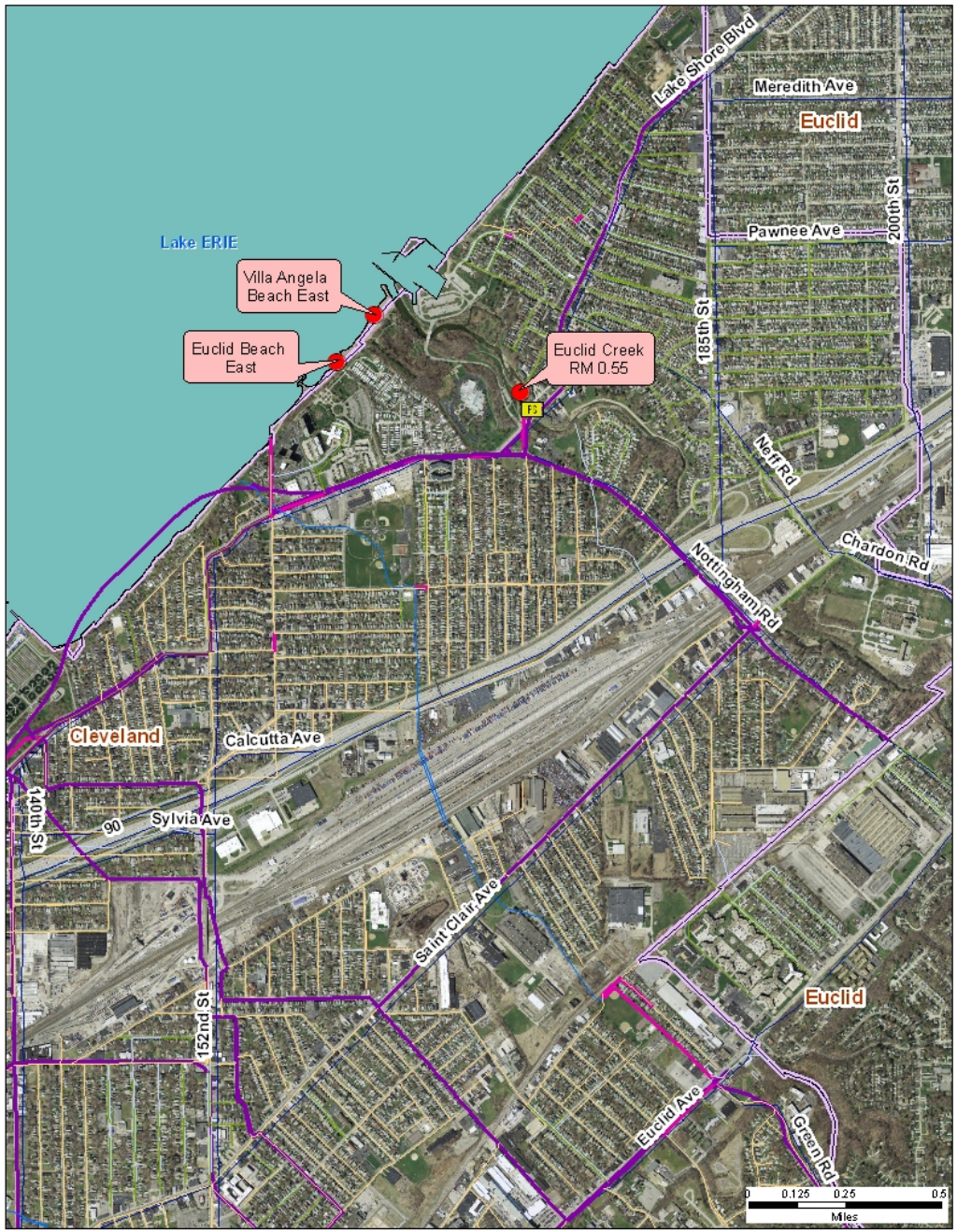
Print/Signature: Francisco Rivera / Francisco Rivera Date: 3/17/21

Print/Signature: Eric Soehnlen / E. Soehnlen Date: 3/29/21

Print/Signature: Justin Telep / Justin Telep Date: 3/19/21

Appendix A. Site Maps





Lake Erie Beach Monitoring

- Sample Location
- Outfall
- Stream
- NEORSD Pump Station
- CSO Outfall
- NEORSD CSO Control Sewer
- NEORSD CSO Responsibility Sewer
- NEORSD Intercommunity Relief Sewer
- NEORSD Interceptor Sewer
- Local Combined Sewer
- Local Culverted Stream
- Local Sanitary Sewer
- Local Storm Sewer

Northeast Ohio Regional Sewer District
Protecting Your Health and Environment

For more information, please contact: NEORSD GIS Services, 3900 Euclid Avenue, Cleveland, Ohio 44115 — (216) 881-6600 — GIS@neorsd.org

Appendix B. Parameter Information

Parameter	Test	Value Reported in	Minimum Detection Limit	Practical Quantitation Limit
E. coli	Colilert QT (SM 9223 B 20th Ed)	MPN (Most Probable Number)	1 MPN	--
	EPA 1603	colony forming units/100mL	1 colony	--
Turbidity*	EPA 180.1	NTU	0.1 NTU	0.2 NTU
Field Parameter	**Test**	**Value Reported in**		
pH	EPA 150.1	s.u.		
Conductivity	SM 2510A	µs/cm		
Temperature	EPA 170.1	°C		
Turbidity*	EPA 180.1	NTU		

*Turbidity will be completed either in the field or the laboratory.

Appendix C. Beach Sampling Standard Operating Procedure

Northeast Ohio Regional Sewer District

Water Quality and Industrial Surveillance
4747 East 49th Street
Cuyahoga Heights, Ohio 44125

Title

Beach Sampling

SOP–EA016-19

Effective Date: 4/26/2021

Approvals

Prepared By: Eric Soehnlen Date: 4/26/21

Reviewed By Supervisor: Seth Hothem Date: 4/26/21

Approved By Manager: John W. Rhoades Date: 04/29/21

Northeast Ohio Regional Sewer District

Water Quality and Industrial Surveillance
4747 East 49th Street
Cuyahoga Heights, OH 44125

TABLE OF CONTENTS

1. Scope and Application

1.1. This SOP describes the procedure for the collection of bacteriological beach water samples.

1.2. Beaches are sampled during the recreational season (May 1-October 31) to monitor levels of bacteria in order to inform the public of a possible risk of exposure to high levels of bacteria.

1.3. *E. coli* are commonly associated with sewage contamination resulting from a number of sources including over ground runoff and overflows of sewage systems from rain events, warm-blooded animal waste and the effects of increased wave height. The presence of the bacteria only indicates that other pathogenic bacteria may be present.

1.4. The EPA has determined that *E. coli* are one of the best indicator organisms of water quality for freshwater bathing beaches.

1.5. *E. coli* densities are compared to the Ohio water quality standards to determine recreation use attainment and beach and bathing water advisories. Beach advisories are based on single sample concentrations of *E. coli* bacteria.

1.6. The data from beach sampling are sent to the Ohio Department of Health for a daily assessment of bathing water quality. The Ohio Department of Health and the Ohio Department of Natural Resources use this data to determine when beach advisory postings should be made.

2. Interferences

2.1. The use of a sample bottle that is not autoclaved may cause elevated bacteria counts or false positives. Autoclaving kills any residual bacteria that may be present in the bottle.

2.2. Do not touch the inside of the bottle or the inside of the cap. This can contaminate the sample.

2.3. Sampling at a distance too close to the shoreline may cause elevated bacteria counts or false positives. Avoid sampling near bird feces, sediment, and floating debris and trash.

2.4. Avoid disturbing and kicking up bottom material at the sampling station.

3. Definitions

3.1. Anemometer- A device used to measure wind speed (maximum and average).

3.2. Beach Sampling Field Data Form- A field form to be filled out at each beach site in order to record field observations and field parameters.

3.3. Edgewater State Park- Lake Erie beach located at 6700 Cleveland Memorial Shoreway, Cleveland.

3.4. EMSC- Environmental Maintenance and Service Center (4747 East 49th Street, Cuyahoga Heights, Ohio 44125; 216-641-6000)

3.5. Sampling pole- Pole that extends to 12 feet and is used to take samples at a distance. Can be used during beach sampling if lake conditions are deemed unsafe due to high wave height.

3.6. Villa Angela/Euclid State Parks- Lake Erie beaches located at 16301 Lakeshore Boulevard, Cleveland.

4. Safety

4.1. Safety Equipment

- 4.1.1. Personal Flotation Device (PFD) (see Section 4.2.7.)
- 4.1.2. Chest waders
- 4.1.3. Gloves, if desired
- 4.1.4. Throw bag with 50 feet of nylon rope (refer to *Throw Bag SOP-EA007-00*)
- 4.1.5. District-issued cell phone

4.2. Sampling Safety Procedures

- 4.2.1. A District cell phone has been provided for additional safety. The phone should be charged and turned on while off District premises.
- 4.2.2. Sampling may not occur during a thunderstorm. During times of inclement weather, check with a Supervisor or Manager of Water Quality and Industrial Surveillance (WQIS) prior to sampling.
- 4.2.3. If inclement weather occurs while sampling, seek safety and call a WQIS Supervisor or Manager for instructions.
- 4.2.4. Samples will not be collected when wave heights are over 3.5 feet.
- 4.2.5. The sampler MUST put on chest waders before entering the water.
- 4.2.6. A PFD is provided for the sampler.
  - 4.2.6.1. A PFD must be worn when factors indicate that a drowning hazard may exist, such as rip current advisories, waves are greater than 2 feet in height and when waters are over waist deep, are swift, cold or turbid.
  - 4.2.6.2. Use of PFD during all other lake conditions is at the discretion of the sampler.

4.2.7. The sampler must wade out to a water depth of 3 feet to collect samples. The wave stick is used as a depth indicator. Do not wade out farther than recommended.

4.2.8. When the water is rough, the sampler may use a 12-foot sampling pole to assist with sampling. The sampler should wade out to a safe distance and then extend the sampling pole to obtain a representative sample. The use of the sampling pole shall be noted on the Beach Sampling Field Data Form.

4.2.9. Safety training will be given to all employees sampling.

4.2.10. Additional safety concerns should be brought to the attention of a WQIS Supervisor or Manager.

5. Equipment and Supplies

5.1. Sample Bottles

5.1.1. 250 milliliter, 500 milliliter, 1000 milliliter, or 2000 milliliter sterilized bacteriological bottle (at least 4 bottles)

5.1.2. 473 milliliter ISCO turbidity bottles (at least 4 bottles)

5.2. Sample Tags and Chain of Custody Sheet

5.3. Beach Sampling Field Data Forms for each beach and creek

5.4. Field Meters

5.4.1. Hanna HI 98129,

5.4.2. YSI 600XL Sonde, or

5.4.3. YSI-556 MPS Multi-Parameter Water Quality Meter

5.4.4. YSI EXO1 Sonde

5.5. Field Turbidity Meter

5.5.1. HACH 2100P Turbidimeter or

5.5.2. HACH 2100Q Turbidimeter

5.6. Anemometer

5.7. Sampling Pole (12 feet) with Zip Ties

5.8. Cooler with Ice

5.9. Throw Bag with 50 feet of Nylon Rope (refer to *Throw Bag SOP-EA007-00*)

5.10. Personal Flotation Device

5.11. District-issued Cell Phone

5.12. Digital Camera

5.13. GPS, if needed

5.14. Wave Height Stick(marked at inch and foot increments)

5.15. Gloves, if desired

5.16. Hand Sanitizer

5.17. Chest Waders

6. Calibration and Standardization

6.1. All field meters must be calibrated daily or verified that the instrument is in calibration by an independent standard.

6.1.1. See "*Operation of the Hanna HI98129 Meter SOP-EA015-00*" for use and calibration of the meter.

6.1.2. Refer to the manufacturer's operations manual or user's guide for the use and calibration of the YSI EXO1 Sonde.

6.1.3. Refer to the manufacturer's operations manual or user's guide for the use and calibration of the HACH 2100P Turbidimeter.

6.1.4. Refer to the manufacturer's operations manual or user's guide for the use and calibration of the HACH 2100Q Turbidimeter.

6.1.5. See "*Procedures for the Calibration and Use of the YSI 556 Multi-Parameter Water Quality Meter & YSI 650 MDS/600XL Sonde SOP-EA010-00*" for the use and calibration of the YSI 556 Multi-Parameter Water Quality Meter and the YSI 600XL Sonde.

6.1.6. Refer to manufacturer's operations manual or user's guide for additional information on all the above meters.

6.2. A log of the calibration history is to be maintained to assure that the meter is working properly.

7. Procedure

7.1. Directions to the Beaches and Euclid Creek

7.1.1. Edgewater Beach – (From 4747 E. 49th Street)

- Take E. 49th Street to Harvard Avenue.
- Make a right turn at Harvard Avenue.
- Make a left onto I-77 N.
- Take I-77N to I-90E.
- Take I-90E to Route 2W.
- Take Route 2 to the Edgewater Park exit.
- Take the exit and follow straight, following the signs to the beach area.
- Park the truck in the parking lot to the left or underneath the pavilion.

7.1.2. Villa Angela Beach/Euclid Beach/Euclid Creek (From 4747 E. 49th Street)

- Take E. 49th Street to Harvard Avenue.
- Make a right turn at Harvard Avenue.
- Make a left onto I-77 N.
- Take I-77N to I-90E.
- Take I-90E to the Lakeshore Boulevard exit.
- Make a right onto Lakeshore Boulevard.
- Follow Lakeshore Boulevard until you see the "Euclid Beach" entrance sign on the left. Turn into the premises (Villa Angela Drive).
- Euclid Creek will be on your right hand side as you enter.
    - Take the bike path on the right hand side and park in the grass at the first bend.
    - RM 0.55 sampling location is approximately 485 feet north of the Lakeshore Boulevard bridge.
- Take a right onto the bike path right before the foot bridge on Villa Angela Drive.
- Go onto the bike path very slowly; watch out for pedestrians.
- Villa Angela is the first beach on your right. Park on the right hand side in the grass by the entrance that leads you down to the beach.
- Euclid Beach is the second beach on your right. Park in the grass near the picnic tables.

7.2. Sampling Locations

7.2.1. Additional sampling locations may be added as needed.

7.2.2. See attached site diagrams for sampling locations (Appendix 1 and 2).

7.2.3. Edgewater Beach – There are 2 buoys and 3 lifeguard stations at this beach.

7.2.3.1. The sample is taken in line with the brick stack on the other side of the freeway.

7.2.3.2. **GPS Location**: 41.489694/-81.739117

7.2.4. Villa Angela Beach – There are 4 stone break walls at this beach. Count them left to right.

7.2.4.1. The sample is taken mid-distance between the 3rd and 4th break walls.

7.2.4.2. **GPS Location:** 41.586242/-81.566656

7.2.5. Euclid Beach – There are 2 stone break walls at this beach.

7.2.5.1. The sample is taken in front of the pile of stones on the east side of the beach.

7.2.5.2. **GPS Location:** 41.584244/-81.568739

7.2.6. Euclid Creek

7.2.6.1. **Euclid Creek RM 0.55 –** Downstream of Lakeshore Boulevard

7.2.6.2. **RM 0.55 GPS Location:** 41.583525/-81.5595

7.3. General Field Analysis/Observations Required at All Sampling Locations

7.3.1. Digital pictures are to be taken prior to sampling to avoid causing any disturbances of the bird activity.

7.3.1.1. Pictures of the east, west and overall views of the beach are to be taken (Appendix 3). Additional pictures of beach conditions that could impact the outcome of the testing should be taken as well as noted on the Beach Sampling Field Data Form.

7.3.2. The sample tag must be completed at the sampling site with the following information:

- Signature
- Employee ID
- Start Time (time sample was collected)

7.3.3. Field observation notes, field parameters and other miscellaneous information must be entered onto the Beach Sampling Field Data Form (Appendix 3) at the sampling site. The form must be filled out completely.

7.3.4. The sample collected in the 250mL, 500mL, 1000mL or 2000mL bottle will be used for microbiological tests at the laboratory. Turbidity will be collected in a 473-mL ISCO bottle.

7.3.5. Once the field collection has been performed, place the sample into the portable cooler filled with ice.

7.3.6. The samples must remain in the cooler until delivered to the Sample Custodian in the Analytical Services Department at the Environmental Maintenance and Service Center (EMSC).

7.3.7. Upon returning to EMSC, the field data and scanned in field forms are entered into eAquaPro and pictures are saved to the W:/ drive.

7.4. Bacteriological and Turbidity Field Sample Collection Protocol

7.4.1. Sampling method shall follow Ohio EPA's *Surface Water Field Sampling Manual for water quality parameters and flow (*2019).

7.4.2. Locate the sampling location by the markers on the beach as indicated in section 7.2.

7.4.3. If necessary, take a GPS reading to verify the location.

7.4.4. Wade out to a water depth of approximately 3 feet. Use the wave stick to verify the depth. The distance from the shoreline will vary daily based on the depth of Lake Erie and wave height.

7.4.5. The sampler must remove the cap from the sterilized bacteriological bottle invert the sample bottle and plunge the sample bottle 6-12 inches below the surface of the water.
7.4.6. The bottle should be rotated with the opening facing the surface to allow sample to fill the bottle. Make sure to leave headspace in order to provide sufficient space for shaking the sample for analysis.
7.4.7. The sample container should be capped and secured.
7.4.8. Repeat steps 7.4.4. through 7.4.6. to obtain the turbidity samples.
7.4.9. All samples are to be placed into the portable cooler containing ice.
7.4.10. Repeat Section 7.4 to collect samples at other sites.

7.5. Field Observations/Parameters
7.5.1. Take the maximum and minimum wave height before returning to the shoreline by using the wave stick. This is done by observing the minimum and maximum height of waves for one minute. Record the minimum and maximum wave heights, in inches, on the Beach Sampling Field Data Form (Appendix 3). Perform the following calculation to get the wave height:

[Maximum height (in)] (-) [-minimum height (in)] = wave height (in)

7.5.2. If you are unable to enter the water because of unsafe conditions, estimate the wave height and indicate so on the Beach Sampling Field Data Form.
7.5.3. Field parameters must be collected in the water at each sample site. Measure pH, conductivity and temperature in the water with the appropriate field meter. A turbidity sample will be collected in a 473-mL plastic bottle and analyzed at EMSC with a turbidimeter.

7.6. Sample Collection During Inclement Weather
7.6.1. Locate the sampling location by the markers on the beach.
7.6.2. If necessary, take a GPS reading to verify the location.
7.6.3. A sampling pole must be used to obtain samples when the water is rough and you are unable to wade out to 3 feet. If the wave height is over 3.5 feet, then samples will not be collected.
7.6.4. Bacteriological Sample Collection
7.6.4.1. Secure the sampling bottle to the pole with at least three zip ties then remove the cap of a sterilized bacteriological bottle.
7.6.4.2. Wade out into the water to a safe depth, at least 1.5 feet deep. The distance from the shoreline will vary based on the depth of Lake Erie and wave height.

7.6.4.3. The sample pole should be extended to maximum length and the sample bottle is inverted and plunged below the surface of the water.

7.6.4.4. Cap and secure the sample.

7.6.5. Repeat steps 7.6.4.1. through 7.6.4.4. using the 473-mL bottle to obtain the turbidity sample.

7.6.6. If unable to obtain field parameters in the water due to high waves or dangerous conditions, field parameters may be obtained from the turbidity sample on the shoreline.

7.6.7. Return to the shoreline, tag the samples and place the samples into the ice-filled portable cooler.

7.6.8. Be sure to fill in the Beach Sampling Field Data Form (Appendix 3) completely and indicate that the sampling pole was used.

7.7. Turbidity Analysis

7.7.1. Turbidity analysis is to be performed at EMSC for all sites.

7.7.1.1. Each beach site is run for turbidity twice and the values are averaged for a final turbidity result.

8. Data Handling and Review

8.1. The Project Leader will review all Beach Sampling Field Data Forms for accuracy and neatness.

8.2. The Project Leader will periodically audit the sampling process.

8.3. Report any unusual circumstances to the Project Leader or WQIS Supervisor.

8.4. For all beach sites, the sampler must enter the field measurements and observations into eAquaPro immediately upon returning to EMSC.

8.5. Scan and save all Beach Sampling Field Data Forms and pictures into the W\: drive upon returning to EMSC.

9. Additional Information

9.1. Using the Anemometer to Measure Wind Speed

9.1.1. Refer to the manufacturer's operations manual or user's guide for the use of the Kestrel 2000 Pocket Weather Meter.

10. References

10.1. Microbiological Methods for Monitoring the Environment Water and Wastes, EPA-600/8-78-017 (1978). Cincinnati, OH.

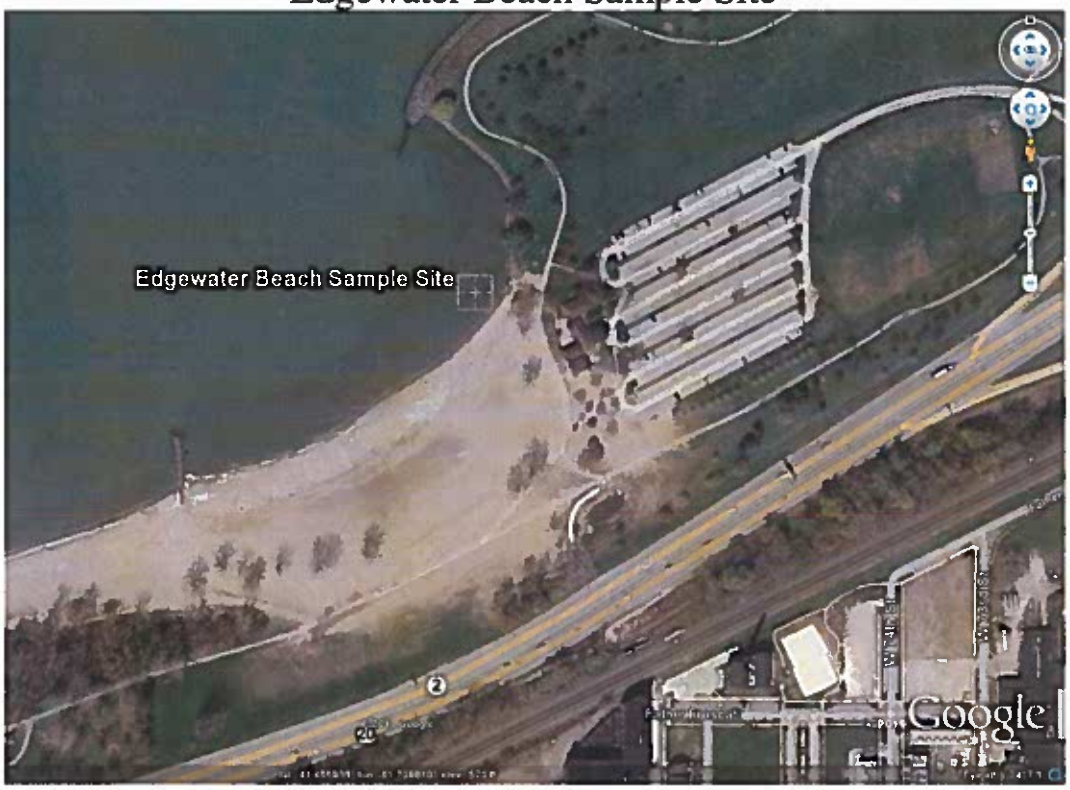
10.2. Ohio Environmental Protection Agency. (2019). *Surface Water Field Sampling Manual for water quality parameters and flow.* Columbus, OH: Division of Surface Water.

10.3. USEPA National Beach Guidance and Required Performance Criteria for Grants (EPA-823-B-02-004). (2002). Chapter 4-Beach Monitoring and Assessment.

10.4. Website: http://www.epa.gov/waterscience/beaches/grants/index.html.

APPENDIX 1

Edgewater Beach Sample Site



SAMPLE SITE
Brick stack on other side of freeway

APPENDIX 2

Villa Angela Sample Site

SAMPLE SITE
Mid-distance between 3rd and 4th break walls

Euclid Beach Sample Site

SAMPLE SITE
Pile of stones

Euclid Creek Sample Site

EUCLID CREEK RM 0.55
Downstream of Lakeshore Boulevard

APPENDIX 3

Example Beach Observation Sheet

NEORSD Beach Sampling Field Data Form

Location: _____ Date: _____ Time: _____ (hrs)

Samplers: _____

Meter(s) Used: _____

Sample ID: _____

General Observations

Weather: _____ 1-Clear 2-Partly Cloudy 3-Overcast 4-Light Rain 5-Heavy Rain 6-Steady Rain 7-Heavy Snow Melt 8-Other

Water Surface Conditions: _____ 1-None 2-Foam 3-Oily 4-Scum 5-Other

Lake Surface Conditions: _____ 1-Calm 2-Ripple 3-Moderate Waves 4-White Caps

Color: _____ 1-Clear 2-Muddy 3-Tea 4-Milky 5-Other

Odor: _____ 1-Normal 2-Petroleum 3-Septic 4-Sewage 5-Chemical 6-Other

Algae: _____ Debris: _____ 1-None 2-Some 3-Floating 4-Thick Layer 5-Multiple Layers

Fecal Matter: _____ 1-None 2-Sparse 3-Some 4-Multiple Areas 5-All Along Shoreline

Number of Swimmers: _____

Number of Birds: Gulls _____ Geese _____ Ducks _____ Other (ie, pigeons) _____ Total _____

Was the sample taken during or following a wet weather event? _____ (Yes/No)

Physical Parameters

Water Temp: _____ (°C)

pH :_____ (SU)

Turbidity: (1) _____ (2) _____ Avg _____ (NTU)

[Duplicate Turbidity: (1) _____ (2) _____ Avg _____ (NTU)]

Conductivity: _____ (µmhos/cm)

Location: _____ Date: _____ Time: _____ (hrs)

Measurements

Wave Height: _____ (in)

Wave Run Up: _____ (1-5)

1 – ≤1ft	3 – 4ft to 6ft	5 – ≥10ft
2 – 1ft to 3ft	4 – 7ft to 9 ft	

Wind Direction: _____ (degrees)

Wind Speed: Max _____ Avg _____ (mph)

Air temp: _____ (°C)

Fecal Contamination on Beach: _____ (%)

Debris on the Beach: _____ (%)

1 – ≤1%	4 – 30-49%
2 – 2- 14%	5 – 50-75%
3 – 15-29%	6 – >75%

Comments

_____

_____

_____

_____

To be completed by Lab Personnel

Storm Water Effects on the Beach _____

0 – No Rain Event	1 – Wet Sand, No Run Off
2 – Wet Sand, Mild Scouring	3 – Wet Sand, Moderate Scouring
4 – Wet Sand, Major Scouring, No Standing Water	
5 – Wet Sand, Major Scouring, Standing and flowing Water	

[Place Label Here]

2/6/14 JM

Appendix D. Field Form

NEORSD Beach Sampling Field Data Form

Location: _____ Date: _____ Time (hrs): _____

Meter(s) Used: _____ Samplers: _____

Was this sample taken during or following a wet weather event? YES / NO

Weather Conditions Air Temp: _____ (°F)

Longshore Wind Speed: Max _____ Avg _____ (mph) Direction _____ (Deg)

Condition: Sunny Mostly Sunny Mostly Cloudy Cloudy Light Rain/Showers
Heavy Rain Heavy Snow Melt Other: _____

Beach Conditions Odor: _____ **1** - Normal **2** - Oil **3** - Septic **4** - Sewage **5** - Chemical 6-Other

Number of People on Beach: _____

Number of Birds: Gull _____ Geese _____ Duck _____ Other _____ Total _____

Number of Wildlife: Dog _____ Raccoon _____ Deer _____ Horse _____ Total _____

Debris on Beach: _____ (1-6)

Fecal Contamination on Beach: _____ (1-6)

1 - ≤1% **2** - 2-14% **3** - 15-29%
4 - 30-49% **5** - 50-75% **6** - >75%

Numer of Dead Organisms: Fish _____ Birds _____ Other _____

Lake Conditions: Number of Swimmers: _____

Color: _____ (1-5) **1** - Clear **2** - Muddy **3** - Tea **4** - Milky **5** - Other Wave Height: _____ (ft)

Wave Condition: _____ (1-3) **1** - Calm **2** - Normal **3** - Rough

Algae: _____ Debris: _____ (1-5) **1** - None **2** - Some **3** - Floating **4** - Thick Layer **5** - Multiple Layers

Water Surface Condition: _____ (1-5) **1** - None **2** - Foam **3** - Oily **4** - Scum **5** - Other

Lake Physical Parameters: Water Temp: _____ (°C) pH: _____ (s.u.)

Conductivity: _____ (µmhos/cm)

Turbidity* (NTU): (1) _____ (2) _____ (Avg) _____

Duplicate Turbidity 1 (NTU): (1) _____ (2) _____ (Avg) _____

General Comments: _____

_____

_____

* Clear = <1.9 NTU, Slightly Turbid = 2-9.9 NTU, Turbid = 10-249.9 NTU, Opaque = >250

Modified April 2021

Appendix E. Meter Specifications

HI 98129

Combo pH/EC/TDS/Temperature Tester with Low Range EC

Description

The HI 98129 Combo waterproof tester offer high accuracy pH, EC/TDS and temperature measurements in a single tester! No more switching between meters for your routine measurements. The waterproof Combo (it even floats) has a large easy-to-read, dual-level LCD and automatic shut-off. pH and EC/TDS readings are automatically compensated for the effects of temperature (ATC). This technologically advanced tester has a replaceable pH electrode cartridge with an extendable cloth junction as well as an EC/TDS graphite electrode that resists contamination by salts and other substances. This gives these meters a greatly extended life. Your tester no longer needs to be thrown away when the pH sensor is exhausted.

The EC/TDS conversion factor is user selectable as is the temperature compensation coefficient (ß). Fast, efficient, accurate and portable, the Combo pH, EC/TDS and temperature tester brings you all the features you've asked for and more!

Specifications

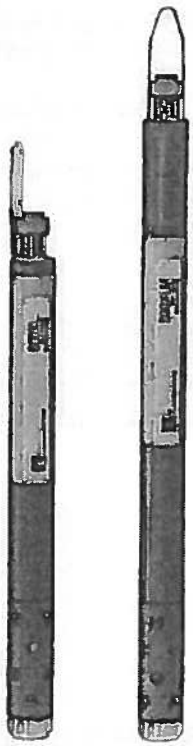
Range	pH	0.00 to 14.00 pH
Range	EC	0 to 3999 µS/cm
Range	TDS	0 to 2000 ppm
Range	Temperature	0.0 to 60.0°C / 32 to 140.0°F
Resolution	pH	0.01 pH
Resolution	EC	1 µS/cm
Resolution	TDS	1 ppm
Resolution	Temperature	0.1°C / 0.1°F
Accuracy	pH	±0.05 pH
Accuracy	EC/TDS	±2% F.S.
Accuracy	Temperature	±0.5°C / ±1°F
Temperature Compensation		pH: automatic; EC/TDS: automatic with ß adjustable from 0.0 to 2.4% / °C
Calibration	pH	automatic, 1 or 2 points with 2 sets of memorized buffers (pH 4.01 / 7.01 / 10.01 or 4.01 / 6.86 / 9.18)
Calibration	EC/TDS	automatic, 1 point
TDS Conversion Factor		adjustable from 0.45 to 1.00
pH Electrode		HI 73127 (replaceable; included)
Environment		0 to 50°C (32 to 122°F); RH max 100%
Battery Type / Life		4 x 1.5V / approx. 100 hours of continuous use; auto-off after 8 minutes of non-use
Dimensions		163 x 40 x 26 mm (6.4 x 1.6 x 1.0")
Weight		100 g (3.5 oz.)

YSI 600XL and 600XLM Sondes

Measure multiple parameters simultaneously

The YSI 600XL and YSI 600XLM compact sondes measure eleven parameters simultaneously:

Temperature	TDS
Conductivity	pH
Specific Conductance	ORP
Salinity	Depth or Level
Resistivity	Rapid Pulse™ DO (% and mg/L)



The YSI 600XL and 600XLM

Connect with Data Collection Platforms

Either sonde can easily connect to the YSI 6200 DAS (Data Acquisition System), YSI EcoNet™ or your own data collection platform, via SDI-12 for remote and real-time data acquisition applications.

Economical Logging System

The YSI 600XLM is an economical logging system for long-term, *in situ* monitoring and profiling. It will log all parameters at programmable intervals and store 150,000 readings. At one-hour intervals, the instrument will log data for about 75 days utilizing its own power source. The 600XL can also be utilized in the same manner with user-supplied external power.

- Either sonde fits down 2-inch wells
- Horizontal measurements in very shallow waters
- Stirring-independent Rapid Pulse® dissolved oxygen sensor
- Field-replaceable sensors
- Easily connects to data collection platforms
- Available with detachable cables to measure depth up to 200 feet
- Compatible with YSI 650 Multiparameter Display System
- Use with the YSI 5083 flow cell for groundwater applications

Pure Data for a Healthy Planet.®

Economical, multiparameter sampling or logging in a compact sonde

Sensor performance verified*

The 6820 V2 and 6920 V2 sondes use sensor technology that was verified through the US EPA's Environmental Technology Verification Program (ETV). For information on which sensors were performance-verified, turn this sheet over and look for the ETV logo.

ETV

www.ysi.com

To order, or for more info, contact YSI Environmental.

+1 937 767 7241
800 897 4151 (US)
www.ysi.com

YSI Environmental
+1 937 767 7241
Fax +1 937 767 9353
environmental@ysi.com

Endeco/YSI
+1 508 748 0366
Fax +1 508 748 2543
systems@ysi.com

SonTek/YSI
+1 858 546 8327
Fax +1 858 546 8150
inquiry@sontek.com

YSI Gulf Coast
+1 225 753 2650
Fax +1 225 753 8669
environmental@ysi.com

YSI Hydrodata (UK)
+44 1462 673 581
Fax +44 1462 673 582
europe@ysi.com

YSI Middle East (Bahrain)
+973 1753 6222
Fax +973 1753 6333
halsalem@ysi.com

YSI (Hong Kong) Limited
+852 2891 8154
Fax +852 2834 0034
hongkong@ysi.com

YSI (China) Limited
+86 10 5203 9675
Fax +86 10 5203 9679
beijing@ysi-china.com

YSI Nanotech (Japan)
+81 44 222 0009
Fax +81 44 221 1102
nanotech@ysi.com

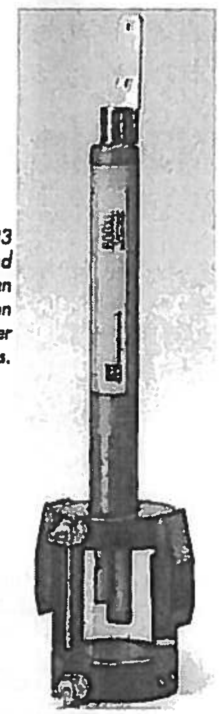
YSI 600XL & 600XLM Sensor Specifications

	Range	Resolution	Accuracy
Dissolved Oxygen % Saturation ETV✓ 6562 Rapid Pulse™ Sensor*	0 to 500%	0.1%	0 to 200%: ±2% of reading or 2% air saturation, whichever is greater; 200 to 500%: ±6% of reading
Dissolved Oxygen mg/L ETV✓ 6562 Rapid Pulse™ Sensor*	0 to 50 mg/L	0.01 mg/L	0 to 20 mg/L: ± 0.2 mg/L or 2% of reading, whichever is greater; 20 to 50 mg/L: ±6% of reading
Conductivity* ETV✓ 6560 Sensor*	0 to 100 mS/cm	0.001 to 0.1 mS/cm (range dependent)	±0.5% of reading + 0.001 mS/cm
Salinity	0 to 70 ppt	0.01 ppt	±1% of reading or 0.1 ppt, whichever is greater
Temperature ETV✓ 6560 Sensor*	-5 to +50°C	0.01°C	±0.15°C
pH ETV✓ 6561 Sensor*	0 to 14 units	0.01 unit	±0.2 unit
ORP	-999 to +999 mV	0.1 mV	±20 mV
Depth & Level — Medium	0 to 200 ft, 61 m	0.001 ft, 0.001 m	±0.4 ft, ±0.12 m
Shallow	0 to 30 ft, 9.1 m	0.001 ft, 0.001 m	±0.06 ft, ±0.02 m
Vented Level	0 to 30 ft, 9.1 m	0.001 ft, 0.001 m	±0.01 ft, 0.003 m

• Report outputs of specific conductance (conductivity corrected to 25° C), resistivity, and total dissolved solids are also provided. These values are automatically calculated from conductivity according to algorithms found in *Standard Methods for the Examination of Water and Wastewater* (ed 1989)

YSI 600XL & 600XLM Sonde Specifications

Medium		Fresh, sea or polluted water
Temperature	Operating	-5 to +50°C
	Storage	-10 to +60°C
Communications		RS-232, SDI-12
Software		EcoWatch®
Dimensions 600XL | 600XLM	Diameter	1.65 in, 4.19 cm | 1.65 in, 4.9 cm
	Length	16 in, 40.6 cm | 21.3 in, 54.1 cm
	Weight	1.3 lbs, 0.59 kg | 1.5 lbs, 0.69 kg
Power	External	12 V DC
	Internal (600XLM only)	4 AA-size alkaline batteries



YSI model 5083 flow cell and 600XL. This is an ideal combination for groundwater applications.

ISO 9001
ISO 14001
Yellow Springs, Ohio Facility

CE

[illegible]

YSI incorporated
Who's Minding the Planet?

2100Q and 2100Q *is* Portable Turbidimeter

The Hach 2100Q and 2100Q is Portable Turbidimeters offer unsurpassed ease of use and accuracy in turbidity measurement. Only Hach offers this unique combination of advanced features, such as assisted calibration and simplified data transfer, and measurement innovation, giving you accurate results every time.

Features and Benefits

Easy Calibration and Verification

Hach 2100Q and 2100Q *is* Portable Turbidimeters provide confidence your measurements are right every time. On-screen assisted calibration and verification save you time and ensure accuracy. With an easy-to-follow interface, complicated manuals are not needed to perform routine calibrations. Single-standard RapidCal™ calibration offers a simplified solution for low level measurements.

Simple Data Transfer

Data transfer with the optional USB + Power Module is simple, flexible, and doesn't require additional software. All data can be transferred to the module and easily downloaded to your computer with a USB connection, providing superior data integrity and availability. With two different module options, you can customize connectivity and power to meet your unique needs.

Accurate for Rapidly Settling Samples

The Hach 2100Q Portable Turbidimeter incorporates an innovative Rapidly Settling Turbidity™ mode to provide accurate, repeatable measurements for difficult to measure, rapidly settling samples. An exclusive algorithm that calculates turbidity based on a series of automatic readings eliminates redundant measurements and estimating.

Convenient Data Logging

Up to 500 measurements are automatically stored in the instrument for easy access and backup. Stored information includes: date and time, operator ID, reading mode, sample ID, sample number, units, calibration time, calibration status, error messages and the result.

Optical System for Precision in the Field

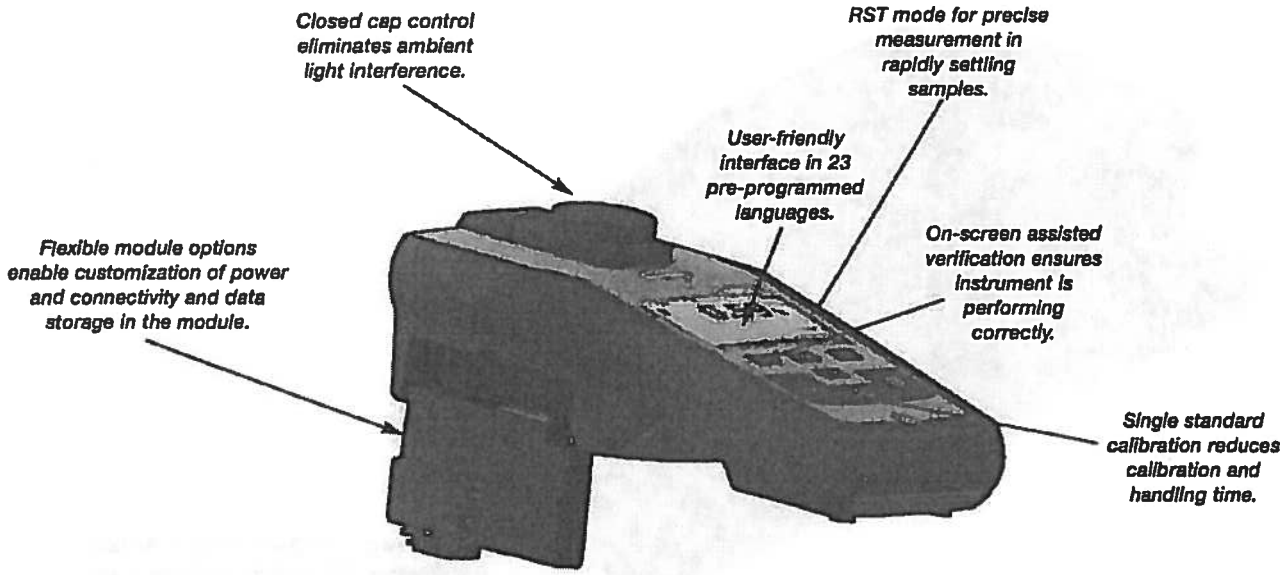
The two-detector optical system compensates for color in the sample, light fluctuation, and stray light, enabling analysts to achieve laboratory-grade performance on a wide range of samples, even under difficult site conditions.

Two Models for Specific Requirements

- **2100Q Turbidimeter**—*Compliant with USEPA Method 180.1 design criteria.*
- **2100Q *is* Turbidimeter**—*Compliant with ISO 7027 design criteria.*

DW = drinking water WW = wastewater municipal PW = pure water / power
IW = industrial water E = environmental C = collections FB = food and beverage

Key Features



Specifications*

Measurement Method
Ratio turbidimetric determination using a primary nephelometric light scatter signal (90°) to the transmitted light scatter signal.

Regulatory
2100Q: Meets EPA Method 180.1
2100Q *is:* Meets ISO 7027

Light Source
2100Q: Tungsten filament lamp
2100Q *is:* Light-emitting diode (LED) @ 860 nm

Range
0 to 1000 NTU (FNU)

Accuracy
±2% of reading plus stray light from 0 to 1000 NTU

Repeatability
±1% of reading, or 0.01 NTU (FNU), whichever is greater

Resolution
0.01 NTU on lowest range

Stray Light
<0.02 NTU (FNU)

Signal Averaging
Selectable on/off

Detector
Silicon photovoltaic

Reading Modes (user selectable)
Normal (Push to Read)
Signal Averaging
Rapidly Settling Turbidity

Data Logger
500 records

Power Requirement
110-230 Vac, 50/60 Hz (with Power or USB+Power Module)
4 AA alkaline batteries
Rechargeable NIMH (for use with USB+Power Module)

Operating Conditions
Temperature: 0 to 50°C (32 to 122°F)
Relative Humidity: 0 to 90% @ 30°C,
0 to 80% @ 40°C, 0 to 70% @ 50°C, noncondensing

Storage Conditions
-40 to 60°C (-40 to 140°F), instrument only

Languages
English, French, German, Italian, Spanish, Portuguese (BR), Portuguese (PT), Bulgarian, Chinese, Czech, Danish, Dutch, Finnish, Greek, Hungarian, Japanese, Korean, Polish, Romanian, Russian, Slovenian, Swedish, Turkish

Interface
Optional USB

Instrument Enclosure Rating
IP67 (closed lid, battery compartment excluded)

Protection Class
Power Supply: Class II

Certification
CE certified

Sample Required
15 mL (0.3 oz.)

Sample Cells
60 x 25 mm (2.36 x 1 in.) borosilicate glass with screw cap

Dimensions
22.9 x 10.7 x 7.7 cm (9.0 x4.2 x 3.0 in.)

Weight
527 g (1.16 lb) without batteries
618 g (1.36 lb) with four AA alkaline batteries

Warranty
1 year

**Specifications subject to change without notice.*

EXO1 Water Quality Sonde

Recycling

The EXO1 multiparameter water quality sonde collects data with up to four user-replaceable smart sensors and an integral pressure transducer for depth.

Send me a Quote!

Description | Specifications | Resources | Accessories | Request a Quote

The EXO1 with

- 4 sensor ports
- Integral pressure transducer
- 1 peripheral port for power communication
- Depth: 820 ft, 250 m

Medium		Fresh, sea or polluted water
Temperature	Operating Storage	-5 to +50°C -20 to +80°C
Communications		Bluetooth wireless technology; USB cable RS-485, RS-232, SDI-12
Software		KOR®
Dimensions	Diameter Length, no depth Weight	1.85 in. 4.70 cm 25.50 in. 64.77 cm 1.42 kg 3.15 lbs (batteries and sensors installed)
Power	External Internal	9 to 16.5 V DC 2 D-size alkaline batteries

Memory 512 MB; >1,000,000 logged readings

Ratings CE, UL, RoHS, WEEE

Find a Distributor

YSI has Authorized Distributors all over the globe. View a map and find your closest contact for YSI EXO1 Water Quality Sonde products and accessories.

Get Support

Have a question about your YSI EXO1 Water Quality Sonde? Check out the support page with resources compiled just for you.

Product Service Centers

Want to return a product for service? Here you'll find authorized service centers and instructions on how to send in your YSI EXO1 Water Quality Sonde.

Appendix F. Sampling Schedule

2021 Beach Monitoring Sampling Schedule

Day	Date	Edgewater Beach	Villa Angela Beach	Euclid Beach	Euclid Creek RM 0.55
Saturday	5/1/2021				
Sunday	5/2/2021				
Monday	5/3/2021	√	√	√	√
Tuesday	5/4/2021	√	√	√	√
Wednesday	5/5/2021	√	√	√	√
Thursday	5/6/2021	√	√	√	√
Friday	5/7/2021				
Saturday	5/8/2021				
Sunday	5/9/2021				
Monday	5/10/2021	√	√	√	√
Tuesday	5/11/2021	√	√	√	√
Wednesday	5/12/2021	√	√	√	√
Thursday	5/13/2021	√	√	√	√
Friday	5/14/2021				
Saturday	5/15/2021				
Sunday	5/16/2021				
Monday	5/17/2021	√	√	√	√
Tuesday	5/18/2021	√	√	√	√
Wednesday	5/19/2021	√	√	√	√
Thursday	5/20/2021	√	√	√	√
Friday	5/21/2021	√	√	√	√
Saturday	5/22/2021	√	√	√	√
Sunday	5/23/2021	√	√	√	√
Monday	5/24/2021	√	√	√	√
Tuesday	5/25/2021	√	√	√	√
Wednesday	5/26/2021	√	√	√	√
Thursday	5/27/2021	√	√	√	√
Friday	5/28/2021	√	√	√	√
Saturday	5/29/2021	√	√	√	√
Sunday	5/30/2021	√	√	√	√
Monday	5/31/2021	√	√	√	√
Tuesday	6/1/2021	√	√	√	√
Wednesday	6/2/2021	√	√	√	√
Thursday	6/3/2021	√	√	√	√
Friday	6/4/2021	√	√	√	√
Saturday	6/5/2021	√	√	√	√
Sunday	6/6/2021	√	√	√	√
Monday	6/7/2021	√	√	√	√
Tuesday	6/8/2021	√	√	√	√
Wednesday	6/9/2021	√	√	√	√
Thursday	6/10/2021	√	√	√	√
Friday	6/11/2021	√	√	√	√
Saturday	6/12/2021	√	√	√	√
Sunday	6/13/2021	√	√	√	√
Monday	6/14/2021	√	√	√	√
Tuesday	6/15/2021	√	√	√	√
Wednesday	6/16/2021	√	√	√	√
Thursday	6/17/2021	√	√	√	√

		Edgewater Beach	Villa Angela Beach	Euclid Beach	Euclid Creek
Day	**Date**	**East**	**East**	**East**	**RM 0.55**
Friday	6/18/2021	√	√	√	√
Saturday	6/19/2021	√	√	√	√
Sunday	6/20/2021	√	√	√	√
Monday	6/21/2021	√	√	√	√
Tuesday	6/22/2021	√	√	√	√
Wednesday	6/23/2021	√	√	√	√
Thursday	6/24/2021	√	√	√	√
Friday	6/25/2021	√	√	√	√
Saturday	6/26/2021	√	√	√	√
Sunday	6/27/2021	√	√	√	√
Monday	6/28/2021	√	√	√	√
Tuesday	6/29/2021	√	√	√	√
Wednesday	6/30/2021	√	√	√	√
Thursday	7/1/2021	√	√	√	√
Friday	7/2/2021	√	√	√	√
Saturday	7/3/2021	√	√	√	√
Sunday	7/4/2021	√	√	√	√
Monday	7/5/2021	√	√	√	√
Tuesday	7/6/2021	√	√	√	√
Wednesday	7/7/2021	√	√	√	√
Thursday	7/8/2021	√	√	√	√
Friday	7/9/2021	√	√	√	√
Saturday	7/10/2021	√	√	√	√
Sunday	7/11/2021	√	√	√	√
Monday	7/12/2021	√	√	√	√
Tuesday	7/13/2021	√	√	√	√
Wednesday	7/14/2021	√	√	√	√
Thursday	7/15/2021	√	√	√	√
Friday	7/16/2021	√	√	√	√
Saturday	7/17/2021	√	√	√	√
Sunday	7/18/2021	√	√	√	√
Monday	7/19/2021	√	√	√	√
Tuesday	7/20/2021	√	√	√	√
Wednesday	7/21/2021	√	√	√	√
Thursday	7/22/2021	√	√	√	√
Friday	7/23/2021	√	√	√	√
Saturday	7/24/2021	√	√	√	√
Sunday	7/25/2021	√	√	√	√
Monday	7/26/2021	√	√	√	√
Tuesday	7/27/2021	√	√	√	√
Wednesday	7/28/2021	√	√	√	√
Thursday	7/29/2021	√	√	√	√
Friday	7/30/2021	√	√	√	√
Saturday	7/31/2021	√	√	√	√
Sunday	8/1/2021	√	√	√	√
Monday	8/2/2021	√	√	√	√
Tuesday	8/3/2021	√	√	√	√
Wednesday	8/4/2021	√	√	√	√
Thursday	8/5/2021	√	√	√	√
Friday	8/6/2021	√	√	√	√

		Edgewater Beach	Villa Angela Beach	Euclid Beach	Euclid Creek
Day	**Date**	**East**	**East**	**East**	**RM 0.55**
Saturday	8/7/2021	√	√	√	√
Sunday	8/8/2021	√	√	√	√
Monday	8/9/2021	√	√	√	√
Tuesday	8/10/2021	√	√	√	√
Wednesday	8/11/2021	√	√	√	√
Thursday	8/12/2021	√	√	√	√
Friday	8/13/2021	√	√	√	√
Saturday	8/14/2021	√	√	√	√
Sunday	8/15/2021	√	√	√	√
Monday	8/16/2021	√	√	√	√
Tuesday	8/17/2021	√	√	√	√
Wednesday	8/18/2021	√	√	√	√
Thursday	8/19/2021	√	√	√	√
Friday	8/20/2021	√	√	√	√
Saturday	8/21/2021	√	√	√	√
Sunday	8/22/2021	√	√	√	√
Monday	8/23/2021	√	√	√	√
Tuesday	8/24/2021	√	√	√	√
Wednesday	8/25/2021	√	√	√	√
Thursday	8/26/2021	√	√	√	√
Friday	8/27/2021	√	√	√	√
Saturday	8/28/2021	√	√	√	√
Sunday	8/29/2021	√	√	√	√
Monday	8/30/2021	√	√	√	√
Tuesday	8/31/2021	√	√	√	√
Wednesday	9/1/2021	√	√	√	√
Thursday	9/2/2021	√	√	√	√
Friday	9/3/2021	√	√	√	√
Saturday	9/4/2021	√	√	√	√
Sunday	9/5/2021	√	√	√	√
Monday	9/6/2021	√	√	√	√
Tuesday	9/7/2021	√	√	√	√
Wednesday	9/8/2021	√	√	√	√
Thursday	9/9/2021	√	√	√	√
Friday	9/10/2021				
Saturday	9/11/2021				
Sunday	9/12/2021				
Monday	9/13/2021	√	√	√	√
Tuesday	9/14/2021	√	√	√	√
Wednesday	9/15/2021	√	√	√	√
Thursday	9/16/2021	√	√	√	√
Friday	9/17/2021				
Saturday	9/18/2021				
Sunday	9/19/2021				
Monday	9/20/2021	√	√	√	√
Tuesday	9/21/2021	√	√	√	√
Wednesday	9/22/2021	√	√	√	√
Thursday	9/23/2021	√	√	√	√
Friday	9/24/2021				

Saturday	9/25/2021				
		Edgewater Beach	**Villa Angela Beach**	**Euclid Beach**	**Euclid Creek**
Day	**Date**	**East**	**East**	**East**	**RM 0.55**
Sunday	9/26/2021				
Monday	9/27/2021	√	√	√	√
Tuesday	9/28/2021	√	√	√	√
Wednesday	9/29/2021	√	√	√	√
Thursday	9/30/2021	√	√	√	√

√= Bacteriological Sampling

Highlight= Duplicate

Appendix G. Training Form

Beach Training

Signature: _____ Project Manager: _____

	Yes	No	Initials	Date
Method Review				
1. Review “2021 Lake Erie Beach Monitoring” Level 3 Project Study Plan				
2. Review "Beach Sampling" SOP.				
3. Review two (2) Turbidity SOPs.				
4. Review District Cell Phone Policy.				
5. Review "Operation of the Hanna HI98129 Meter" SOP.				
6. Review “YSI 600XL Sonde” SOP.				
7. Review “NRS Compact Throw Bag Usage” SOP.				
8. Review “Vehicle and Mobile Radio Operation” SOP				
Safety Equipment Usage				
1. Life jacket or inflatable safety vest (must be worn if wave height is greater than two feet; all other conditions are at the discretion of the sampler)				
2. Chest waders				
3. Gloves, if desired				
4. Throw bag				
5. Cell phone				
6. Sampling pole for inclement weather sampling				
Equipment				
1. Can calibrate and use the Hanna HI98129 meter.				
2. Can use digital camera/iPad and upload images.				
3. Can scan beach observation sheets.				
4. Can upload field data.				
5. Can check and use turbidity meter.				
6. Can use wind anemometer.				
7. Uses wave height stick to measure wave height.				
Sampling				
1. Samples at correct beach sites and Euclid Creek RM 0.55.				
2. Uses appropriate sample bottles.				
3. Uses proper sampling techniques.				
4. Can fill out Beach Sampling Field Data Form.				
5. Uses cooler with ice.				
6. Truck locked when not occupied/visible.				
7. Can sign over samples and complete Chain of Custody.				
LabLynx Skills				
1. Can log in field parameters and approve.				

Revised 02/09/17 ESS

Appendix H. Audit Form

Beach Sampling Audit

Beach/Samplers Audited: _____ QDC Auditing:_____

Safety Equipment	Yes	No	Initials	Date
1. Life jacket or inflatable safety vest (must be worn if wave height is greater than two feet; all other conditions are at the discretion of the sampler)				
2. Chest waders				
3. Throw bag				
4. Cell phone				
5. Sampling pole for inclement weather sampling				
Sampling Equipment Checklist	**Yes**	**No**	**Initials**	**Date**
1. Field Observation Sheet(s) or iPad				
2. Sterile bacti bottles (enough for all sites being sampled)				
3. Sample tags				
4. Bottles for turbidity samples				
5. pH/Conductivity/Temp meter				
6. Wind anenometer				
7. Wave height stick				
8. Digital camera or iPad				
9. Cooler with ice				
Method Review	**Yes**	**No**	**Initials**	**Date**
1. Samplers obtained samples at appropriate sites.				
2. Sampled at appropriate depth of 3 feet using wave height stick to verify.				
3. Samplers exhibited proper sampling technique.				
a. Uses sterile bottles.				
b. Bottle inverted before it enters the water.				
c. Bottle is plunged 6-12 inches below the surface of the water.				
d. Bottle rotated with the opening facing the surface.				
e. Enough headspace left in bottle.				
f. Bottle capped securely.				
g. Second bottle collected for turbidity analysis.				
4. Can fill out Beach Observation Sheet or enter data into iPad correctly				
5. Uses cooler with ice.				
6. Truck locked when not occupied/visible.				
7. Uses buddy system.				
Equipment Skills	**Yes**	**No**	**Initials**	**Date**
1. Can calibrate and use the Hanna HI98129 meter.				
2. Can use digital camera or iPad and upload images to computer.				
3. Can scan beach observation sheets.				
4. Can check and use turbidity meter.				
5. Can use wind anemometer to measure wind speed.				
6. Can use wave height stick to measure wave height.				
LabLynx Skills	**Yes**	**No**	**Initials**	**Date**
1. Can enter field parameters and approve.				

Comments:

Appendix I. Laboratory Certifications

NEW HAMPSHIRE ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM

29 Hazen Drive, PO Box 95, Concord, NH 03302 (603) 271-2998

PRIMARY ACCREDITATION ANALYTE LIST

ANALYTE LIST NUMBER: 223820-A

NORTHEAST OHIO REGIONAL SEWER DISTRICT ANALYTICAL SERVICES
4747 EAST 49TH STREET

CUYAHOGA HEIGHTS OH 44125
216-641-6000
Lab ID: 2238

Analyte Code	Analyte Name	Effective Date	Expiration Date	Matrix	Category	Accr. Type
Method Code: 20211614	**Method Ref: SM 9223 B (COLILERT QUANTI-TRAY)-2004**		**Revision:**		**Date: 2004**	
2525	ESCHERICHIA COLI	12/01/2019	11/30/2021	N	MIC	NE
2500	TOTAL COLIFORMS	12/01/2019	11/30/2021	N	MIC	NE
Method Code: 10013806	**Method Ref: EPA 200.7**		**Revision: 4.4**		**Date: 1994**	
1000	ALUMINUM, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1005	ANTIMONY, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1010	ARSENIC, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1015	BARIUM, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1020	BERYLLIUM, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1030	CADMIUM, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1035	CALCIUM, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1040	CHROMIUM, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1050	COBALT, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1055	COPPER, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1070	IRON, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1075	LEAD, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1085	MAGNESIUM, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1090	MANGANESE, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1100	MOLYBDENUM, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1105	NICKEL, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1125	POTASSIUM, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1140	SELENIUM, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1150	SILVER, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1155	SODIUM, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1160	STRONTIUM,TOTAL	12/01/2019	11/30/2021	N	MET	NE
1165	THALLIUM, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1175	TIN, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1180	TITANIUM, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1185	VANADIUM, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1190	ZINC, TOTAL	12/01/2019	11/30/2021	N	MET	NE
Method Code: 10014605	**Method Ref: EPA 200.8**		**Revision: 5.4**		**Date: 1994**	
1000	ALUMINUM, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1005	ANTIMONY, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1010	ARSENIC, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1015	BARIUM, TOTAL	12/01/2019	11/30/2021	N	MET	NE

This analyte list supersedes all previously issued analyte lists. Method accreditation does not imply acceptance for NHDES compliance testing. Laboratory is required to use EPA-approved methods required by regulation. Continuing accreditation status is dependent on successful ongoing participation in the program. Customers may verify the laboratory's current accreditation status by calling (603) 271-2998 or by visiting the NH ELAP website (https://www.des.nh.gov/water/drinking-water/new-hampshire-environmental-laboratory-accreditation-program).

NORTHEAST OHIO REGIONAL SEWER DISTRICT ANALYTICAL SERVICES
4747 EAST 49TH STREET

CUYAHOGA HEIGHTS OH 44125
216-641-6000
Lab ID: 2238

1020	BERYLLIUM, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1030	CADMIUM, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1035	CALCIUM, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1040	CHROMIUM, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1050	COBALT, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1055	COPPER, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1070	IRON, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1075	LEAD, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1085	MAGNESIUM, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1090	MANGANESE, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1100	MOLYBDENUM, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1105	NICKEL, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1125	POTASSIUM, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1140	SELENIUM, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1150	SILVER, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1155	SODIUM, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1160	STRONTIUM,TOTAL	12/01/2019	11/30/2021	N	MET	NE
1165	THALLIUM, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1175	TIN, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1180	TITANIUM, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1185	VANADIUM, TOTAL	12/01/2019	11/30/2021	N	MET	NE
1190	ZINC, TOTAL	12/01/2019	11/30/2021	N	MET	NE
Method Code: 10036609	**Method Ref: EPA 245.1**		**Revision: 3**		**Date: 1994**	
1095	MERCURY, TOTAL	12/01/2019	11/30/2021	N	MET	NE
Method Code: 10237204	**Method Ref: EPA 1631E**		**Revision:**		**Date: 2002**	
1095	MERCURY, TOTAL	12/01/2019	11/30/2021	N	MET	NE
Method Code: 20066266	**Method Ref: SM 3500-CR B-2011**		**Revision:**		**Date: 2011**	
1045	CHROMIUM VI	12/01/2019	11/30/2021	N	MET	NE
Method Code: 10010409	**Method Ref: EPA 160.4**		**Revision:**		**Date: 1971**	
1970	RESIDUE, VOLATILE	12/01/2019	11/30/2021	N	NMI	NE
Method Code: 10011800	**Method Ref: EPA 180.1**		**Revision: 2**		**Date: 1993**	
2055	TURBIDITY	12/01/2019	11/30/2021	N	NMI	NE
Method Code: 10053200	**Method Ref: EPA 300.0**		**Revision: 2.1**		**Date: 1993**	
1540	BROMIDE	12/01/2019	11/30/2021	N	NMI	NE
1575	CHLORIDE	12/01/2019	11/30/2021	N	NMI	NE
1730	FLUORIDE	12/01/2019	11/30/2021	N	NMI	NE
1810	NITRATE AS N	12/01/2019	11/30/2021	N	NMI	NE

NORTHEAST OHIO REGIONAL SEWER DISTRICT ANALYTICAL SERVICES
4747 EAST 49TH STREET

CUYAHOGA HEIGHTS OH 44125
216-641-6000
Lab ID: 2238

1840	NITRITE AS N	12/01/2019	11/30/2021	N	NMI	NE
1870	ORTHOPHOSPHATE AS P	12/01/2019	11/30/2021	N	NMI	NE
2000	SULFATE	12/01/2019	11/30/2021	N	NMI	NE
Method Code: 10055206	**Method Ref: EPA 310.2**		**Revision:**		**Date: 1974**	
1505	ALKALINITY	12/01/2019	11/30/2021	N	NMI	NE
Method Code: 10063602	**Method Ref: EPA 350.1**		**Revision: 2**		**Date: 1993**	
1515	AMMONIA AS N	12/01/2019	11/30/2021	N	NMI	NE
Method Code: 10065404	**Method Ref: EPA 351.2**		**Revision: 2**		**Date: 1993**	
1795	TOTAL KJELDAHL NITROGEN (TKN)	12/01/2019	11/30/2021	N	NMI	NE
Method Code: 10067604	**Method Ref: EPA 353.2**		**Revision: 2**		**Date: 1993**	
1810	NITRATE AS N	12/01/2019	11/30/2021	N	NMI	NE
1820	NITRATE-NITRITE AS N	03/09/2020	09/18/2021	N	NMI	NE
Method Code: 10070005	**Method Ref: EPA 365.1**		**Revision: 2**		**Date: 1993**	
1870	ORTHOPHOSPHATE AS P	12/01/2019	11/30/2021	N	NMI	NE
1910	PHOSPHORUS, TOTAL	12/01/2019	11/30/2021	N	NMI	NE
Method Code: 10077404	**Method Ref: EPA 410.4**		**Revision: 2**		**Date: 1993**	
1565	COD	12/01/2019	11/30/2021	N	NMI	NE
Method Code: 10079400	**Method Ref: EPA 420.1**		**Revision:**		**Date: 1978**	
1905	PHENOLICS, TOTAL	12/01/2019	11/30/2021	N	NMI	NE
Method Code: 10081400	**Method Ref: EPA 445**		**Revision: 1.2**		**Date: 1997**	
9345	CHLOROPHYLLS	12/01/2019	11/30/2021	N	NMI	NE
Method Code: 10261617	**Method Ref: EPA 1664B**		**Revision:**		**Date: 2010**	
1803	N-HEXANE EXTRACTABLE MATERIAL (O&G)	12/01/2019	11/30/2021	N	NMI	NE
Method Code: 20049416	**Method Ref: SM 2540 B-2011**		**Revision:**		**Date: 2011**	
1950	RESIDUE, TOTAL (TS)	12/01/2019	11/30/2021	N	NMI	NE
Method Code: 20050413	**Method Ref: SM 2540 C-2011**		**Revision:**		**Date: 2011**	
1955	RESIDUE, FILTERABLE (TDS)	12/01/2019	11/30/2021	N	NMI	NE
Method Code: 20051212	**Method Ref: SM 2540 D-2011**		**Revision:**		**Date: 2011**	
1960	RESIDUE, NON-FILTERABLE (TSS)	12/01/2019	11/30/2021	N	NMI	NE
Method Code: 20053127	**Method Ref: SM 2550 B**		**Revision: 22ND ED**		**Date: 2010**	
2030	TEMPERATURE	12/01/2019	11/30/2021	N	NMI	NE
Method Code: 20080426	**Method Ref: SM 4500-CL E-2011**		**Revision:**		**Date: 2011**	
1940	CHLORINE, RESIDUAL TOTAL	12/01/2019	11/30/2021	N	NMI	NE
Method Code: 20085216	**Method Ref: SM 4500-CL C-2011**		**Revision:**		**Date: 2011**	
1575	CHLORIDE	12/01/2019	11/30/2021	N	NMI	NE
Method Code: 20097227	**Method Ref: SM 4500-CN G-2011**		**Revision:**		**Date: 2011**	
1510	CYANIDE, AMENABLE	12/01/2019	11/30/2021	N	NMI	NE
Method Code: 20102414	**Method Ref: SM 4500-F C-2011**		**Revision:**		**Date: 2011**	
1730	FLUORIDE	12/01/2019	11/30/2021	N	NMI	NE

NEW HAMPSHIRE ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM

29 Hazen Drive, PO Box 95, Concord, NH 03302 (603) 271-2998

PRIMARY ACCREDITATION ANALYTE LIST

ANALYTE LIST NUMBER: 223820-A

NORTHEAST OHIO REGIONAL SEWER DISTRICT ANALYTICAL SERVICES
4747 EAST 49TH STREET

CUYAHOGA HEIGHTS OH 44125
216-641-6000
Lab ID: 2238

Method Code: 20105220	**Method Ref: SM 4500-H+ B-2011**		**Revision:**		**Date: 2011**	
1900	HYDROGEN ION (PH)	12/01/2019	11/30/2021	N	NMI	NE
Method Code: 20113115	**Method Ref: SM 4500-NO2 B-2011**		**Revision:**		**Date: 2011**	
1840	NITRITE AS N	12/01/2019	11/30/2021	N	NMI	NE
Method Code: 20135266	**Method Ref: SM 5210 B-2011**		**Revision:**		**Date: 2011**	
1530	BIOCHEMICAL OXYGEN DEMAND (BOD)	12/01/2019	11/30/2021	N	NMI	NE
1555	CARBONACEOUS BIOLOGICAL OXYGEN DEMAND	12/01/2019	11/30/2021	N	NMI	NE
Method Code: 20137820	**Method Ref: SM 5310 B-2011**		**Revision:**		**Date: 2011**	
2040	TOTAL ORGANIC CARBON (TOC)	12/01/2019	11/30/2021	N	NMI	NE
Method Code: 60007150	**Method Ref: LACHAT 10-204-00-1-X**		**Revision:**		**Date: NOV-00**	
1645	CYANIDE, TOTAL	12/01/2019	11/30/2021	N	NMI	NE
Method Code: 60031405	**Method Ref: OIA 1677**		**Revision:**		**Date: 2004**	
1523	CYANIDE, AVAILABLE	12/01/2019	11/30/2021	N	NMI	NE
Method Code: 10133207	**Method Ref: SW-846 3005A**		**Revision: 1**		**Date: 1992**	
1438	PRECONCENTRATION UNDER ACID	12/01/2019	11/30/2021	N	PRE	NE
Method Code: 10133605	**Method Ref: SW-846 3010A**		**Revision: 1**		**Date: 1992**	
1420	HOT PLATE ACID DIGESTION (HNO3 + HCL)	12/01/2019	11/30/2021	N	PRE	NE
Method Code: 10133809	**Method Ref: SW-846 3015**		**Revision:**		**Date: 1994**	
1430	MICROWAVE-ASSISTED ACID DIGESTION OF TCLP EXTRACTS	12/01/2019	11/30/2021	N	PRE	NE
Method Code: 10214207	**Method Ref: EPA 1000.0 - FATHEAD MINNOW, 7-DAY CHRONIC, DAILY**		**Revision:**		**Date: 2002**	
3470	IC25 (ON) GROWTH	12/01/2019	11/30/2021	N	TOX	NE
3475	NOEC (GROWTH)	12/01/2019	11/30/2021	N	TOX	NE
3465	NOEC (SURVIVAL)	12/01/2019	11/30/2021	N	TOX	NE
Method Code: 10253040	**Method Ref: EPA 1002.0 - CERIODAPHNIA DUBIA, 3-BROOD CHRONIC,**		**Revision:**		**Date: 2002**	
3480	IC25 REPRODUCTION	12/01/2019	11/30/2021	N	TOX	NE
3465	NOEC (SURVIVAL)	12/01/2019	11/30/2021	N	TOX	NE
3485	NOEC REPRODUCTION	12/01/2019	11/30/2021	N	TOX	NE
Method Code: 10013806	**Method Ref: EPA 200.7**		**Revision: 4.4**		**Date: 1994**	
1000	ALUMINUM, TOTAL	12/01/2019	11/30/2021	SC	MET	NE
1005	ANTIMONY, TOTAL	12/01/2019	11/30/2021	SC	MET	NE
1010	ARSENIC, TOTAL	12/01/2019	11/30/2021	SC	MET	NE
1015	BARIUM, TOTAL	12/01/2019	11/30/2021	SC	MET	NE
1020	BERYLLIUM, TOTAL	12/01/2019	11/30/2021	SC	MET	NE
1030	CADMIUM, TOTAL	12/01/2019	11/30/2021	SC	MET	NE
1035	CALCIUM, TOTAL	12/01/2019	11/30/2021	SC	MET	NE
1040	CHROMIUM, TOTAL	12/01/2019	11/30/2021	SC	MET	NE
1050	COBALT, TOTAL	12/01/2019	11/30/2021	SC	MET	NE

This analyte list supersedes all previously issued analyte lists. Method accreditation does not imply acceptance for NHDES compliance testing. Laboratory is required to use EPA-approved methods required by regulation. Continuing accreditation status is dependent on successful ongoing participation in the program. Customers may verify the laboratory's current accreditation status by calling (603) 271-2998 or by visiting the NH ELAP website (https://www.des.nh.gov/water/drinking-water/new-hampshire-environmental-laboratory-accreditation-program).

NORTHEAST OHIO REGIONAL SEWER DISTRICT ANALYTICAL SERVICES
4747 EAST 49TH STREET

CUYAHOGA HEIGHTS OH 44125
216-641-6000
Lab ID: 2238

1055	COPPER, TOTAL	12/01/2019	11/30/2021	SC	MET	NE
1070	IRON, TOTAL	12/01/2019	11/30/2021	SC	MET	NE
1075	LEAD, TOTAL	12/01/2019	11/30/2021	SC	MET	NE
1085	MAGNESIUM, TOTAL	12/01/2019	11/30/2021	SC	MET	NE
1090	MANGANESE, TOTAL	12/01/2019	11/30/2021	SC	MET	NE
1100	MOLYBDENUM, TOTAL	12/01/2019	11/30/2021	SC	MET	NE
1105	NICKEL, TOTAL	12/01/2019	11/30/2021	SC	MET	NE
1125	POTASSIUM, TOTAL	12/01/2019	11/30/2021	SC	MET	NE
1140	SELENIUM, TOTAL	12/01/2019	11/30/2021	SC	MET	NE
1150	SILVER, TOTAL	12/01/2019	11/30/2021	SC	MET	NE
1155	SODIUM, TOTAL	12/01/2019	11/30/2021	SC	MET	NE
1160	STRONTIUM,TOTAL	12/01/2019	11/30/2021	SC	MET	NE
1165	THALLIUM, TOTAL	12/01/2019	11/30/2021	SC	MET	NE
1175	TIN, TOTAL	12/01/2019	11/30/2021	SC	MET	NE
1180	TITANIUM, TOTAL	12/01/2019	11/30/2021	SC	MET	NE
1185	VANADIUM, TOTAL	12/01/2019	11/30/2021	SC	MET	NE
1190	ZINC, TOTAL	12/01/2019	11/30/2021	SC	MET	NE
Method Code: 10036609	**Method Ref: EPA 245.1**		**Revision: 3**		**Date: 1994**	
1095	MERCURY, TOTAL	12/01/2019	11/30/2021	SC	MET	NE
Method Code: 10063602	**Method Ref: EPA 350.1**		**Revision: 2**		**Date: 1993**	
1515	AMMONIA AS N	12/01/2019	11/30/2021	SC	NMI	NE
Method Code: 10065404	**Method Ref: EPA 351.2**		**Revision: 2**		**Date: 1993**	
1795	TOTAL KJELDAHL NITROGEN (TKN)	12/01/2019	11/30/2021	SC	NMI	NE
Method Code: 10070005	**Method Ref: EPA 365.1**		**Revision: 2**		**Date: 1993**	
1910	PHOSPHORUS, TOTAL	12/01/2019	11/30/2021	SC	NMI	NE
Method Code: 20005270	**Method Ref: SM 2540 G-2011**		**Revision:**		**Date: 2011**	
1947	RESIDUE, FIXED	12/01/2019	11/30/2021	SC	NMI	NE
1950	RESIDUE, TOTAL (TS)	12/01/2019	11/30/2021	SC	NMI	NE
1970	RESIDUE, VOLATILE	12/01/2019	11/30/2021	SC	NMI	NE
Method Code: 10135805	**Method Ref: SW-846 3051**		**Revision: 0**		**Date: 1994**	
1451	MICROWAVE DIGESTION OF SOLIDS (HNO3)	12/01/2019	11/30/2021	SC	PRE	NE

NORTHEAST 12/28/2020

This analyte list supersedes all previously issued analyte lists. Method accreditation does not imply acceptance for NHDES compliance testing. Laboratory is required to use EPA-approved methods required by regulation. Continuing accreditation status is dependent on successful ongoing participation in the program. Customers may verify the laboratory's current accreditation status by calling (603) 271-2998 or by visiting the NH ELAP website (https://www.des.nh.gov/water/drinking-water/new-hampshire-environmental-laboratory-accreditation-program).

NEW HAMPSHIRE ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM

29 Hazen Drive, PO Box 95, Concord, NH 03302 (603) 271-2998

PRIMARY ACCREDITATION ANALYTE LIST

ANALYTE LIST NUMBER: 223820-A

NORTHEAST OHIO REGIONAL SEWER DISTRICT ANALYTICAL SERVICES
4747 EAST 49TH STREET

CUYAHOGA HEIGHTS OH 44125
216-641-6000
Lab ID: 2238

Bill Hall
NH ELAP Program Manager
Issue Date: 12/28/2020

Matrix Legend: AE=Air; BT=Tissue; D=Drinking Water; N=Non-Potable Water; SC=Solid and Chemical Materials

Category Legend: MIC=Microbiology; MET=Metals; NMI=Non-Metal Inorganics; PRE=Preparation; VOC=Volatile Organic Compounds; SBN=SVOC-BNA; SHE=SVOC-Herbicides; SNO=SVOC-NOS; SPC=SVOC-PCB; SPE=SVOC-Pesticides; RAD=Radiochemistry; WET=Wet, PFC=Perfluorinated compound

Accreditation Legend: NE=NELAP; NH=NH State Certification; CE=State Certification; IN=Interim (NELAP); WI=Withdrawn; AP=Applied; RE=Revoked; SU=Suspended