Northeast Ohio Regional Sewer District
Protecting Your Health and Environment

Level 3 Project Study Plan

2017 Lake Erie Beach Monitoring

(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 will occur between May 1, 2017 and October 31, 2017. 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 will 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 (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-556 MPS Multi-Parameter Water Quality Meter, 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* (2015). 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°N/81.744972°W) 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* (2015). All samples will be analyzed using approved EPA methods as specified in NEORSD's Analytical Services' most current *Quality Assurance Manual* (effective January 30, 2013).

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 1, 2017, and end on September 28, 2017 (Appendix F). From May 1 through May 18, bacteriological water samples from all sites listed in section 6 will be collected four days a week (Monday through Thursday). Beginning May 22, and lasting through September 3, bacteriological water quality samples will be collected seven days a week from all sites. From September 4 through September 28, bacteriological water quality sampling at the beach sites is expected to return to four days a week (Monday through Thursday). 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. Sampling may be discontinued in the month of October depending upon weather conditions and 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: January 30, 2013) 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 VirtualBeach 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 catalogue. 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 Laboratory Information Management System (LIMS).

(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
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
Kelsey Amidon	01091	4747 E. 49th St., Cuyahoga Heights, OH 44125	amidonk@neorsd.org	216-641-6000
Donna Friedman	01031	4747 E. 49th St., Cuyahoga Heights, OH 44125	friedmand@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
John Rhoades	00008	4747 E. 49th St., Cuyahoga Heights, OH 44125	rhoadesj@neorsd.org	216-641-6000
Francisco Rivera	00262	4747 E. 49th St., Cuyahoga Heights, OH 44125	riveraf@neorsd.org	216-641-6000
Cathy Zamborsky	00009	4747 E. 49th St., Cuyahoga Heights, OH 44125	zamborskyc@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
Nya Aron	4747 E. 49th St., Cuyahoga Heights, OH 44125	aronn@neorsd.org	216-641-6000
Lindsay Baker	4747 E. 49th St., Cuyahoga Heights, OH 44125	bakerl@neorsd.org	216-641-6000
Nicholas Barille	4747 E. 49th St., Cuyahoga Heights, OH 44125	barillen@neorsd.org	216-641-6000
Mark Colvin	4747 E. 49th St., Cuyahoga Heights, OH 44125	colvinm@neorsd.org	216-641-6000
Rae Grant	4747 E. 49th St., Cuyahoga Heights, OH 44125	grantr@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
Denise Phillips	4747 E. 49th St., Cuyahoga Heights, OH 44125	phillipsd@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
Nicole Velez	4747 E. 49th St., Cuyahoga Heights, OH 44125	velezn@neorsd.org	216-641-6000

Name	Address	Email Address	Phone Number
Wolfram von Kiparski	4747 E. 49th St., Cuyahoga Heights, OH 44125	vonkiparskiw@neorsd.org	216-641-6000
Justin Telep	4747 E. 49th St., Cuyahoga Heights, OH 44125	telepj@neorsd.org	216-641-6000
James Ferritto	4747 E. 49th St., Cuyahoga Heights, OH 44125	ferrittoj@neorsd.org	216-641-6000
WQIS Intern	4747 E. 49th St., Cuyahoga Heights, OH 44125	@neorsd.org	216-641-6000
WQIS Intern	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:

Mr. Mark Citriglia
4747 E. 49th Street
Cuyahoga Heights, Ohio 44056
citrigliam@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: 2/20/17

(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: 2/20/17

(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: 2/20/17

(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: Kelsey Amidon / Kelsey Amidon Date: 2/20/17

Print/Signature: Donna Friedman / Donna Friedman Date: 2/20/17

Print/Signature: Seth Hothem / Seth Hothem Date: 2/20/17

Print/Signature: Jill Knittle / Jill Knittle Date: 2/20/17

Print/Signature: Ron Maichle / Ron Maichle Date: 02-20-17

Print/Signature: Mark Matteson / Mark Matteson Date: 2/20/17

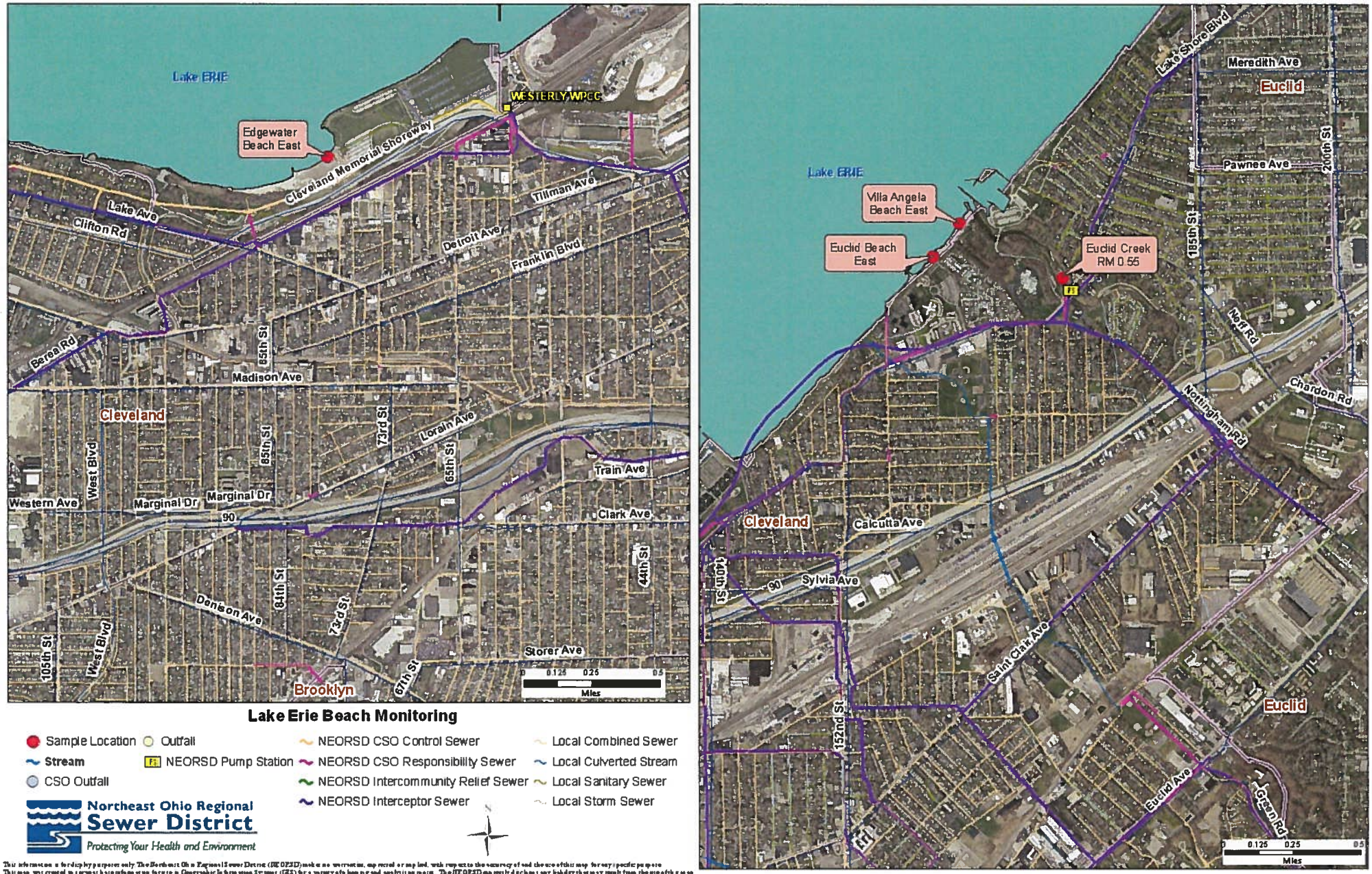
Print/Signature: John Rhoades / John Rhoades Date: 02/20/17

Print/Signature: Francisco Rivera / Francisco Rivera Date: 2/20/17

Print/Signature: Eric Soehnlen/ Eric Soehnlen Date: 2/20/17

Print/Signature: Cathy Zamborsky / Cathy Zamborsky Date: 2/20/17

Appendix A



Lake Erie Beach Monitoring

- Sample Location
- Stream
- CSO Outfall
- Outfall
- NEORSD Pump Station
- 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
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Appendix B

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

Northeast Ohio Regional
Sewer District
Protecting Your Health and Environment

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

Title

Beach Sampling

SOP–EA016-18

Effective Date: 2/28/2014

Approvals

Prepared By: Jillian Novak Date: 2/28/14

Reviewed By Supervisor: John Rhoades Date: 02/28/14

Approved By Manager: Scott Broski Date: 2/28/14

Northeast Ohio Regional
Sewer District
Protecting Your Health and Environment

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. While traveling in the District vehicle, all employees should be familiar with the use of the mobile radio. Refer to *SOP-3003 Vehicle and Mobile Radio Operation* for the procedures.

4.2.2. A District cell phone has been provided for additional safety. The phone should be charged and turned on while off District premises.

4.2.3. 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.

4.2.4. If inclement weather occurs while sampling, seek safety and call a WQIS Supervisor or Manager for instructions.

4.2.5. Samples will not be collected when wave heights are over 3.5 feet.

4.2.6. The sampler MUST put on chest waders before entering the water.

4.2.7. A PFD is provided for the sampler.

4.2.7.1. 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.

4.2.7.2. Use of PFD during all other lake conditions is at the discretion of the sampler.

4.2.8. 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.

4.2.9. 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.

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

4.2.11. 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.

6.3. All calibration events must be logged into Lablynx.

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°N/81.739117°W

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°N/81.566656°W

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°N/81.568739°W

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°N/81.5595°W

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 is entered into Lablynx and field sheets and pictures are saved to the J:/ 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 chemistry, bacteria, and flows* (2013).

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 Lablynx immediately upon returning to EMSC.

8.5. Scan and save all Beach Sampling Field Data Forms and pictures into the J\: 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. (2013). *Surface Water Field Sampling Manual for water chemistry, bacteria, and flows.* Columbus, OH.

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.

11. Revision History

11.1. Section 1.4 deleted fecal coliform as a beach standard (E. Hatvani, 5/5/06)
11.2. Section 4.3.2 added reference to SOP-3003 (E. Hatvani 5/5/06)
11.3. Section 5.0 added equipment:
11.4. Section 5.4 added Anemometer, E. Hatvani 5/5/06).
11.5. Section 5.10 added Wave Height Stick, E. Hatvani 5/5/06).
11.6. Section 7.7.2 added information on analysis, E. Hatvani 5/5/06).
11.7. Section 1.3 single sample concentrations of E. coli bacteria (E. Hatvani 6/6/2007)
11.8. Section 5.1 Sample Bottles – changed volume and added second bottle type (E. Hatvani 6/6/2007)
11.9. Section 5.2 Added Chain of Custody Sheet (E. Hatvani 6/6/2007)
11.10. Section 5.11 Added Ziploc Bags (E. Hatvani 6/6/2007)
11.11. Section 7.5.1 Complete all information on the sample tags with permanent marker or pen. (E. Hatvani 6/6/2007)
11.12. Section 7.5.4 added to use the wave height stick to verify the depth. (E. Hatvani 6/6/2007)
11.13. Section 7.5.6. Make sure to leave headspace in order to provide sufficient space for shaking the sample for analysis. (E. Hatvani 6/6/2007)
11.14. Section 7.5.9 Added (E. Hatvani 6/6/2007) Take the maximum and minimum wave heights before returning to the shoreline.
11.15. Section 7.5.10 Added the bottles are placed in a Ziploc bag and placed into the cooler containing ice. (E. Hatvani 6/6/2007)
11.16. Section 7.7.6 Added Appendix A,B,C, and D. (E. Hatvani 6/6/2007)
11.17. Section 7.6.8 Added place the bottle into a Ziploc bag. (E. Hatvani 6/6/2007)

11.18. Section 8.4 Revised to state that field observations are entered into LabLynx upon returning to the lab. (E. Hatvani 6/6/2007)
11.19. Section 9.1 and 9.2 Corrected to References to USEPA (E.Hatvani6/6/2007).
11.20. Moved Previously numbered Section 11.1 to 7.8 Composite Sampling (E. Hatvani 6/6/2007)
11.21. Revised Section 7.5.5 to read plunge the sample bottle 6-12 inches below the surface of the water.6-12 inches. (E. Hatvani 12/18/2007)
11.22. Revised date of the field observations sheets (Appendix C-F) to 2008 (E. Hatvani 12/18/2007)
11.23. Removed Section 4.3. (E. Hatvani 4/23/2008)
11.24. Moved 4.3.2 and 4.3.3 to Section 4.1 Safety. (E. Hatvani 4/23/2008)
11.25. Revised bottle size to 100 ml disposable plastic bottles. (E. Hatvani 4/23/2008)
11.26. Modified 5.5 to include Field Turbidity Meter. (E. Hatvani 4/23/2008)
11.27. Modified Section 6 to include calibration of Turbidity and Filed Turbidity meters in SOP 2007. (E. Hatvani 4/23/2008)
11.28. Removed 11.1. Euclid Creek Sampling and added it to Section 7.3. Also added the GPS locations. (E. Hatvani 4/23/2008)
11.29. Moved Section 7.6 into Section 7.4. (E. Hatvani 4/23/2008)
11.30. Revised 7.4.9 to include the calculation for wave height. And convert to feet.(e. Hatvani 4/29/2008)
11.31. Added 5.12 Laptop computers with wireless connection for Edgewater Sample Collection. (E. Hatvani 4/29/2008)
11.32. Added 9.4 and 9.5 two USGS references for Nowacast Model Protocol. (E. Hatvani 4/29/2008)
11.33. Added 5.13 – 5.17 – 100 ml plastic graduated cylinder, deioinzed water bottle, kimwipes, gloves and hand sanitizer. (E. Hatvani 5/28/2008)
11.34. Revised 7.6.4.3 to read, "Shake each sample a minimum of 15 times before measuring." (E. Hatvani 5/28/2008)
11.35. Revised 7.3.11 to include field parameters are to be entered into Lablynx. (E. Hatvani 5/28/2008)
11.36. Revised Appendix A to include additional pictures of the sampling sites at Edgewater. (E. Hatvani 5/28/2008)
11.37. Revised Appendix B to include additional pictures of the sampling sites at Villa Angela, Euclid and Euclid Creek sites. (E. Hatvani 5/28/2008)
11.38. Revised Appendices C-F - Edgewater, Villa Angela, Euclid Beaches and Euclid Creek observation sheets to latest version. (E. Hatvani 6/5/2008).
11.39. Removed Sampling Schedule Appendix G. (E. Hatvani 3/3/2009).

11.40. Revised 5.10 Wave Height Stick, marked at inch and foot increments. (E. Hatvani 3/3/2009).
11.41. Revised 4.2.6 to read, "The wave stick is used as a depth indicator". (E. Hatvani 3/3/2009)
11.42. Revised Appendices C, D, E and F. Removed date and forms. Listed them as examples. (E. Hatvani 3/3/2009)
11.43. Revised 7.3.10 to read, "See Appendix C, D, E and F for examples of the forms. Use current revisions of FORMS numbered 3154-3157. (E. Hatvani 3/3/2009)
11.44. Added to 5.10. added red and yellow tape marking on wave height stick. (E. Hatvani 5/11/2009)
11.45. Revised 6.1. 1 SOP number was changed from 7002 to SOP 6000. (E. Hatvani 5/11/2009)
11.46. Revised 9.2.4 changed the units on the anemometer from knots to ft/min. (E. Hatvani 5/11/2009)
11.47. Changed observation sheet in Appendix C for Edgewater with 2009 beach model criteria. (E. Hatvani 5/11/2009)
11.48. Added 7.10.4. This section explains how to determine water clarity based on the visibility of markings on the wave height stick. (E. Hatvani 5/11/2009)
11.49. Removed Villa Angela Beach Observation Sheet, Euclid Beach Observation Sheet and Euclid Creek Observation Sheet from Table of Contents (J. Novak 2/17/2010)
11.50. Revised Table of Contents to reflect updated page numbers (J. Novak 2/17/2010)
11.51. Revised 4.1.5 to read "Throw bag with 50 feet of nylon rope (refer to *Throw Bag SOG*)" (J. Novak 2/17/2010)
11.52. Removed "Analytical Services" from 4.2.3. and replaced with "Water Quality and Industrial Surveillance" (J. Novak 2/17/2010)
11.53. Removed "Analytical Services" from 4.2.4. and replaced with "Water Quality and Industrial Surveillance" (J. Novak 2/17/2010)
11.54. Revised 5.4 to read "Field Meters: Hanna pH EC/TDS, Anemometer" (J. Novak 2/17/2010)
11.55. Removed from 7.3.4. "One sheet is used for each location" (J. Novak 2/17/2010)
11.56. Revised 7.3.5. to read "Field parameters must be taken in the water at each sampling location (east and west)" (J. Novak 2/17/2010)
11.57. Removed 7.6.4. (J. Novak 2/17/2010)
11.58. Revised 9.2.2. to read "Turn the unit ON by pressing the ON button" (J. Novak 2/17/2010)

11.59. Removed "knots setting" from 9.2.4. and added "feet/minute setting" (J. Novak 2/17/2010)
11.60. Revised 9.2.5. to read "Place the anemometer vane probe into the air flow and read the maximum and average wind speed measurement on the display" (J. Novak 2/17/2010)
11.61. Added "RM 0.55" to Appendix B, Euclid Creek Sampling Sites (J. Novak 2/17/2010)
11.62. Revised Beach Observation Sheet in Appendix C (J. Novak 2/17/2010)
11.63. Removed Appendix D, E and F (J. Novak 2/17/2010)
11.64. Re-lettered "NOWCASTING Protocol for Edgewater Beach" to Appendix D (J. Novak 2/17/2010)
11.65. Removed "Obtain Lake Level Data" from Appendix D, NOWCASTING Protocol for Edgewater Beach (J. Novak 2/17/2010)
11.66. Added "Update NEORSD Website" to Appendix D, NOWCASTING Protocol for Edgewater Beach" (J. Novak 2/17/2010)
11.67. Added "if desired" to 4.1.4. (J. Novak 12/29/10)
11.68. Added 4.2.7.1 and 4.2.7.2. (J. Novak 12/29/10)
11.69. Removed "sterilized 500ml or 1000ml bottle" and added 5.1.1. and 5.1.2. (J. Novak 12/29/10)
11.70. Added "YSI 600XL Sonde" and "YSI 556" to 5.4. (J. Novak 12/29/10)
11.71. Removed "pull ties and rubber bands" from 5.6. and added "zip ties". (J. Novak 12/29/10)
11.72. Added "if needed" to 5.9. (J. Novak 12/29/10)
11.73. Removed "sample collection" from 5.12. (J. Novak 12/29/10)
11.74. Added "if desired" to 5.17. (J. Novak 12/29/10)
11.75. Changed GPS location at all beach sites to decimal degrees. (J. Novak 12/29/10)
11.76. "Removed "0.5 location" from 7.2.6.1. and added "RM 0.55". (J. Novak 12/29/10)
11.77. Added "RM 0.14" to 7.2.6.3. (J. Novak 12/29/10)
11.78. Removed 7.3.1. and 7.3.10. (J. Novak 12/29/10)
11.79. Added "if necessary" to 7.4.2. and 7.5.2. and removed "record the coordinates on the field observation sheet". (J. Novak 12/29/10)
11.80. Replaced "at least" with "approximately" in 7.4.3. (J. Novak 12/29/10)
11.81. Added 7.4.8. (J. Novak 12/29/10)
11.82. Changed "-" to "+" in 7.4.9. for wave height calculation. (J. Novak 12/29/10)
11.83. Reworded 7.4.11.1.-7.4.11.4. (J. Novak 12/29/10)
11.84. Changed 7.6. to "Turbidity Analysis". (J. Novak 12/29/10)
11.85. Removed 7.6.1. (J. Novak 12/29/10)

11.86. Added that turbidity is to be done in the field for all beach sites in 7.6. (J. Novak 12/29/10)
11.87. Removed "tags and beach logs" in 8.1. and added "beach observation sheets". (J. Novak 12/29/10)
11.88. Added "notify Project Leader or WQIS Supervisor if this occurs" to 8.5. (J. Novak 12/29/10)
11.89. Added current beach observation sheet to Appendix C. (J. Novak 12/29/10)
11.90. Changed 1.A. to "SOP-EA0013-00" in Appendix D. (J. Novak 12/29/10)
11.91. Added 5.B.: "use the average of the east and west turbidity values" in Appendix D. (J. Novak 12/29/10)
11.92. Removed "and rainfall" from 6.F. in Appendix D. (J. Novak 12/29/10)
11.93. Removed "field parameters" from 7.3.3. (J. Novak 12/29/10)
11.94. Removed 8.4. (J. Novak 12/29/10)
11.95. Removed "other" from 8.5. (J. Novak 12/29/10)
11.96. Added "*E. coli* densities are compared to the Ohio water quality standards to determine recreation use attainment" to 1.5 (J. Novak 1/18/11).
11.97. Added "See *SOP-EA010-00* for the use and calibration of the YSI 600XL Sonde and YSI 556" and "Refer to manufacturer's operations manual for the proper use and calibration of other meters" to 6.0. (J. Novak 1/18/11)
11.98. Added "bacteriological" to 1.1. (J. Novak 1/21/11)
11.99. Added Section 1.5. (J. Novak 1/21/11)
11.100. Added "the effects of increased" to Section 1.3. (J. Novak 1/21/11)
11.101. Added 4.2.11 "Additional safety concerns should be brought to the attention of a WQIS Supervisor or Manager." (J. Novak 1/21/11)
11.102. Added Omegaette PHH-7200 to list of equipment in Section 5. (J. Novak 1/21/11)
11.103. Added LaMotte 2020 turbidity meter to list of equipment in Section 5 (J. Novak 1/21/11)
11.104. Removed "bench turbidity meter and" from Section 6.1.2. (J. Novak 1/21/11)
11.105. Added Section 6.1.4. "Refer to manufacturer's operations manual for the proper use and calibration of all other meters." (J. Novak 1/21/11)
11.106. Removed "Collect the second sample for field analysis by repeating steps 7.4.1. through 7.4.6. from Section 7. (J. Novak 1/21/11)
11.107. Replaced "measuring stick" with "wave stick" in Section 7.4.9. (J. Novak 1/21/11)

11.108. Removed wave height categories from Section 7.4.10. (J. Novak 1/21/11)
11.109. Added Section 7.4.13. "Repeat Section 7.4 to collect samples at other site." (J. Novak 1/21/11)
11.110. Added Section 7.5.10. "Fill in Beach Sampling Field Data Form completely and indicate that the sampling pole was used." (J. Novak 1/21/11)
11.111. Replaced "analyst" with "sampler" in Section 8.4. (J. Novak 1/21/11)
11.112. Added directions to Euclid Creek in Section 7. (J. Novak 1/26/11)
11.113. Added "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" to Section 7.1.2. (J. Novak 1/26/11)
11.114. Removed definitions may, may not, must, shall and should from Section 3. (J. Novak 1/26/11)
11.115. Added the following definitions to Section 3: sampling pole, anemometer, nowcast model, beach sampling field data form, Edgewater state park, Villa Angela/Euclid state parks. (J. Novak 4/15/11)
11.116. Added 473-mL ISCO bottle to Equipment and Supplies list, Section 5. (J.Novak 4/15/11)
11.117. Added 7.3.4. "Samples collected in the 1-L cubitainer will be used for chemical water quality analysis." (J.Novak 4/15/11)
11.118. Added chemical water quality and turbidity sampling protocols to Section 7. (J. Novak 4/15/11)
11.119. Added 7.4.1. "Sampling method shall follow the Manual of Ohio EPA Surveillance Methods and Quality Assurance Practices (2009)." (J. Novak 4/15/11)
11.120. Added 7.4.9. "All samples are to be placed into the portable cooler containing ice." (J. Novak 4/15/11)
11.121. Added how to collect bacteriological and chemical water quality samples during inclement weather, Section 7.6. (J. Novak 4/15/11)
11.122. Added 7.6.7. "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." (J. Novak 4/15/11)
11.123. Added 7.7.1.1. "Turbidity analysis should take place at the truck." (J. Novak 4/15/11)
11.124. Added 8.5 "Scan and save all Beach Sampling Field Data Forms and pictures into the J: drive upon returning to EMSC." (J. Novak 4/15/11)
11.125. Deleted "Use a digital anemometer" from 9.2. (J. Novak 4/15/11)
11.126. Added reference 10.2 "Ohio Environmental Protection Agency. (2009). *Ohio EPA manual of surveillance methods and quality assurance*

practices. Columbus, OH: Divisions of Surface Water and Environmental Services." (J. Novak 4/15/11)

11.127. Replaced Beach Observation Sheet in Appendix C with revised January 25, 2012 version. (J. Novak 2/22/12)

11.128. Added "500 milliliter" and "1000 milliliter" to 5.1.1. (J. Novak 2/22/12)

11.129. Deleted "Eva Hatvani" from "Prepared By:" on page i. (J. Novak 2/22/12)

11.130. Deleted "473 milliliter ISCO bottle (to be used only during inclement weather" from Section 5.1.3. (J. Novak 2/22/12)

11.131. Deleted "Extech Exstik II EC500 Meter," from Section 5.4.1. (J. Novak 2/22/12)

11.132. Added "HACH 2100Q Turbidimeter" to Section 5.5. (J. Novak 2/22/12)

11.133. Deleted Section 6.1.5. "See *SOP-EA018-00* for the use and calibration of the Extech Exstik II EC500 Meter." (J. Novak 2/22/12)

11.134. Deleted Section 7.2.6.3. "**Euclid Creek RM 0.14** – 30 feet north of the foot bridge" and Section 7.2.6.4. "**RM 0.14 GPS Location:** 41.585294°N 81.564139°W." (J. Novak 2/22/12)

11.135. Deleted "central" from 7.3.1.1. (J. Novak 2/22/12)

11.136. Added "500 milliliter, 1-L or" to Section 7.3.4. (J. Novak 2/22/12)

11.137. Deleted "Samples collected in the 1-L cubitainer will be used for chemical water quality analysis" from Section 7.3.4. (J. Novak 2/22/12)

11.138. Revised Section 7.3.7. to "Upon returning to base, the field data is entered into Lablynx and field sheets and pictures are saved to the J:/ drive" and deleted "The Beach Sampling Field Data Forms (Appendix C) are uploaded through Lablynx to the NEORSD intranet page. See *SOP-1005 LIMS Image and File Upload for Beach.*" (J. Novak 2/22/12)

11.139. Deleted "Chemical Water Quality" from Section 7.4. (J. Novak 2/22/12)

11.140. Deleted "1-L cubitainer or turbidity bottle" from Section 7.4.5. (J. Novak 2/22/12)

11.141. Deleted "1-L cubitainer and" from 7.4.8. (J. Novak 2/22/12)

11.142. Removed Section 7.6.5. regarding chemical water quality sample collection. (J. Novak 2/22/12)

11.143. Updated steps in 7.6.5. and added "using the 125-milliliter bottle." (J. Novak 2/22/12)

11.144. Updated Beach Observation Sheet in Appendix C with revised versions. (J. Novak 4/5/12)

11.145. Added "250 milliliter" to Section 5.1.1. (J. Novak 4/5/12)

11.146. Replaced "Hanna pH EC/TDS" with "Hanna HI 98129" in Section 5.4.1. (J. Novak 4/5/12)
11.147. Replaced "YSI 556" with "YSI-556 MPS Multi-Parameter Water Quality Meter" in Section 5.4.3. (J. Novak 4/5/12)
11.148. Renamed Appendices A-D as Appendices 1-4. (J. Novak 4/5/12)
11.149. Updated Section 4.1.4. with "*Throw Bag SOP-EA007-00"* (J. Novak 4/5/12)
11.150. Revised Section 6.1.1. to read "See "*Operation of the Hanna HI98129 Meter SOP-EA015-00"* for use and calibration of Hanna HI98129 meter." (J. Novak 4/5/12)
11.151. Revised Section 6.1.2. to read "Refer to the manufacturer's operations manual or user's guide for the use and calibration of Thermo Orion AQ4500 Turbidimeter." (J. Novak 4/5/12)
11.152. Revised 6.1.3. to read "Refer to the manufacturer's operations manual or user's guide for the use and calibration of the HACH 2100P Turbidimeter." (J. Novak 4/5/12)
11.153. Added "Refer to the manufacturer's operations manual or user's guide for the use and calibration of the LaMotte 2020e Turbidimeter." (J. Novak 4/5/12)
11.154. Added "Refer to the manufacturer's operations manual or user's guide for the use and calibration of the HACH 2100Q Turbidimeter." (J. Novak 4/5/12)
11.155. Revised Section 6.1.6. to read "See "*Procedures for the Calibration and Use of the YSI 556 Multi-Parameter Water Quality Meter & YSI 650 MDS/600XL Sonde SOP-EA010-00."* (J. Novak 4/5/12)
11.156. Added Section 1.1.7. "Refer to manufacturer's operations manual or user's guide for additional information on all meters." (J. Novak 4/5/12)
11.157. Changed Section 7.2.2. "Appendices A and B" to "Appendices 1 and 2." (J. Novak 4/5/12)
11.158. Referenced Appendix 3 in Sections 7.3.1.1., 7.3.3., 7.5.1., 7.6.8. (J. Novak 4/5/12)
11.159. Added "250mL" to Section 7.3.4. (J. Novak 4/5/12)
11.160. Deleted "*See current version of SOP 2007*" from Section 7.7.1. (J. Novak 4/5/12)
11.161. Changed "Appendix H" to "Appendix 4" and deleted "for Protocol for the Edgewater Model" in Section 9.1.1. (J. Novak 4/5/12)
11.162. Deleted Sections 9.2.1.-9.2.5. and added "Refer to the manufacturer's operations manual or user's guide for the use of the Kestrel 2000 Pocket Weather Meter." (J. Novak 4/5/12)
11.163. Changed Appendix 3 title to "Example Beach Observation Sheet" (J. Novak 4/10/12)

11.164. Removed Euclid Creek RM 0.14 directions from Section 7.1.2. (J. Novak 4/18/12)
11.165. In Section 5.1.1. changed 1-L and 2-L to 1000mL and 2000mL. (J. Novak 4/18/12)
11.166. Removed Euclid Creek RM 0.14 picture from Appendix 2. (J. Novak 4/18/12)
11.167. Deleted Section 5.5.3. "LaMotte 2020 Turbidity Meter" (J. Novak 11/26/12)
11.168. Deleted Setion 5.5.4. "Thermo Orion AQ4500 Turbidimeter" (J. Novak 11/26/12)
11.169. Deleted Section 5.12 "Ziploc bags" (J. Novak 11/26/12)
11.170. Deleted Section 6.1.2. "Refer to the manufacturer's operations manual or user's guide for the use and calibration of Thermo Orion AQ4500 Turbidimeter" (J. Novak 11/26/12)
11.171. Deleted Section 6.1.4. "Refer to the manufacturer's operations manual or user's guide for the use and calibration of LaMotte 2020e Turbidimeter" (J. Novak 11/26/12)
11.172. Deleted "into a Ziploc bag and place it" from Section 7.3.5. (J. Novak 11/26/12)
11.173. Added Section 3.4. "EMSC- Environmental Maintenance and Service Center (4747 East 49th Street, Cuyahoga Heights, Ohio 44125; 216-641-6000)" (J. Novak 1/3/13)
11.174. Added "Department at the Environmental Maintenance and Service Center (EMSC)" to Section 7.3.6. (J. Novak 1/3/13)
11.175. Added "plastic" to Section 7.5.4. (J. Novak 1/3/13)
11.176. Added revised field sheet (modified 5/4/12) to Appendix 3 (J. Novak 1/3/13)
11.177. Changed "Groupwise" to "Microsoft Outlook" and "login" to "enter personal login information" in Appendix 4, Section (3)(B) (J. Novak 1/3/13)
11.178. Changed "8:51-7:51" to "7:51-6:51" in Appendix 4, Section (3)(G) (J. Novak 1/3/13)
11.179. Changed "8:51-7:51" to "7:51-6:51" in Appendix 4, Section (3)(H) (J. Novak 1/3/13)
11.180. Changed "check" to "circle" in Appendix 4, Section (3)(I) (J. Novak 1/3/13)
11.181. Changed "check" to "circle" in Appendix 4, Section (B)(i) (J. Novak 1/3/13)
11.182. Change "2011" to "2013" in Appendix 4, Section (6)(B) (J. Novak 1/3/13)

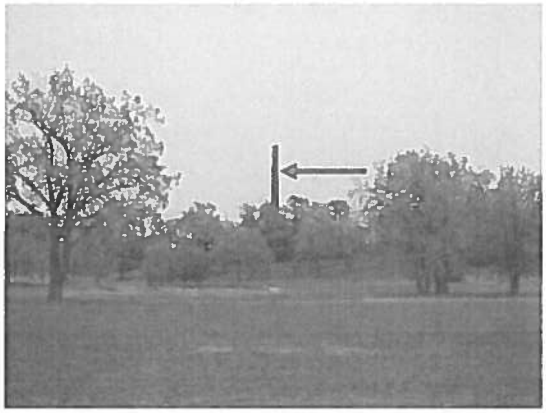
11.183. Deleted "lower", "upper", and added "model"; deleted "probability E. coli densities" and added "exceedance percentage" to Appendix 4 (6)(E) (J. Novak 1/3/13)
11.184. Changed "probability" to "exceedance"; changed "season" to "subseason"; changed "check" to "circle" to Appendix 4 Section (6)(F) (J. Novak 1/3/13)
11.185. Changed password from "mark2011" to "jill2013" in Appendix 4, (7)(E) (J. Novak 1/3/13)
11.186. Changed "E. coli" to "Predicted E. coli Concentration" in Appendix 4, Section (7)(G)(iii) (J. Novak 1/3/13)
11.187. Deleted Appendix 4 Section (7)(G)(iv) (J. Novak 1/3/13)
11.188. Added "for Edgewater Beach" to Appendix 4 Section (8)(E) (J. Novak 1/3/13
11.189. Changed "2009" to "2013" in Section 7.4.1. (J. Novak 1/14/13)
11.190. Re-lettered Appendix 4, Section 3 (J. Novak 1/14/13)
11.191. Deleted Appendix 4, Section 9 (J. Novak 1/14/13)
11.192. Changed revision number to 17 (J. Novak 2/8/13)
11.193. Updated 10.2, 10.3 and 10.4 references (J. Novak 2/11/13)
11.194. Deleted 10.5 "USGS, Nowcast at Huntington and Edgewater Quality Assurance/Quality Plan 2008, April 29, 2008" (J. Novak 2/11/13)
11.195. Deleted "East Sample" and "East" from: 7.2.3.1, 7.2.4.1, 7.2.5.1, and (J. Novak 2/21/13)
11.196. Deleted "East" from: 7.2.3.2, 7.2.4.2, and 7.2.5.2 (J. Novak 2/21/13)
11.197. Deleted "West Sample" and "West GPS Location" from: 7.2.3.3, 7.2.3.4, 7.2.4.3, 7.2.4.4, 7.2.5.3, and 7.2.5.4 (J. Novak 2/21/13)
11.198. Deleted "the Manual of Ohio EPA Surveillance Methods and Quality Assurance Practices (2013" and added "Ohio EPA's *Surface Water Field Sampling Manual for water chemistry, bacteria, and flows* (2013) to Section 7.4.1" (J. Novak 2/21/13)
11.199. Added "or at EMSC" and deleted "Analyze both the east and west sample separately for turbidity" to Section 7.7.1 (J. Novak 2/21/13)
11.200. Replaced maps in Appendix 1 (J. Novak 2/21/13)
11.201. Deleted "West Sample Site" picture and description from Appendix 1 (J. Novak 2/21/13)
11.202. Replaced Villa Angela Beach map in Appendix 2 (J. Novak 2/21/13)
11.203. Added Euclid Beach and Euclid Creek RM 0.55 maps to Appendix 2 (J. Novak 2/21/13)
11.204. Replaced Euclid Creek RM 0.55 picture in Appendix 2 (J. Novak 2/21/13)
11.205. Deleted "West Sample Site" description pictures and descriptions from Appendix 2 (J. Novak 2/21/13)

11.206. Deleted "A sample will be taken from two locations on Euclid Creek" from Section 7.2.6 (J. Novak 2/21/13)
11.207. Added "or at EMSC" to Section 7.5.4 (J. Novak 2/21/13)
11.208. Deleted Section 7.7.1.1 "Turbidity analysis should take place at the truck" (J. Novak 2/21/13)
11.209. Moved Section 8.6 to Section 7.7.1.2 (J. Novak 2/21/13)
11.210. Deleted Appendix 4, Section 5.2 (J. Novak 2/21/13)
11.211. Deleted "Use collection time from the east sample" from Appendix 4, Section 7.7.1 and added "Enter collection time as a 24 hour format" (J. Novak 2/21/13)
11.212. Updated Appendix 3 (J. Novak 4/16/13)
11.213. Deleted Section 9.1 "NOWCASTING Protocol for EDGEWATER" (J. Novak 4/16/13)
11.214. Deleted Appendix 4 (J. Novak 4/16/13)
11.215. Deleted Section 3.5 "Nowcast Model" definition (J. Novak 2/6/14)
11.216. Added "issued" to Section 4.1.5. (J. Novak 2/6/14)
11.217. Added "at least 4 bottles" to Sections 5.1.1. and 5.1.2. (J. Novak 2/6/14)
11.218. Changed "125" to "473" in Section 5.1.2. (J. Novak 2/6/14)
11.219. Added Section 5.9. "Throw Bag" (J. Novak 2/6/14)
11.220. Added Section 5.10. "Life jacket or inflatable safety best" (J. Novak 2/6/14)
11.221. Added Section 5.11. "District-issued cell phone" (J. Novak 2/6/14)
11.222. Added Section 5.18 "Chest waders" (J. Novak 2/6/14)
11.223. Deleted Section 5.14. "Equipment needed at Edgewater only" (J. Novak 2/6/14)
11.224. Revised Section 7.1 to read "Directions to the beach and Euclid Creek" (J. Novak 2/6/14)
11.225. Deleted "noting the picture number on the Beach Sampling Field Form" from Section 7.3.1.1. (J. Novak 2/6/14)
11.226. Changed "125" to "473" from Section 7.3.4. (J. Novak 2/6/14)
11.227. Deleted "convert inches to feet for use in the Edgewater NOWCAST model and entry into Lablynx" and "for the model" from Section 7.5.1. (J. Novak 2/6/14)
11.228. Added "and indicate so on the Beach Sampling Field Form" to Section 7.5.2. (J. Novak 2/6/14)
11.229. Changed "125" to "473" to Section 7.5.4. (J. Novak 2/6/14)
11.230. Changed "125" to "473" to Section 7.6.5. (J. Novak 2/6/14)
11.231. Deleted "in the field or" from Section 7.7.1. (J. Novak 2/6/14)
11.232. Deleted Section 7.7.1.2. regarding failure to measure turbidity in the field (J. Novak 2/6/14)

11.233. Deleted Section 10.4. "USGS, Nowcasting Protocol at Great Lakes Beaches" (J. Novak 2/6/14)
11.234. Deleted Section 10.5. "Nowcast at Huntington and Edgewater Quality Assurance/Quality Plan" (J. Novak 2/6/14)
11.235. Deleted Section 7.5.3. regarding taking water clarity measurement (J. Novak 2/7/14)
11.236. Updated Appendix 3 with revised NEORSD Beach Sampling Field Form (J. Novak 2/7/14)
11.237. Added Section 5.4.4. "YSI EXO1 Sonde" (J. Novak 2/11/14)
11.238. Changed "warn" to "inform" in Section 1.2. (J. Novak 2/11/14)
11.239. Added "over ground runoff and overflows of sewage systems from" to Section 1.3. (J. Novak 2/11/14)
11.240. Changed "taken" to "collected" in Sections 4.2.5., 7.3.2., 7.5.3. (J. Novak 2/11/14)
11.241. Replaced "inflatable life vest" with "personal flotation device (PFD)" in Sections 4.2.7., 4.2.7.1., 4.2.7.2., 5.10. (J. Novak 2/11/14)
11.242. Added "The use of the sampling pole shall be noted on the Beach Sampling Field Data Form" to Section 4.2.9. (J. Novak 2/11/14)
11.243. Added "Refer to the manufacturer's operations manual or user's guide for the use and calibration of the YSI EXO1 Sonde" to Section 6. (J. Novak 2/11/14)
11.244. Changed "330" to "485" in Section 7.1.2. (J. Novak 2/11/14)
11.245. Changed "base" to "EMSC" in Section 7.3.7. (J. Novak 2/11/14)
11.246. Added "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" to Section 7.6.3. (J. Novak 2/11/14)
11.247. Added "ice-filled" to section 7.6.7. (J. Novak 2/11/14)
11.248. Deleted "at the truck" from Section 7.5.3. (J. Novak 2/11/14)
11.249. Reworded Section 4.2.7.1. to read "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" (J. Novak 2/27/14)
11.250. Changed Section 4.1.1. to "Personal Flotation Device (PFD)" (J. Novak 2/27/14)

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 JN

Appendix D

NEORSD Beach Sampling Field Data Form

[Place Label Here]

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

Samplers: _____

Meter(s) used: _____

Weather Conditions

Was the sample taken during or following a wet weather event: (Yes/No) (During/After)

Weather Condition: _____ (1-8)

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

Air Temp: _____ (°C)

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

Beach Conditions

Number of Birds: Gull ____ Geese ____ Duck____ Other$_{(pigeons, etc)}$ ____ Total ____

Number of Wildlife: Dog_____ Raccoon _____ Deer _____ Horse _____ Total_____

Odor: _____

1-Normal **2**-Petroleum **3**-Septic **4**-Sewage **5**-Chemical **6**-Other

Debris on Beach: _____ (1-6)

Fecal Contamination on Beach: _____ (1-6) (Bird/Wildlife)

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

Lake Conditions

Water Surface Condition: _____ (1-5)

1-None **2**-Foam **3**-Oily **4**-Scum **5**-Other

Color: _____ (1-5)

1-Clear **2**-Muddy **3**-Tea **4**-Milky **5**-Other

Wave Condition: _____ (1-4)

1-Calm **2**-Ripple **3**-Moderate **4**-White Caps

Wave Run Up: _____ (1-5)

1- ≤1 ft **2**-1-3 ft **3**-4-6 ft **4**-7-9 ft **5**-≥10 ft

Wave Height: _____ (inches)

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

Lake Conditions

Algae: _____ **Debris** _____ (1-5)

1-None **2**-Some **3**-Floating **4**-Thick Layer **5**-Multiple Layers

Fecal Matter: _____ (1-5)

1-None **2**-Sparse **3**-Some **4**-Multiple Areas **5**-Along Shoreline

Number of Swimmers: _____

Lake Physical Parameters

Water Temp: _____ (°C)

pH: _____(SU)

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

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

Conductivity: _____ (µmhos/cm)

Comments

_____

_____

_____

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	

Appendix E

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 Environmental

YSI 556 Multiparameter System

Versatile, multiparameter handheld instrument

Rugged and reliable, the YSI 556 MPS (Multiprobe System) combines the versatility of an easy-to-use, easy-to-read handheld unit with all the functionality of a multiparameter system.

- Simultaneously measures dissolved oxygen, pH, conductivity, temperature, and ORP
- Field-replaceable electrodes
- Compatible with EcoWatch® for Windows® data analysis software
- Stores over 49,000 data sets, time and date stamped, interval or manual logging
- Three-year warranty on the instrument; one-year on the probes
- GLP assisting, records calibration data in memory
- Available with 4, 10, and 20-m cable lengths
- IP-67, impact-resistant, waterproof case
- Easy-to-use, screw-on cap DO membranes
- RS-232 interface for PC connection

The 556 has multiple language capabilities and graphing!

Pure Data for a Healthy Planet.®

A rugged, cost-effective multiparameter handheld system designed for the field!

Options to Fit Your Applications!

- Battery Options – The unit is powered by alkaline batteries or an optional rechargeable battery pack with quick-charge feature.
- Optional Barometer – Internal barometer can be user-calibrated and displayed along with other data, used in dissolved oxygen calibrations, and logged to memory for tracking changes in barometric pressure. (Choose 556-02)
- Optional Flow Cell - The 5083 flow cell can be used for ground water applications or anytime water is pumped for sampling.
- Carrying Case – The instrument comes standard with YSI 5061, a soft-sided carrying case with enough space for the 556, a 20-meter cable, and calibrating supplies. An optional 5080 hard-sided carrying case is also available.
- Confidence Solution® - Quality assurance ensured. Quickly check conductivity, pH, and ORP readings with one solution.

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ISO 9001
ISO 14001

CE

YSI Incorporated
Who's Minding the Planet?®

5563 MPS Sensor Specifications

Dissolved Oxygen (% saturation)	Sensor Type	Steady state polarographic
	Range	0 to 500% air saturation
	Accuracy	0 to 200% air saturation, ± 2% of the reading or ±2% air saturation, whichever is greater; 200 to 500% air saturation, ± 6% of the reading
	Resolution	0.1% air saturation
Dissolved Oxygen (mg/L)	Sensor Type	Steady state polarographic
	Range	0 to 50 mg/L
	Accuracy	0 to 20 mg/L, ± 2% of the reading or ±0.2 mg/L, whichever is greater; 20 to 50 mg/L, ± 6% of the reading
	Resolution	0.01 mg/L
Temperature	Sensor Type	YSI Temperature Precision™ thermistor
	Range	-5 to 45°C
	Accuracy	± 0.15°C
	Resolution	0.1°C
Conductivity	Sensor Type	4-electrode cell with autoranging
	Range	0 to 200 mS/cm
	Accuracy	± 0.5% of reading or ± 0.001 mS/cm; whichever is greater (4-meter cable) ± 1.0% of reading or ± 0.001 mS/cm; whichever is greater (20-meter cable)
	Resolution	0.001 mS/cm to 0.1 mS/cm (range-dependent)
Salinity	Sensor Type	Calculated from conductivity and temperature
	Range	0 to 70 ppt
	Accuracy	± 1.0% of reading or ±0.1 ppt, whichever is greater
	Resolution	0.01 ppt
pH (optional)	Sensor Type	Glass combination electrode
	Range	0 to 14 units
	Accuracy	±0.2 units
	Resolution	0.01 units
ORP (optional)	Sensor Type	Platinum button
	Range	-999 to +999 mV
	Accuracy	± 20 mV
	Resolution	0.1 mV
Total Dissolved Solids (TDS)	Sensor Type	Calculated from conductivity (variable constant, default 0.65)
	Range	0 to 100 g/L
	Resolution	4 digits
Barometer (optional)	Range	500 to 800 mm Hg
	Accuracy	± 3 mm Hg within ± 10°C temperature range from calibration point
	Resolution	0.1 mm Hg

YSI 556 Instrument Specifications

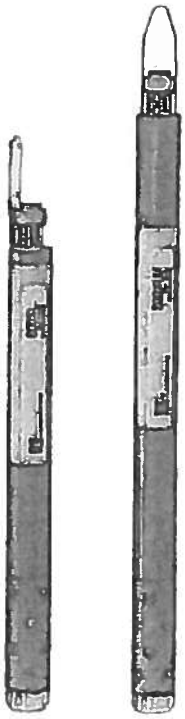
Size	11.9 cm width x 22.9 cm length (4.7 in. x 9 in.)
Weight with batteries	2.1 lbs. (916 grams)
Power	4 alkaline C-cells; optional rechargeable pack
Cables	4-, 10-, and 20-m (13.1, 32.8, 65.6 ft.) lengths
Warranty	3-year instrument; 1-year probes and cables
Communication Port	RS-232 Serial
Data Logger	49,000 data sets, date and time stamp, manual or logging, with user-selectable intervals

556 Ordering Information (Order all items separately)

556-01	Instrument (with 5061 large, soft-sided carrying case)
556-02	Instrument with barometer option (with 5061 carrying case)
5563-4	4-m cable and DO/temp/conductivity
5563-10	10-m cable and DO/temp/conductivity
5563-20	20-m cable and DO/temp/conductivity
5564	pH Probe for any 5563 cable
5565	pH/ORP Probe for any 5563 cable
6118	Rechargeable battery pack kit (includes battery, adapter, charger)
614	Ultra clamp, C-clamp mount
616	Charger, cigarette lighter
4654	Tripod (small tripod for instrument)
5060	Small carrying case, soft-sided (fits instrument and 4-m cable)
5065	Form-fitted carrrier with shoulder strap
5080	Small carrying case, hard-sided (fits instrument, 4-m cable, flow cell, batteries, membrane kit, calibration bottles)
5083	Flow cell
5085	Hands-free harness
5580	Confidence Solution® (insure probe accuracy with a simple field-check for conductivity, pH, and ORP)

The 5080 carrying case with 556, 5563-4 cable, and 5083 flow cell.

YSI 600XL and 600XLM Sondes



The YSI 600XL and 600XLM

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)

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
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Fax +1 937 767 9353
environmental@ysi.com

Endeco/YSI
+1 508 748 0366
Fax +1 508 748 2543
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SonTek/YSI
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Fax +1 858 546 8150
inquiry@sontek.com

YSI Gulf Coast
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YSI Hydrodata (UK)
+44 1462 673 581
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YSI Middle East (Bahrain)
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+86 10 5203 9675
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beijing@ysi-china.com

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

ISO 9001
ISO 14001

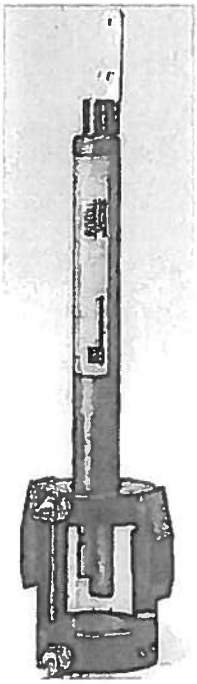
YSI 600XL & 600XLM Sensor Specifications

		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 6560 Sensor* ETV		-5 to +50°C	0.01°C	±0.15°C
pH 6561 Sensor* ETV		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)

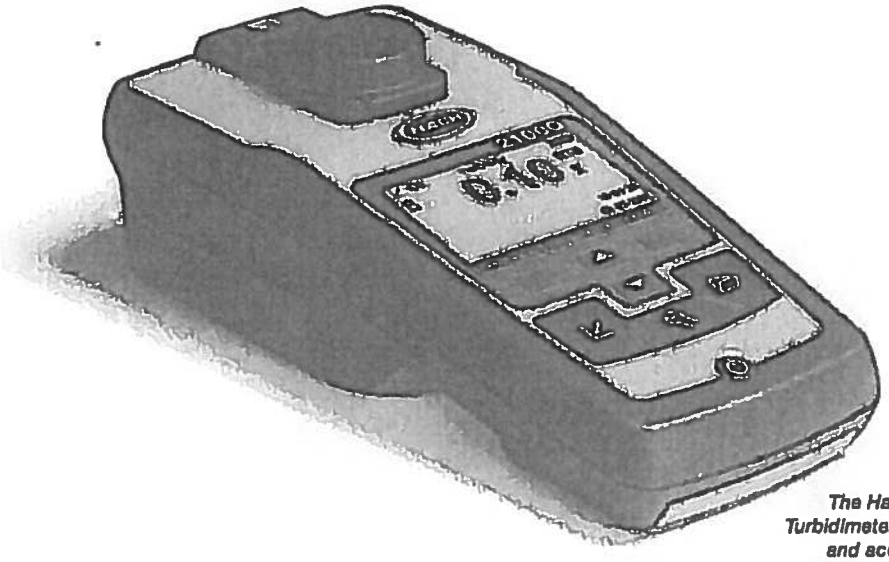
YSI 600XL & 600XLM Sonde Specifications

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.

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.

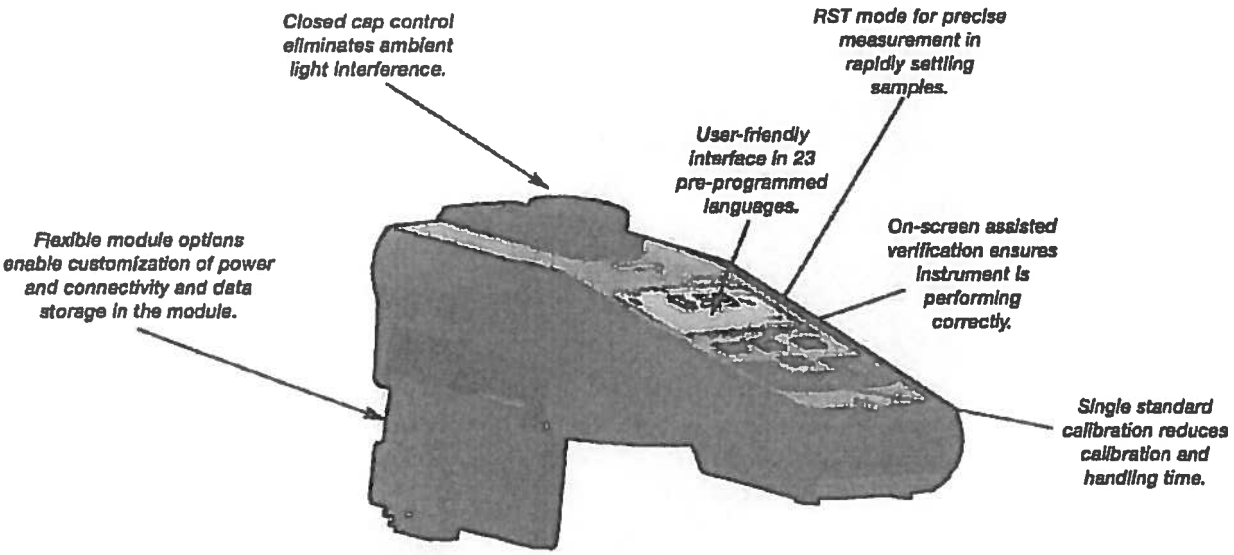
Optical System for Precision in the Field

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.*

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.

2100P and 2100P IS Portable Turbidimeter

Features and Benefits

Laboratory Quality in a Portable Unit

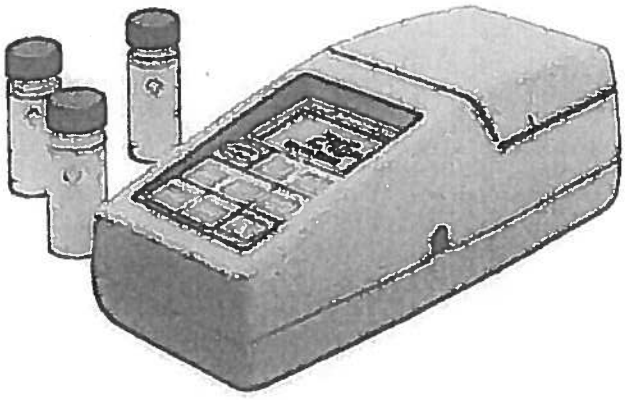
The Hach 2100P and 2100P IS Portable Turbidimeters offer a level of performance previously possible only with laboratory instruments. Microprocessor-controlled operation and Hach's unique Ratio™ optics bring great accuracy, sensitivity, and reliability to field and in-plant testing.

Two Models for Specific Requirements

- **2100P Turbidimeter**—*Get fast, accurate turbidity testing in the field or the lab, over a wide range of samples. Compliant with USEPA Method 180.1 design criteria.*
- **2100P IS Turbidimeter**—*Designed to meet international standards that mandate measurement using an LED light source.*

Two-detector Optical System

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, onsite conditions.



The Hach 2100P and 2100P IS Portable Turbidimeters bring laboratory-level performance on-site, offering fast, accurate results and the ease-of-use analysts demand in the field. With a measurement range of 0 to 1000 NTU and a resolution of 0.01 NTU, the 2100P turbidimeter is ideal for regulatory monitoring, process control or field studies.

Specifications*

	2100P	2100P IS
Measurement Method	Nephelometric Ratio	
Regulatory	Meets EPA Method 180.1	Meets EN ISO 7027
Light Source	Tungsten lamp	Light-emitting diode (LED) @ 860 nm
Range		
Automatic Range Mode	0 to 1000 NTU	0 to 1000 FNU
Manual Range Selection	0 to 9.99, 0 to 99.9 and 0 to 1000 NTU	0 to 9.99, 0 to 99.9 and 0 to 1000 FNU
Accuracy	±2% of reading plus stray light	
Repeatability	±1% of reading, or 0.01 NTU, whichever is greater	±1% of reading, or 0.01 FNU, whichever is greater
Resolution	0.01 on lowest range	
Signal Averaging	Selectable on/off	
Power Requirement	4 AA alkaline batteries or optional battery eliminator	
Battery Life, Typical	300 tests with signal average mode off 180 tests with signal average mode on	
Operating Temperature	0 to 50°C (32 to 122°F)	
Sample Required	15 mL (0.5 oz.)	
Sample Cells	60 x 25 mm (2.36 x 1 in.) borosilicate glass with screw caps	
Dimensions	22.2 x 9.5 x 7.9 cm (8.75 x 3.75 x 3.12 in.)	
Weight	0.5 kg (1.1 lb.); shipping weight 2.7 kg (6 lb.)	
Warranty	2 years	

**Specifications subject to change without notice.*

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

HACH®
Be Right™

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EXO1 Water Quality Sonde

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

2017 Beach Monitoring Sampling Schedule

Day	Date	Edgewater Beach	Villa Angela Beach	Euclid Beach	Euclid Creek RM 0.55
Monday	5/1/2017	√	√	√	√
Tuesday	5/2/2017	√	√	√	√
Wednesday	5/3/2017	√	√	√	√
Thursday	5/4/2017	√	√	√	√
Friday	5/5/2017				
Saturday	5/6/2017				
Sunday	5/7/2017				
Monday	5/8/2017	√	√	√	√
Tuesday	5/9/2017	√	√	√	√
Wednesday	5/10/2017	√	√	√	√
Thursday	5/11/2017	√	√	√	√
Friday	5/12/2017				
Saturday	5/13/2017				
Sunday	5/14/2017				
Monday	5/15/2017	√	√	√	√
Tuesday	5/16/2017	√	√	√	√
Wednesday	5/17/2017	√	√	√	√
Thursday	5/18/2017	√	√	√	√
Friday	5/19/2017				
Saturday	5/20/2017				
Sunday	5/21/2017				
Monday	5/22/2017	√	√	√	√
Tuesday	5/23/2017	√	√	√	√
Wednesday	5/24/2017	√	√	√	√
Thursday	5/25/2017	√	√	√	√
Friday	5/26/2017	√	√	√	√
Saturday	5/27/2017	√	√	√	√
Sunday	5/28/2017	√	√	√	√
Monday	5/29/2017	√	√	√	√
Tuesday	5/30/2017	√	√	√	√
Wednesday	5/31/2017	√	√	√	√
Thursday	6/1/2017	√	√	√	√
Friday	6/2/2017	√	√	√	√
Saturday	6/3/2017	√	√	√	√
Sunday	6/4/2017	√	√	√	√
Monday	6/5/2017	√	√	√	√
Tuesday	6/6/2017	√	√	√	√
Wednesday	6/7/2017	√	√	√	√
Thursday	6/8/2017	√	√	√	√
Friday	6/9/2017	√	√	√	√
Saturday	6/10/2017	√	√	√	√
Sunday	6/11/2017	√	√	√	√
Monday	6/12/2017	√	√	√	√
Tuesday	6/13/2017	√	√	√	√
Wednesday	6/14/2017	√	√	√	√
Thursday	6/15/2017	√	√	√	√
Friday	6/16/2017	√	√	√	√
Saturday	6/17/2017	√	√	√	√

		Edgewater Beach	Villa Angela Beach	Euclid Beach	Euclid Creek
Day	Date	East	East	East	RM 0.55
Sunday	6/18/2017	√	√	√	√
Monday	6/19/2017	√	√	√	√
Tuesday	6/20/2017	√	√	√	√
Wednesday	6/21/2017	√	√	√	√
Thursday	6/22/2017	√	√	√	√
Friday	6/23/2017	√	√	√	√
Saturday	6/24/2017	√	√	√	√
Sunday	6/25/2017	√	√	√	√
Monday	6/26/2017	√	√	√	√
Tuesday	6/27/2017	√	√	√	√
Wednesday	6/28/2017	√	√	√	√
Thursday	6/29/2017	√	√	√	√
Friday	6/30/2017	√	√	√	√
Saturday	7/1/2017	√	√	√	√
Sunday	7/2/2017	√	√	√	√
Monday	7/3/2017	√	√	√	√
Tuesday	7/4/2017	√	√	√	√
Wednesday	7/5/2017	√	√	√	√
Thursday	7/6/2017	√	√	√	√
Friday	7/7/2017	√	√	√	√
Saturday	7/8/2017	√	√	√	√
Sunday	7/9/2017	√	√	√	√
Monday	7/10/2017	√	√	√	√
Tuesday	7/11/2017	√	√	√	√
Wednesday	7/12/2017	√	√	√	√
Thursday	7/13/2017	√	√	√	√
Friday	7/14/2017	√	√	√	√
Saturday	7/15/2017	√	√	√	√
Sunday	7/16/2017	√	√	√	√
Monday	7/17/2017	√	√	√	√
Tuesday	7/18/2017	√	√	√	√
Wednesday	7/19/2017	√	√	√	√
Thursday	7/20/2017	√	√	√	√
Friday	7/21/2017	√	√	√	√
Saturday	7/22/2017	√	√	√	√
Sunday	7/23/2017	√	√	√	√
Monday	7/24/2017	√	√	√	√
Tuesday	7/25/2017	√	√	√	√
Wednesday	7/26/2017	√	√	√	√
Thursday	7/27/2017	√	√	√	√
Friday	7/28/2017	√	√	√	√
Saturday	7/29/2017	√	√	√	√
Sunday	7/30/2017	√	√	√	√
Monday	7/31/2017	√	√	√	√
Tuesday	8/1/2017	√	√	√	√
Wednesday	8/2/2017	√	√	√	√
Thursday	8/3/2017	√	√	√	√
Friday	8/4/2017	√	√	√	√
Saturday	8/5/2017	√	√	√	√
Sunday	8/6/2017	√	√	√	√

		Edgewater Beach	Villa Angela Beach	Euclid Beach	Euclid Creek
Day	Date	East	East	East	RM 0.55
Monday	8/7/2017	√	√	√	√
Tuesday	8/8/2017	√	√	√	√
Wednesday	8/9/2017	√	√	√	√
Thursday	8/10/2017	√	√	√	√
Friday	8/11/2017	√	√	√	√
Saturday	8/12/2017	√	√	√	√
Sunday	8/13/2017	√	√	√	√
Monday	8/14/2017	√	√	√	√
Tuesday	8/15/2017	√	√	√	√
Wednesday	8/16/2017	√	√	√	√
Thursday	8/17/2017	√	√	√	√
Friday	8/18/2017	√	√	√	√
Saturday	8/19/2017	√	√	√	√
Sunday	8/20/2017	√	√	√	√
Monday	8/21/2017	√	√	√	√
Tuesday	8/22/2017	√	√	√	√
Wednesday	8/23/2017	√	√	√	√
Thursday	8/24/2017	√	√	√	√
Friday	8/25/2017	√	√	√	√
Saturday	8/26/2017	√	√	√	√
Sunday	8/27/2017	√	√	√	√
Monday	8/28/2017	√	√	√	√
Tuesday	8/29/2017	√	√	√	√
Wednesday	8/30/2017	√	√	√	√
Thursday	8/31/2017	√	√	√	√
Friday	9/1/2017	√	√	√	√
Saturday	9/2/2017	√	√	√	√
Sunday	9/3/2017	√	√	√	√
Monday	9/4/2017	√	√	√	√
Tuesday	9/5/2017	√	√	√	√
Wednesday	9/6/2017	√	√	√	√
Thursday	9/7/2017	√	√	√	√
Friday	9/8/2017				
Saturday	9/9/2017				
Sunday	9/10/2017				
Monday	9/11/2017	√	√	√	√
Tuesday	9/12/2017	√	√	√	√
Wednesday	9/13/2017	√	√	√	√
Thursday	9/14/2017	√	√	√	√
Friday	9/15/2017				
Saturday	9/16/2017				
Sunday	9/17/2017				
Monday	9/18/2017	√	√	√	√
Tuesday	9/19/2017	√	√	√	√
Wednesday	9/20/2017	√	√	√	√
Thursday	9/21/2017	√	√	√	√
Friday	9/22/2017				
Saturday	9/23/2017				
Sunday	9/24/2017				
Monday	9/25/2017	√	√	√	√

		Edgewater Beach	Villa Angela Beach	Euclid Beach	Euclid Creek
Day	Date	East	East	East	RM 0.55
Tuesday	9/26/2017	√	√	√	√
Wednesday	9/27/2017	√	√	√	√
Thursday	9/28/2017	√	√	√	√
Friday	9/29/2017				
Saturday	9/30/2017				
Sunday	10/1/2017				
Monday	10/2/2017	√	√	√	√
Tuesday	10/3/2017	√	√	√	√
Wednesday	10/4/2017	√	√	√	√
Thursday	10/5/2017	√	√	√	√
Friday	10/6/2017				
Saturday	10/7/2017				
Sunday	10/8/2017				
Monday	10/9/2017	√	√	√	√
Tuesday	10/10/2017	√	√	√	√
Wednesday	10/11/2017	√	√	√	√
Thursday	10/12/2017	√	√	√	√
Friday	10/13/2017				
Saturday	10/14/2017				
Sunday	10/15/2017				
Monday	10/16/2017	√	√	√	√
Tuesday	10/17/2017	√	√	√	√
Wednesday	10/18/2017	√	√	√	√
Thursday	10/19/2017	√	√	√	√
Friday	10/20/2017				
Saturday	10/21/2017				
Sunday	10/22/2017				
Monday	10/23/2017	√	√	√	√
Tuesday	10/24/2017	√	√	√	√
Wednesday	10/25/2017	√	√	√	√
Thursday	10/26/2017	√	√	√	√
Friday	10/27/2017				
Saturday	10/28/2017				
Sunday	10/29/2017				
Monday	10/30/2017	√	√	√	√
Tuesday	10/31/2017	√	√	√	√

√= Bacteriological Sampling

Shading= Sampling dependent on weather and staffing availablility

Shading= No Sampling

Highlight= Duplicate

Appendix G

Beach Training

Signature: _____ Project Manager: _____

	Yes	No	Initials	Date
Method Review				
1. Review "2017 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

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

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

BUREAU OF LABORATORIES

LABORATORY ACCREDITATION PROGRAM

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Certifies That

68-03670

Northeast Ohio Regional Sewer District Analytical Services

4747 East 49th Street, Cuyahoga Heights, OH 44125

Having duly met the requirement of
The act of June 29, 2002 (P.L. 596, No. 90)
dealing with Environmental Laboratories Accreditation
(27 Pa. C.S. §§4104-4113) and the
National Environmental Laboratory Accreditation Program Standard

is hereby approved as an

Accredited Laboratory

to conduct analysis within the fields of accreditations more fully described in the attached Scope of Accreditation

Expiration Date: **11/30/2017**

Certificate Number: **010**

Aaren S. Alger, Chief
Laboratory Accreditation Program
Bureau of Laboratories

Continued accreditation status depends on successful ongoing participation in the program
Certificate not transferable Surrender upon revocation
To be conspicuously displayed at the Laboratory
Not valid unless accompanied by a valid Scope of Accreditation
Shall not be used to imply endorsement by the Commonwealth of Pennsylvania
Customers are urged to verify the laboratory's current accreditation status
PA DEP is a NELAP recognized accreditation body

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DEPARTMENT OF ENVIRONMENTAL PROTECTION

Laboratory Scope of Accreditation

Attached to Certificate of Accreditation 010-001 expiration date November 30, 2017. This listing of accredited analytes should be used only when associated with a valid certificate of accreditation.

DEP Laboratory ID: 68-03670 **EPA Lab Code: OH00300** **TNI Code: TNI02140** **(216) 641-6000**

PADWIS ID: 03670

Northeast Ohio Regional Sewer District Analytical Services
4747 East 49th Street
Cuyahoga Heights, OH 44125

Matrix: Drinking Water

Method	Revision	Analyte	Accreditation Type	Primary	Effective Date
EPA 1603		E. coli (Enumeration)	NELAP	PA	12/16/2015
SM 9222 B		Total coliform (Enumeration)	NELAP	PA	12/16/2015

Matrix: Non-Potable Water

Method	Revision	Analyte	Accreditation Type	Primary	Effective Date
ASTM D4839-03		Total organic carbon (TOC)	NELAP	PA	11/25/2014
EPA 1000.0		Pimephales promelas	NELAP	PA	1/8/2009
EPA 1002.0		Ceriodaphnia dubia	NELAP	PA	1/8/2009
EPA 160.4		Residue, volatile	NELAP	PA	10/22/2008
EPA 1600		Enterococci	NELAP	PA	11/22/2010
EPA 1603		E. coli (Enumeration)	NELAP	PA	11/29/2007
EPA 1631	E	Mercury	NELAP	PA	3/31/2008
EPA 1664	A	Oil and grease	NELAP	PA	4/27/2015
EPA 180.1		Turbidity	NELAP	PA	12/31/2007
EPA 200.7	4.4	Aluminum	NELAP	PA	11/29/2007
EPA 200.7	4.4	Antimony	NELAP	PA	11/29/2007
EPA 200.7	4.4	Arsenic	NELAP	PA	11/29/2007
EPA 200.7	4.4	Barium	NELAP	PA	11/29/2007
EPA 200.7	4.4	Beryllium	NELAP	PA	11/29/2007
EPA 200.7	4.4	Cadmium	NELAP	PA	11/29/2007
EPA 200.7	4.4	Calcium	NELAP	PA	11/29/2007
EPA 200.7	4.4	Chromium	NELAP	PA	11/29/2007
EPA 200.7	4.4	Cobalt	NELAP	PA	11/29/2007
EPA 200.7	4.4	Copper	NELAP	PA	12/31/2007
EPA 200.7	4.4	Iron	NELAP	PA	11/29/2007
EPA 200.7	4.4	Lead	NELAP	PA	11/29/2007
EPA 200.7	4.4	Magnesium	NELAP	PA	11/17/2010
EPA 200.7	4.4	Manganese	NELAP	PA	11/29/2007
EPA 200.7	4.4	Molybdenum	NELAP	PA	11/29/2007
EPA 200.7	4.4	Nickel	NELAP	PA	11/29/2007
EPA 200.7	4.4	Potassium	NELAP	PA	12/31/2007
EPA 200.7	4.4	Selenium	NELAP	PA	11/29/2007
EPA 200.7	4.4	Silver	NELAP	PA	11/29/2007
EPA 200.7	4.4	Sodium	NELAP	PA	12/31/2007
EPA 200.7	4.4	Strontium	NELAP	PA	4/27/2015
EPA 200.7	4.4	Thallium	NELAP	PA	4/15/2014
EPA 200.7	4.4	Tin	NELAP	PA	11/29/2007

The Pennsylvania Department of Environmental Protection Laboratory Accreditation Program is a NELAP recognized Accreditation Body. Customers are urged to verify the laboratory's current accreditation standing.

www.dep.state.pa.us

Issue Date: 11/28/2016

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DEPARTMENT OF ENVIRONMENTAL PROTECTION

Laboratory Scope of Accreditation

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DEP Laboratory ID: 68-03670 **EPA Lab Code: OH00300** **TNI Code: TNI02140** **(216) 641-6000**

PADWIS ID: 03670

Matrix: Non-Potable Water

Method	Revision	Analyte	Accreditation Type	Primary	Effective Date
EPA 200.7	4.4	Titanium	NELAP	PA	11/29/2007
EPA 200.7	4.4	Vanadium	NELAP	PA	11/29/2007
EPA 200.7	4.4	Zinc	NELAP	PA	12/31/2007
EPA 200.8	5.4	Aluminum	NELAP	PA	4/27/2015
EPA 200.8	5.4	Antimony	NELAP	PA	4/27/2015
EPA 200.8	5.4	Arsenic	NELAP	PA	4/27/2015
EPA 200.8	5.4	Barium	NELAP	PA	4/27/2015
EPA 200.8	5.4	Beryllium	NELAP	PA	4/27/2015
EPA 200.8	5.4	Cadmium	NELAP	PA	4/27/2015
EPA 200.8	5.4	Calcium	NELAP	PA	12/1/2015
EPA 200.8	5.4	Chromium	NELAP	PA	4/27/2015
EPA 200.8	5.4	Cobalt	NELAP	PA	4/27/2015
EPA 200.8	5.4	Copper	NELAP	PA	4/27/2015
EPA 200.8	5.4	Iron	NELAP	PA	8/12/2015
EPA 200.8	5.4	Lead	NELAP	PA	4/27/2015
EPA 200.8	5.4	Magnesium	NELAP	PA	8/12/2015
EPA 200.8	5.4	Manganese	NELAP	PA	4/27/2015
EPA 200.8	5.4	Molybdenum	NELAP	PA	4/27/2015
EPA 200.8	5.4	Nickel	NELAP	PA	4/27/2015
EPA 200.8	5.4	Potassium	NELAP	PA	12/1/2015
EPA 200.8	5.4	Selenium	NELAP	PA	4/27/2015
EPA 200.8	5.4	Silver	NELAP	PA	4/27/2015
EPA 200.8	5.4	Sodium	NELAP	PA	12/1/2015
EPA 200.8	5.4	Strontium	NELAP	PA	12/1/2015
EPA 200.8	5.4	Thallium	NELAP	PA	4/27/2015
EPA 200.8	5.4	Tin	NELAP	PA	8/12/2015
EPA 200.8	5.4	Titanium	NELAP	PA	8/12/2015
EPA 200.8	5.4	Vanadium	NELAP	PA	4/27/2015
EPA 200.8	5.4	Zinc	NELAP	PA	4/27/2015
EPA 245.1	3.0	Mercury	NELAP	PA	11/29/2007
EPA 300.0	2.1	Bromide	NELAP	PA	11/22/2010
EPA 300.0	2.1	Chloride	NELAP	PA	11/22/2010
EPA 300.0	2.1	Fluoride	NELAP	PA	11/22/2010
EPA 300.0	2.1	Nitrate as N	NELAP	PA	11/22/2010
EPA 300.0	2.1	Nitrite as N	NELAP	PA	4/27/2015
EPA 300.0	2.1	Orthophosphate as P	NELAP	PA	11/22/2010
EPA 300.0	2.1	Sulfate	NELAP	PA	11/22/2010
EPA 3005	A	Preconcentration under acid	NELAP	PA	11/29/2007
EPA 3010	A	Hot plate acid digestion (HNO3 + HCl)	NELAP	PA	11/29/2007
EPA 3015		Microwave-assisted acid digestion	NELAP	PA	11/29/2007
EPA 310.2		Alkalinity as CaCO3	NELAP	PA	9/20/2012
EPA 350.1		Ammonia as N	NELAP	PA	11/29/2007
EPA 351.2		Kjeldahl nitrogen, total (TKN)	NELAP	PA	11/17/2010
EPA 353.2		Nitrate as N	NELAP	PA	11/29/2007
EPA 353.2		Total nitrate-nitrite	NELAP	PA	11/17/2010

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DEPARTMENT OF ENVIRONMENTAL PROTECTION

Laboratory Scope of Accreditation

Attached to Certificate of Accreditation 010-001 expiration date November 30, 2017. This listing of accredited analytes should be used only when associated with a valid certificate of accreditation.

DEP Laboratory ID: 68-03670 **EPA Lab Code: OH00300** **TNI Code: TNI02140** **(216) 641-6000**

PADWIS ID: 03670

Matrix: Non-Potable Water

Method	Revision	Analyte	Accreditation Type	Primary	Effective Date
EPA 365.1		Orthophosphate as P	NELAP	PA	12/1/2015
EPA 365.1		Phosphorus, total	NELAP	PA	10/22/2008
EPA 410.4		Chemical oxygen demand (COD)	NELAP	PA	11/29/2007
EPA 420.4		Total phenolics	NELAP	PA	11/17/2010
EPA 445		Chlorophyll A	NELAP	PA	11/22/2010
EPA 6010		Aluminum	NELAP	PA	11/29/2007
EPA 6010		Antimony	NELAP	PA	11/29/2007
EPA 6010		Arsenic	NELAP	PA	11/29/2007
EPA 6010		Barium	NELAP	PA	11/29/2007
EPA 6010		Beryllium	NELAP	PA	11/29/2007
EPA 6010		Cadmium	NELAP	PA	11/29/2007
EPA 6010		Calcium	NELAP	PA	11/29/2007
EPA 6010		Chromium	NELAP	PA	11/29/2007
EPA 6010		Cobalt	NELAP	PA	11/29/2007
EPA 6010		Copper	NELAP	PA	12/31/2007
EPA 6010		Iron	NELAP	PA	11/29/2007
EPA 6010		Lead	NELAP	PA	11/29/2007
EPA 6010		Magnesium	NELAP	PA	11/29/2007
EPA 6010		Manganese	NELAP	PA	11/29/2007
EPA 6010		Molybdenum	NELAP	PA	11/29/2007
EPA 6010		Nickel	NELAP	PA	11/29/2007
EPA 6010		Potassium	NELAP	PA	12/31/2007
EPA 6010		Selenium	NELAP	PA	11/29/2007
EPA 6010		Silver	NELAP	PA	11/29/2007
EPA 6010		Sodium	NELAP	PA	12/31/2007
EPA 6010		Thallium	NELAP	PA	4/15/2014
EPA 6010		Tin	NELAP	PA	11/29/2007
EPA 6010		Titanium	NELAP	PA	11/29/2007
EPA 6010		Vanadium	NELAP	PA	11/29/2007
EPA 6010		Zinc	NELAP	PA	12/31/2007
EPA 7470		Mercury	NELAP	PA	11/29/2007
Enterolert		Enterococci (Enumeration)	NELAP	PA	11/22/2010
Lachat 10-204-00-1X		Cyanide	NELAP	PA	12/1/2015
OIA 1677		Available cyanide	NELAP	PA	11/29/2007
SM 2540 B		Residue, total	NELAP	PA	11/29/2007
SM 2540 C		Residue, filterable (TDS)	NELAP	PA	11/29/2007
SM 2540 D		Residue, nonfilterable (TSS)	NELAP	PA	11/29/2007
SM 2540 F		Residue, settleable	NELAP	PA	11/29/2007
SM 2550 B		Temperature, deg. C	NELAP	PA	10/22/2008
SM 3500-Cr B	20-22	Chromium VI	NELAP	PA	11/29/2007
SM 4500-CN- G		Amenable cyanide	NELAP	PA	11/29/2007
SM 4500-Cl E		Total residual chlorine	NELAP	PA	11/29/2007
SM 4500-Cl- C		Chloride	NELAP	PA	11/19/2012
SM 4500-H+ B		pH	NELAP	PA	11/29/2007
SM 4500-NO2- B		Nitrite as N	NELAP	PA	11/29/2007

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DEP Laboratory ID: 68-03670 EPA Lab Code: OH00300 TNI Code: TNI02140 (216) 641-6000
PADWIS ID: 03670

Matrix: Non-Potable Water

Method	Revision	Analyte	Accreditation Type	Primary	Effective Date
SM 4500-Norg B		Kjeldahl nitrogen, total (TKN)	NELAP	PA	10/22/2008
SM 4500-P B		Preliminary treatment of phosphate samples	NELAP	PA	11/13/2013
SM 4500-P E		Orthophosphate as P	NELAP	PA	11/13/2013
SM 5210 B		Biochemical oxygen demand (BOD)	NELAP	PA	11/29/2007
SM 5210 B		Carbonaceous BOD (CBOD)	NELAP	PA	11/29/2007
SM 9222 D		Fecal coliform (Enumeration)	NELAP	PA	11/29/2007
SM 9223 Colilert MPN or QT		E. coli (Enumeration)	NELAP	PA	11/29/2007
SM 9223 Colilert MPN or QT		Total coliform (Enumeration)	NELAP	PA	11/22/2010

Matrix: Solid and Chemical Materials

Method	Revision	Analyte	Accreditation Type	Primary	Effective Date
EPA 245.1	3.0	Mercury	NELAP	PA	11/22/2010
EPA 3051		Microwave digestion of solids (HNO3 only)	NELAP	PA	11/17/2010
EPA 350.1		Ammonia as N	NELAP	PA	4/27/2015
EPA 351.2		Kjeldahl nitrogen, total (TKN)	NELAP	PA	4/27/2015
EPA 365.1		Phosphorus, total	NELAP	PA	4/27/2015
EPA 6010		Aluminum	NELAP	PA	11/22/2010
EPA 6010		Antimony	NELAP	PA	11/13/2013
EPA 6010		Arsenic	NELAP	PA	11/22/2010
EPA 6010		Barium	NELAP	PA	11/22/2010
EPA 6010		Beryllium	NELAP	PA	11/22/2010
EPA 6010		Cadmium	NELAP	PA	11/22/2010
EPA 6010		Calcium	NELAP	PA	11/22/2010
EPA 6010		Chromium	NELAP	PA	11/22/2010
EPA 6010		Cobalt	NELAP	PA	11/22/2010
EPA 6010		Copper	NELAP	PA	11/22/2010
EPA 6010		Iron	NELAP	PA	11/22/2010
EPA 6010		Lead	NELAP	PA	11/22/2010
EPA 6010		Magnesium	NELAP	PA	11/22/2010
EPA 6010		Manganese	NELAP	PA	11/22/2010
EPA 6010	B	Metals by ICP/AES	NELAP	PA	1/22/2013
EPA 6010		Molybdenum	NELAP	PA	11/22/2010
EPA 6010		Nickel	NELAP	PA	11/22/2010
EPA 6010		Potassium	NELAP	PA	11/22/2010
EPA 6010		Selenium	NELAP	PA	11/22/2010
EPA 6010		Silver	NELAP	PA	11/22/2010
EPA 6010		Sodium	NELAP	PA	11/22/2010
EPA 6010		Strontium	NELAP	PA	4/27/2015
EPA 6010		Thallium	NELAP	PA	11/22/2010
EPA 6010		Tin	NELAP	PA	4/15/2013
EPA 6010		Titanium	NELAP	PA	11/22/2010
EPA 6010		Vanadium	NELAP	PA	11/22/2010

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DEP Laboratory ID: 68-03670 **EPA Lab Code: OH00300** **TNI Code: TNI02140** **(216) 641-6000**

PADWIS ID: 03670

Matrix: Solid and Chemical Materials

Method	Revision	Analyte	Accreditation Type	Primary	Effective Date
EPA 6010		Zinc	NELAP	PA	11/22/2010

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