Level 3 Project Study Plan

2012 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, 2012 and October 31, 2012. NEORSD's Analytical Services division will perform sample analysis and the daily distribution of 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 attainment status of Euclid Creek.

(2) Non-point/Point Sources

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

A map has been provided in Appendix A to show 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, beach sand and beach morphology.

(3) Parameters Covered

Samples collected will be analyzed for *E. coli* densities as outlined by NEORSD's most current Standard Operating Procedure (SOP) for *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 the District'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. 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 Euclid Creek site (RM 0.55), and an east and west location at each of the three beaches in at least a 250 milliliter sterilized polypropylene container and up to a 2000 milliliter sterilized polypropylene container, depending on the needs of Analytical Services. A 125-milliliter plastic bottle will be used to collect a sample at each site which will be used to analyze turbidity.

Field blanks are not required by method 1603 or by the National Environmental Laboratory Accreditation Conference (NELAC) for bacteria analysis. 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 10% 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 or YSI 600XL Sonde.

Turbidity samples will be collected with a 125-milliliter container and measured using one of the following portable field turbidity meters: the Hach 2100Q; Hach 2100P Turbidimeter; LaMotte 2020 Turbidity Meter; or the Thermo Orion AQ4500 Turbidimeter. Specifications for the meters are included in Attachment 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, 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). All water samples and field parameters will be collected as specified in the District's most current *Beach Sampling* SOP (Appendix C) and *Manual of Ohio EPA Surveillance Methods and Quality Assurance Practices* (2009). On sampling days during the recreation season, bacteriological samples will be collected from an east and west location and will be analyzed separately at the laboratory. 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 storm water 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 the *Manual of Ohio EPA Surveillance Methods and Quality Assurance Practices* (2009). All samples will be analyzed using approved EPA methods as specified by Analytical Services in the most current *Quality Manual* SOP.

(5) Stream Flow Measurements

Not applicable.

(6) Sampling Locations

Two locations at Edgewater, Villa Angela and Euclid Beaches in Cleveland will be sampled for the duration of the study. One sample location is in the eastern section of each beach and the other is in the western section of each beach. An additional sample will be collected from Euclid Creek at RM 0.55. 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 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	-81.7392	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.
Edgewater Beach	West	41.4887	-81.7404	Western half of the beach. In line with the large metal pole on the other side of the freeway.		
Villa Angela Beach	East	41.5862	-81.5667	Eastern half of beach mid-distance between the 3rd and 4th break walls.		
Villa Angela Beach	West	41.5855	-81.5674	Western half of beach at the beginning of the 2nd break wall.		
Euclid Beach	East	41.5842	-81.5687	In front of the pile of stones on the east side of the beach.		
Euclid Beach	West	41.5837	-81.5695	Western half of the beach between the two break walls at the second set of stairs.		
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, 2012 and end on October 31, 2012 (Appendix F). From May 1 through May 10, bacteriological water samples from the east and west beach sites and Euclid Creek RM 0.55 will be collected four days a week (Monday through Thursday). Beginning May 14 and lasting through September 7, bacteriological water quality samples will be collected seven days a week from the east and west beach sites and Euclid Creek RM 0.55. From September 10 through October 31, bacteriological water quality sampling at the east and west beach sites will return to four days a week (Monday through

Thursday) and Euclid Creek RM 0.55 bacteriological sampling will cease, unless further sampling is deemed necessary. Samples will be collected as scheduled, unless surface water conditions are deemed unsafe or there is inadequate staffing availability. All sampling will be dependent on weather conditions.

(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 Attachment D for examples). The samples will then be delivered immediately to the NEORSD Analytical Services cooler, after which the door to the cooler will be locked and the samples will be transferred to the custody of Analytical Services. The NEORSD's Analytical Services *Quality Assurance Manual* (effective date: November 18, 2011) 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

A summary report will be prepared and sent to the ODH by Analytical Services Monday through Friday. A second internal report and the field observation sheets will be sent to personnel from NEORSD and the United States Geological Survey (USGS) by Analytical Services Monday through Friday, excluding observed holidays. The internal report will contain data from all samples collected and various parameters analyzed from the previous day. Following the completion of the project, a summary report that includes all the data collected during the study will be prepared. The summary report, along with the field observation sheets, laboratory bench sheets and chain of custody information will be sent to the ODH. Additionally, reports summarizing, interpreting, graphically presenting and discussing the bacteriological data and any excursions from water quality standards will be prepared by WQIS for internal use.

Pictures will be taken during each sampling event by the samplers to document the conditions at the beach. Copies of the *Beach Sampling Field Data Form*, pictures 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
John Rhoades*	008	4747 E. 49th St., Cuyahoga Heights, OH 44125	rhoadesj@neorsd.org	216-641-6000
Cathy Zamborsky	009	4747 E. 49th St., Cuyahoga Heights, OH 44125	zamborskyc@neorsd.org	216-641-6000
Seth Hothem	010	4747 E. 49th St., Cuyahoga Heights, OH 44125	hothems@neorsd.org	216-641-6000
Kathryn Crestani	011	4747 E. 49th St., Cuyahoga Heights, OH 44125	crestanik@neorsd.org	216-641-6000
Tom Zablotny	018	4747 E. 49th St., Cuyahoga Heights, OH 44125	zablotnyt@neorsd.org	216-641-6000
Ron Maichle**	145	4747 E. 49th St., Cuyahoga Heights, OH 44125	maichler@neorsd.org	216-641-6000
Francisco Rivera	262	4747 E. 49th St., Cuyahoga Heights, OH 44125	riveraf@neorsd.org	216-641-6000
Jillian Novak**	512	4747 E. 49th St., Cuyahoga Heights, OH 44125	novakj@neorsd.org	216-641-6000
Kristina Granlund	511	4747 E. 49th St., Cuyahoga Heights, OH 44125	granlundk@neorsd.org	216-641-6000

*Project Manager / ** Project Leader(s)

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* (Attachment 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
Nicholas Barille	4747 E. 49th St., Cuyahoga Heights, OH 44125	barillen@neorsd.org	216-641-6000
Jonathan Brauer	4747 E. 49th St., Cuyahoga Heights, OH 44125	brauerj@neorsd.org	216-641-6000
Joseph Carbonaro	4747 E. 49th St., Cuyahoga Heights, OH 44125	carbonaroj@neorsd.org	216-641-6000
Tim Dobriansky	4747 E. 49th St., Cuyahoga Heights, OH 44125	dobrianskyt@neorsd.org	216-641-6000
Kyle Frantz	4747 E. 49th St., Cuyahoga Heights, OH 44125	frantzk@neorsd.org	216-641-6000
Rae Grant	4747 E. 49th St., Cuyahoga Heights, OH 44125	grantr@neorsd.org	216-641-6000
Mark Matteson	4747 E. 49th St., Cuyahoga Heights, OH 44125	mattesonm@neorsd.org	216-641-6000
Denise Phillips	4747 E. 49th St., Cuyahoga Heights, OH 44125	phillipsd@neorsd.org	216-641-6000
Brandy Reischman	4747 E. 49th St., Cuyahoga Heights, OH 44125	reischmanb@neorsd.org	216-641-6000
Kevin Roff	4747 E. 49th St., Cuyahoga Heights, OH 44125	roffk@neorsd.org	216-641-6000
Frank Schuschu	4747 E. 49th St., Cuyahoga Heights, OH 44125	schuschuf@neorsd.org	216-641-6000
Wolfram von Kiparski	4747 E. 49th St., Cuyahoga Heights, OH 44125	vonkiparskiw@neorsd.org	216-641-6000
Kelly Boreman	4747 E. 49th St., Cuyahoga Heights, OH 44125	boremank@neorsd.org	216-641-6000
Summer Co-op	4747 E. 49th St., Cuyahoga Heights, OH 44125	To Be Determined	216-641-6000
Summer Co-op	4747 E. 49th St., Cuyahoga Heights, OH 44125	To Be Determined	216-641-6000
Summer Co-op	4747 E. 49th St., Cuyahoga Heights, OH 44125	To Be Determined	216-641-6000
Summer Co-op	4747 E. 49th St., Cuyahoga Heights, OH 44125	To Be Determined	216-641-6000
Summer Co-op	4747 E. 49th St., Cuyahoga Heights, OH 44125	To Be Determined	216-641-6000
Summer Co-op	4747 E. 49th St., Cuyahoga Heights, OH 44125	To Be Determined	216-641-6000
Summer High School Intern	4747 E. 49th St., Cuyahoga Heights, OH 44125	To Be Determined	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:

NEORSD Analytical Services
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: John W. Rhoades / _____ Date: _____

(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: John W. Rhoades / Date: _____

(16) Additional Data Type Signed Statement

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

Print/Signature: John W. Rhoades / Date: _____

(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: John W. Rhoades / Date: _____

Print/Signature: Cathy Zamborsky / Date: _____

Print/Signature: Seth Hothem / Date: _____

Print/Signature: Kathryn Crestani / Date: _____

Print/Signature: Tom Zablotny / Date: _____

Print/Signature: Ron Maichle / Date: _____

Print/Signature: Francisco Rivera / Date: _____

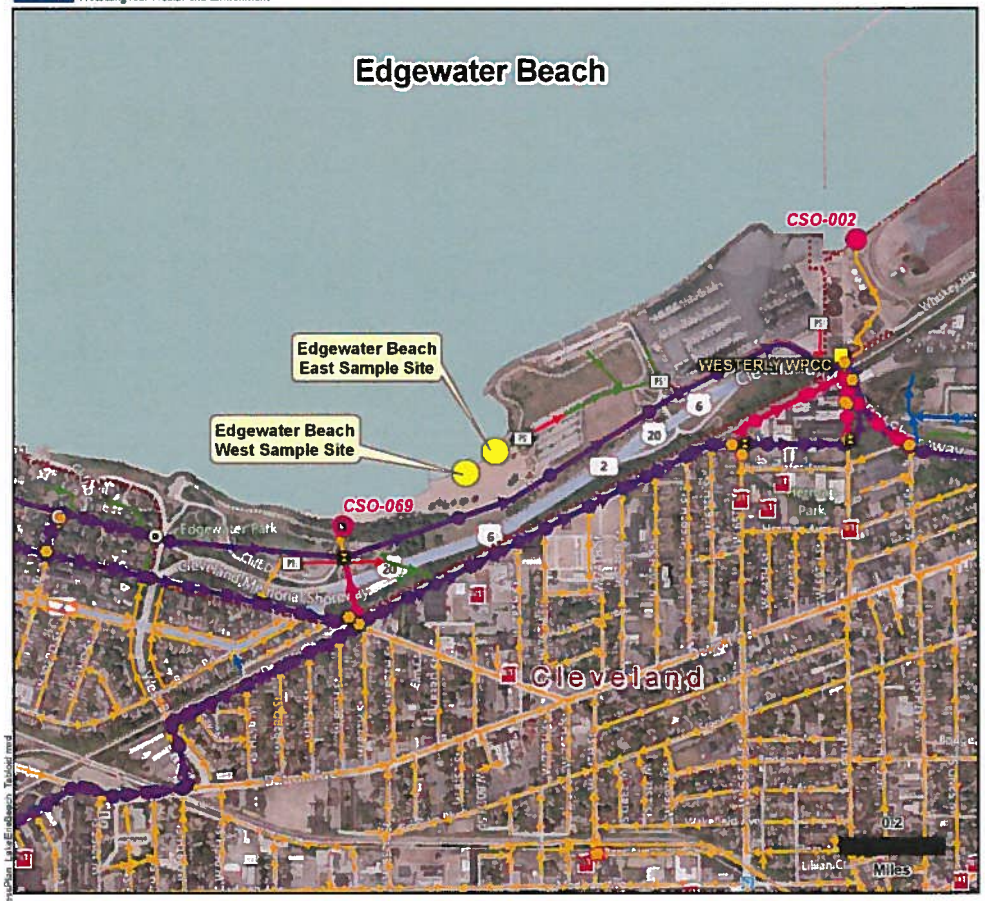
Print/Signature: Jillian Novak / Date: _____

Print/Signature: Kristina Granlund / Date: _____

Appendix A

Northeast Ohio Regional Sewer District
Protecting Your Health and Environment

2012 Lake Erie Beach Monitoring



Beach Samples
District Pump Station
District CSO Permit Point
Interceptor
CSO Responsibility
Sludge Force Main
Combined Sewer
CSO Overflow Sewer
Culverted Stream
Sanitary Sewer
Storm Sewer
Force Main
District Facility
Flow Meter
Level Monitor
Rain Gauge
N

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Appendix B

Parameter	Test	Value Reported in	Minimum Detection Limit	Practical Quantitation Limit
E. coli	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–EA016-17

Effective Date: 04/19/2012

COPY

Approvals

Prepared By: Jillian Novak Date: 4/18/12

Reviewed By Supervisor: John Rhoades Date: 04/18/12

Approved By Manager: Scott Broski Date: 4/18/12

Approved By Superintendent: Frank Foley Date: 4/18/12

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 warn 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 rain events, overflows of sewage systems, 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. Edgewater State Park- Lake Erie beach located at 6700 Cleveland Memorial Shoreway, Cleveland.

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

3.3. 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.

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

3.5. Nowcast Model- Predictive model developed by USGS to predict the water quality at Edgewater Beach.

3.6. 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.

4. Safety

4.1. Safety Equipment

4.1.1. Life jacket or inflatable safety vest (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 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 taken 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. An inflatable life vest is provided for the sampler.

4.2.7.1. Life vest must be worn if wave height is greater than 2 feet.

4.2.7.2. Use of the life vest 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.

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

5.1.2. 125 milliliter turbidity bottle

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

5.5. Field Turbidity Meter

5.5.1. HACH 2100P Turbidimeter or

5.5.2. HACH 2100Q Turbidimeter

5.5.3. LaMotte 2020 Turbidity Meter or

5.5.4. Thermo Orion AQ4500 Turbidimeter

5.6. Anemometer

5.7. Sampling pole (12 feet) with zip ties

5.8. Cooler with ice

5.9. Digital camera

5.10. GPS, if needed

5.11. Wave height stick, marked at inch and foot increments

5.12. Ziploc bags

5.13. Gloves, if desired

5.14. Hand sanitizer

5.15. Equipment needed at Edgewater only

5.15.1. Laptop computer with wireless connection
5.15.2. Water quality advisory sign keys (1C1 key)
5.15.3. Edgewater tote
5.15.3.1. Plastic graduated cylinder (100 milliliter)
5.15.3.2. Deionized water bottle (1 liter)
5.15.3.3. Kimwipes

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 Thermo Orion AQ4500 Turbidimeter.
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 LaMotte 2020e Turbidimeter.
6.1.5. Refer to the manufacturer's operations manual or user's guide for the use and calibration of the HACH 2100Q Turbidimeter.
6.1.6. 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.
6.1.7. Refer to manufacturer's operations manual or user's guide for additional information on all 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 beaches

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 330 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. **East Sample** –The East sample is taken in line with the brick stack on the other side of the freeway.

7.2.3.2. **East GPS Location**: 41.489694°N 81.739117°W

7.2.3.3. **West Sample** – The West sample is taken in line with the large metal pole that is on the other side of the freeway. This pole is lined up perpendicular to the shoreline.

7.2.3.4. **West GPS Location**: 41.488853°N 81.740519°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. **East Sample** – The East sample is taken mid-distance between the 3rd and 4th break walls.

7.2.4.2. **East GPS Locations:** 41.586242°N 81.566656°W

7.2.4.3. **West Sample** – The West sample is taken at the beginning of the 2nd break wall.

7.2.4.4. **West GPS Location:** 41.585467°N 81.567369°W

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

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

7.2.5.2. **East GPS Location:** 41.584244°N 81.568739°W

7.2.5.3. **West Sample** – The West sample is taken between the 2 break walls at the second set of stairs from the structure at Euclid Beach.

7.2.5.4. **West GPS Location:** 41.583747°N 81.569478°W

7.2.6. Euclid Creek - A sample will be taken from two locations on 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, noting the picture number on the Beach Sampling Field Data Form (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 taken)

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 125-mL bottle.

7.3.5. Once the field collection has been performed, place the sample into a Ziploc bag and place it into the portable cooler filled with ice.

7.3.6. The samples must remain in the cooler until delivered to the Sample Custodian at Analytical Services.

7.3.7. Upon returning to base, 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 the Manual of Ohio EPA Surveillance Methods and Quality Assurance Practices (2009).

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). Convert inches to feet for

use in the Edgewater NOWCAST model and entry into Lablynx. Perform the following calculation to get the wave height for the model:

[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.

7.5.3. Make an observation of water clarity using the wave height stick. The wave height stick is marked with colored tape at the 1-foot mark and at the 2-foot mark.

7.5.3.1. "Clear" indicates you can see the bottom sediment.

7.5.3.2. Water clarity is considered "low sediment" if you can only see the tape at the 1-foot mark, but not the bottom sediment.

7.5.3.3. Water clarity is considered "medium sediment" if you can only see the tape at the 2-foot mark, but not the 1-foot mark or bottom sediment.

7.5.3.4. Water clarity is considered "high sediment" if you cannot see either marked tape or bottom sediment.

7.5.4. Field parameters must be taken in the water at each sample site. Measure pH, conductivity and temperature in the water with a field meter. A turbidity sample will be taken in a 125-mL bottle and analyzed at the truck 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 wave height is over 3 feet.

7.6.4. Bacteriological sample collection

7.6.4.1. Remove the cap of a sterilized bacteriological bottle and secure the sampling bottle to the pole with at least three zip ties.

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 125-milliliter 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 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 in field for all beach sites. Analyze both the east and west sample separately for turbidity.

7.7.1.1. Turbidity analysis should take place at the truck.

7.7.1.2. 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.

8.6. If the turbidity is not measured in the field due to meter malfunction, the turbidity analysis must be completed within 1 hour of returning to EMSC (notify Project Leader or WQIS Supervisor if this occurs).

9. Additional Information

9.1. NOWCASTING Protocol for EDGEWATER

9.1.1. See Appendix 4.

9.2. Using the anemometer to measure wind speed

9.2.1. 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. (2009). *Ohio EPA manual of surveillance methods and quality assurance practices*. Columbus, OH: Divisions of Surface Water and Environmental Services.

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

10.4. USGS, Nowcasting Protocol for Edgewater, April 29, 2008.

10.5. USGS, Nowcast at Huntington and Edgewater Quality Assurance/Quality Plan 2008, April 29, 2008.

10.6. 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)

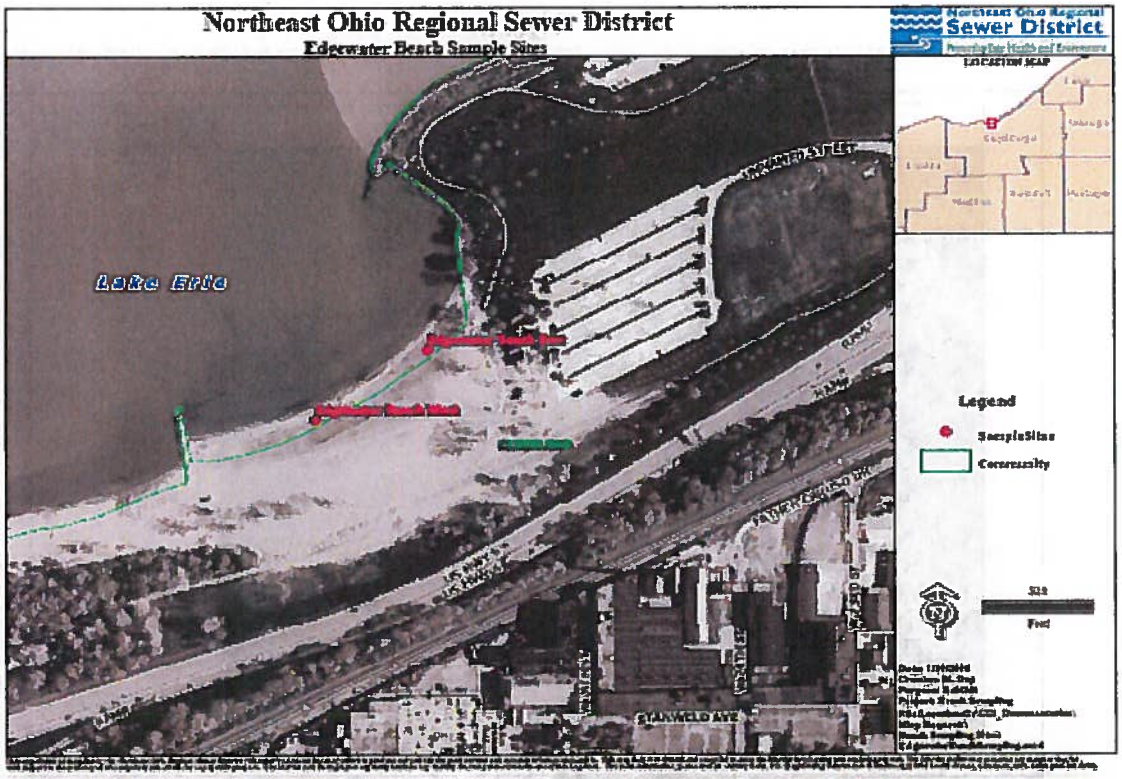
11.144. Updated Beach Observation Sheet in Appendix C with revised versions. (J. Novak 4/5/12)

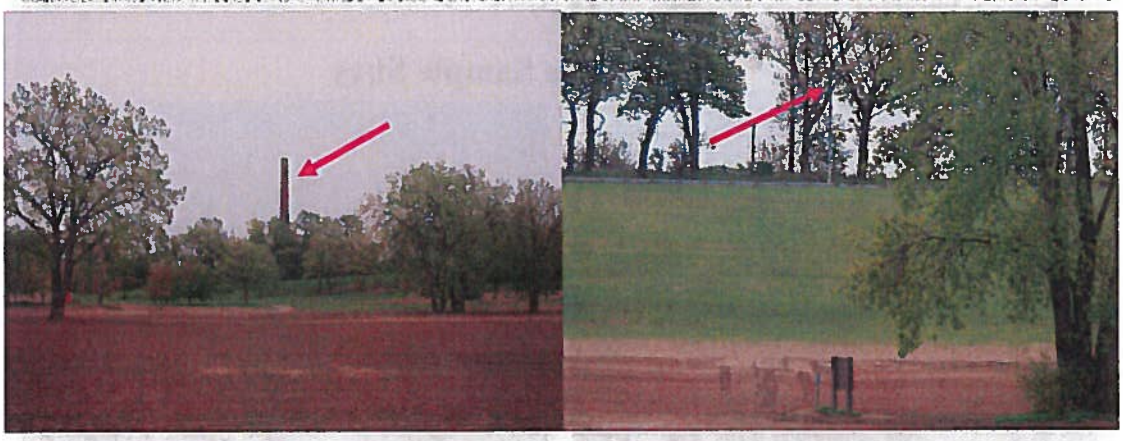
11.145. Added "250 milliliter" to Section 5.1.1. (J. Novak 4/5/12)
11.146. Replaced "Hanna pH EC/TDS" with "Hanna HI 98129" in Section 5.4.1. (J. Novak 4/5/12)
11.147. Replaced "YSI 556" with "YSI-556 MPS Multi-Parameter Water Quality Meter" in Section 5.4.3. (J. Novak 4/5/12)
11.148. Renamed Appendices 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)

APPENDIX 1

Edgewater Beach Sampling Sites



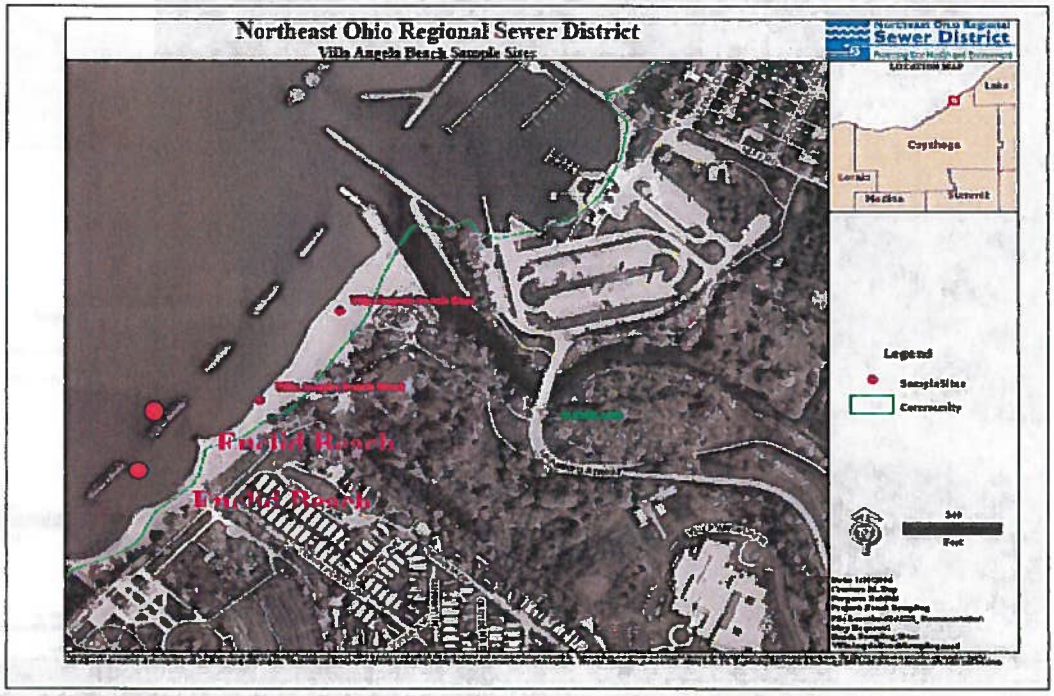


EAST SAMPLE SITE
Brick stack on other side of freeway

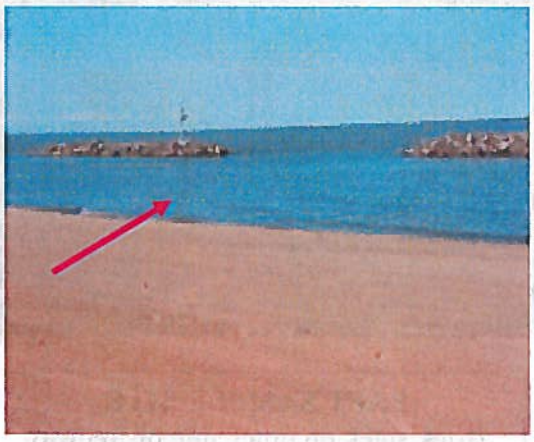
WEST SAMPLE SITE
Large metal pole on other side of the freeway

APPENDIX 2

Villa Angela Beach, Euclid Beach & Euclid Creek Sampling Sites



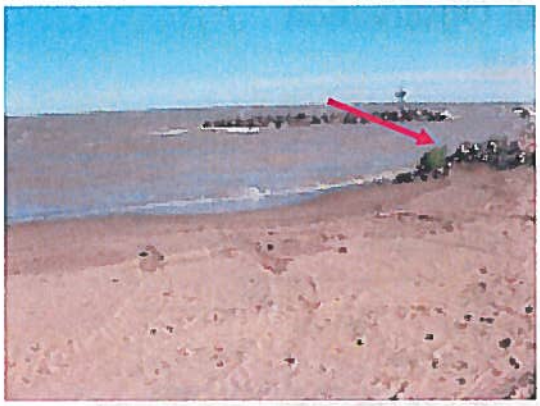
Villa Angela Sample Sites



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

WEST SAMPLE SITE
Beginning of 2nd break wall

Euclid Beach Sample Sites



EAST SAMPLE SITE
Pile of stones

WEST SAMPLE SITE
Midway between 1st and 2nd breakwalls

Euclid Creek Sample Sites

EUCLID CREEK RM 0.55
Downstream of Lakeshore Boulevard

APPENDIX 3
Example Beach Observation Sheet

NEORSD Beach Sampling Field Data Form

Location: _____ Date: _____ Collectors: _____

Weather: Clear Partly Cloudy Overcast Light Rain/Showers Heavy Rain
Steady Rain Heavy Snow Melt Other: _____

Wind Direction: _____ Wind Speed Max: _____ Average: _____

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

Pictures: Overall: _____ Central: _____ West: _____ East: _____

Water Quality Meters Used: _____ Total Number of Swimmers: _____

Time (hrs): _____ Site: _____

Water-
Color: Clear Muddy Tea Milky Other: _____
Clarity: Clear Low Sediment Med Sed. High Sed. Algae Other: _____
Odor: Normal Petroleum Anaerobic Sewage Chemical Other: _____
Surface Coating: None Foam Oily Scum Other: _____
Algae: 1. None 2. Some 3. Visible Floating 4. Thick Layer 5. Multiple Thick Layers
Debris: 1. None 2. Some 3. Visible Floating 4. Thick Layer 5. Multiple Thick Layers
Fecal Material: 1. None 2. Sparse 3. Some 4. Some Multiple Areas 5. All Along Shoreline
Lake Surface Condition: Calm Ripples Moderate Waves Whitecaps Other: _____

Field Parameters: Conductivity (µmhos/cm): _____ Temperature (°C): _____
Turbidity (NTU): 1) _____ 2) _____ Avg. Turbidity: _____ pH (s.u.): _____
Wave Height (inches): Max (+): _____ Min (-): _____ Total: _____
Other-
Number of Birds: Geese: _____ Gulls: _____ Other: _____ Total: _____
General Comments: _____

(Label Here)
Sample ID:

Time (hrs): _____ Site: _____

Water-
Color: Clear Muddy Tea Milky Other: _____
Clarity: Clear Low Sediment Med Sed. High Sed. Algae Other: _____
Odor: Normal Petroleum Anaerobic Sewage Chemical Other: _____
Surface Coating: None Foam Oily Scum Other: _____
Algae: 1. None 2. Some 3. Visible Floating 4. Thick Layer 5. Multiple Thick Layers
Debris: 1. None 2. Some 3. Visible Floating 4. Thick Layer 5. Multiple Thick Layers
Fecal Material: 1. None 2. Sparse 3. Some 4. Some Multiple Areas 5. All Along Shoreline
Lake Surface Condition: Calm Ripples Moderate Waves Whitecaps Other: _____

Field Parameters: Conductivity (µmhos/cm): _____ Temperature (°C): _____
Turbidity (NTU): 1) _____ 2) _____ Avg. Turbidity: _____ pH (s.u.): _____
Wave Height (inches): Max (+): _____ Min (-): _____ Total: _____
Other-
Number of Birds: Geese: _____ Gulls: _____ Other: _____ Total: _____
General Comments: _____

(Label Here)
Sample ID:

Edgewater Model Parameters:
Avg. of East & West Turbidity (NTU): _____ East Site Temperature (°F): _____
Avg. Wave Height (feet): _____ *or Backup* Estimated Average Wave Height: _____
Radar Rain (in): 24 hrs: _____ 48 hrs: _____ *or Backup* NWS Rain (in) 24 hrs: _____ 48 hrs: _____
Predicted E. coli CFU/100mL: _____ Lower: _____ Upper: _____ Probability >235: _____
(Radar RainFall - May 1-June 15 ≥ 27%, June 16- Aug 10 ≥ 28%, Aug 11-Sep 15 ≥ 31%)
NOWCAST: GOOD / POOR
(Hopkins RainFall - May 1 - Sep 15 ≥ 30%)
BEACH POSTED? GOOD / POOR

Modified May 3, 2010

APPENDIX 4
Nowcasting Protocol for Edgewater Beach

1. Collect all beach data
   A. Follow most current Beach Sampling *SOP—EA0013-00.*

2. Set up computer
   A. Insert Sprint card into laptop.
   B. Power ON.
   C. Log on using information on sticker (bottom left of keyboard).
      i. Make sure ***Workstation Only*** is checked.
   D. Connect to internet using Sprint PCS shortcut on laptop desktop.
      i. Click ***GO*** when Sprint PCS window says ***Connected***.

3. Check Email OR Internet to obtain rainfall data
   A. Open **Edgewater Beach Folder** on laptop desktop.
   B. Open GroupWise and login.
   C. Check for email from radarner@usgs.gov for 24 and 48 hour total rainfall and record onto Beach Sampling Field Data Form.
   D. Exit email.

   <u>If no rainfall email was received from USGS:</u>

   A. Open **Edgewater Beach Folder** on laptop desktop.
   B. Open NWS Rainfall link.
   C. For 24 hour data, add up the numbers in the 6 hour column from 8:51AM yesterday to 7:51AM today.
   D. For 48 hour data, add up the numbers in the 6 hour column from 8:51AM the day ***before*** yesterday to 7:51AM today.
   E. Check ***backup*** box on Beach Sampling Field Data Form.

4. Wave Height
   A. Convert wave height to feet.
   B. If wave height cannot be determined using measuring stick, estimate wave height.
      i. Check ***backup*** box on Beach Sampling Field Data Form.

5. Obtain turbidity data
   A. Follow the most current Turbidity SOP.
   B. Use the average of east and west turbidity values.

6. Run model
    A. Open **Edgewater Beach Folder** on laptop desktop.
    B. Open **Edgewater Model 2011.**
    C. Enter model parameters from the Beach Sampling Field Data Form.
    D. When asked if radar rainfall was used, enter ***Y*** if USGS email was received or ***N*** if email was not received and NWS rainfall was used.
    E. Record lower, upper, predicted and probability *E. coli* densities on the Beach Sampling Field Data Form.
    F. Based on probability percentage and season, determine NOWCAST posting and check appropriate box on field sheet.
    G. If problems with the model arise, call John Rhoades at 216-641-6000 ext. 2219.
    H. Close model and proceed to NOWCAST website.

7. NOWCAST
    A. Open **Edgewater Beach Folder** on laptop desktop.
    B. Open NOWCAST website link.
    C. Click on ***Edgewater Beach*** on right-hand side of page.
    D. Click on ***Login*** under "Data Upload" at bottom of page.
    E. Enter in login information:
        Username: neorsd
        Password: mark2011
    F. Click ***Add Record***.
    G. Enter data
        i. Use collection time from the east sample.
        ii. Enter in field parameters (convert water temperature to °F).
        iii. Enter the predicted *E. coli* density in the *E. coli* box.
        iv. Rain at Hopkins= NWS data; Radar Rain= USGS email.
        v. Enter predicted water quality, probability and advisory.
        vi. Enter any relevant notes and initials of model runner into the **Notes** section.
        vii. Click ***ADD***.
    H. Review information and click edit/modify if anything needs to be changed.

8. Update NEORSD website
    A. Open **Edgewater Beach Folder** on laptop desktop.
    B. Double-click the NEORSD link. (http://www.neorsd.org/beach_chk.php)
    C. Enter your NEORSD personal login information.

D. Double-click NEORSD link in the **Edgewater Beach Folder** again. (http://www.neorsd.org/beach_chk.php)
E. Check appropriate water quality box (*Good* or *Poor*) and click ***Submit***.
F. Return to NEORSD homepage to review your submission.

9. Update NOWCAST Information Line (must be done at Edgewater Beach, after NOWCAST website is updated and after NOWCAST prediction for Huntington is posted)

A. From cell phone
   i. Call **216-881-6600**.
   ii. Ask for extension **6890**.
   iii. Dial **6003** and press #.
   iv. Enter password **13581** and press #.
   v. Press **3** to administer a new greeting.
   vi. Press **3** again to activate a new greeting.
   vii. Enter one of the numbered options (**1-7**) to change the greeting for the day (see below).

B. From an EMSC phone
   i. Press **Audix/Voicemail** button on phone (or dial **6890**).
   ii. Dial **6003** and press #.
   iii. Enter password **13581** and press #.
   iv. Press **3** to administer new greeting.
   v. Press **3** to activate new greeting.
   vi. Enter one of the numbered options (**1-7**) to change the greeting for the day (see below).

Option Selection Number	**Edgewater Conditions**	**Huntington Conditions**	**Message Text (see below)**
1	Good	Good	A
2	Good	Poor	B
3	Poor	Good	C
4	Poor	Poor	D
5	Good	Not Available	E
6	Not Available	Not Available	F
7	Record special message for the day		G

Note: If greeting is same as previous day, message does not need to be updated.

Message Text (what caller will hear):

A "Today's nowcast prediction for water quality at **Edgewater is Good**. Today's nowcast prediction for **Huntington is Good**. Be aware that water quality can quickly change from Good to Poor in response to rain and wind storm conditions."

B "Today's nowcast prediction for water quality at **Edgewater is Good**. Today's nowcast prediction for **Huntington is Poor**. A nowcast prediction of Poor means that bacteria levels are likely to be high. Swimming is not advised, especially for children, the elderly and those in ill health. Full body water contact may result in illness. Be aware that water quality can quickly change from Good to Poor in response to rain and wind storm conditions."

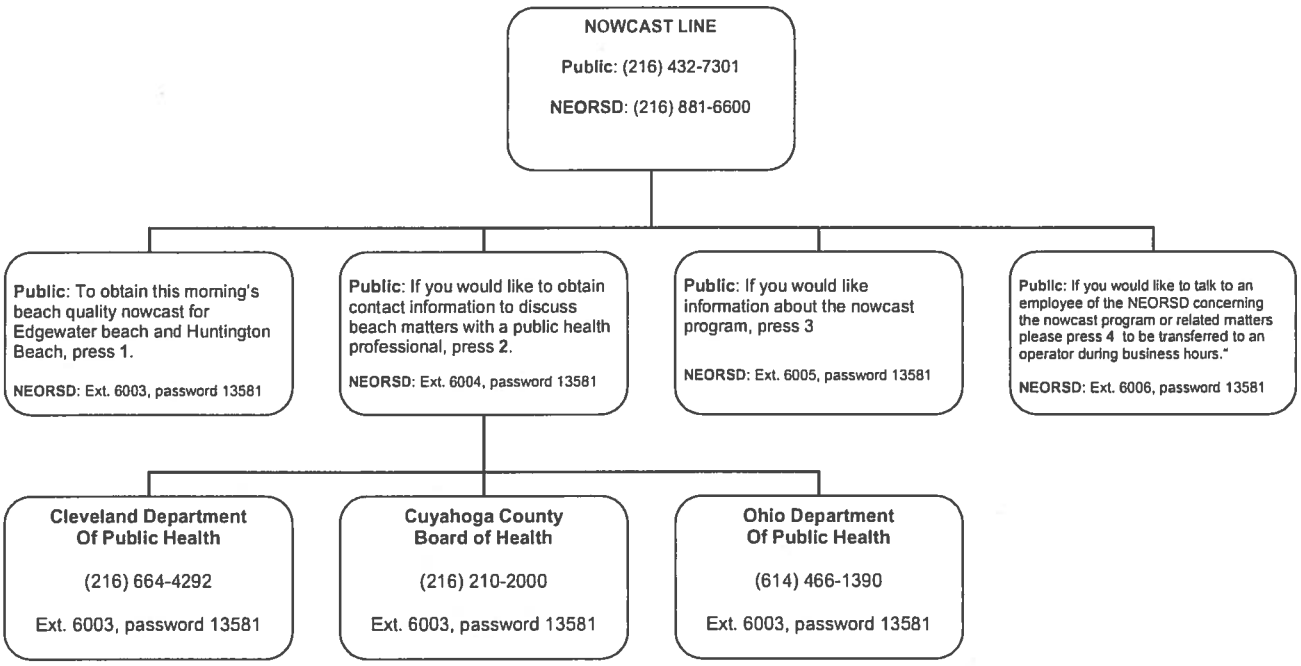
C "Today's nowcast prediction for water quality at **Edgewater is Poor**. Today's nowcast prediction for **Huntington is Good**. A nowcast prediction of Poor means that bacteria levels are likely to be high. Swimming is not advised, especially for children, the elderly and those in ill health. Full body water contact may result in illness. Be aware that water quality can quickly change from Good to Poor in response to rain and wind storm conditions."

D "Today's nowcast prediction for water quality at **Edgewater is Poor**. Today's nowcast prediction for **Huntington is Poor**. A nowcast prediction of Poor means that bacteria levels are likely to be high. Swimming is not advised, especially for children, the elderly and those in ill health. Full body water contact may result in illness."

E "Today's nowcast prediction for water quality at **Edgewater is Good**. There is **no prediction available for Huntington Beach**. Be aware that water quality can quickly change from Good to Poor in response to rain and wind storm conditions."

F "Due to technical problems, we are unable to provide nowcast services today."

G This option would allow for the creation (recording) of a special message for unusual circumstances.


NOWCAST LINE
Public: (216) 432-7301
NEORSD: (216) 881-6600
Public: To obtain this morning's beach quality nowcast for Edgewater beach and Huntington Beach, press 1.
NEORSD: Ext. 6003, password 13581
Public: If you would like to obtain contact information to discuss beach matters with a public health professional, press 2.
NEORSD: Ext. 6004, password 13581
Public: If you would like information about the nowcast program, press 3
NEORSD: Ext. 6005, password 13581
Public: If you would like to talk to an employee of the NEORSD concerning the nowcast program or related matters please press 4 to be transferred to an operator during business hours."
NEORSD: Ext. 6006, password 13581
Cleveland Department Of Public Health
(216) 664-4292
Ext. 6003, password 13581
Cuyahoga County Board of Health
(216) 210-2000
Ext. 6003, password 13581
Ohio Department Of Public Health
(614) 466-1390
Ext. 6003, password 13581

Appendix D

NEORSD Edgewater Beach Sampling Field Data Form

Location: _____ Date: _____ Collectors: _____

Weather: Clear Partly Cloudy Overcast Light Rain/Showers Heavy Rain
Steady Rain Heavy Snow Melt Other: _____

Wind Direction (°): _____ Wind Speed Max: _____ Average: _____ Air Temp (°C): _____

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

Pictures: Overall: _____ West: _____ East: _____

Water Quality Meters Used: _____ Total Number of Swimmers: _____

Time (hrs): _____ Site: _____

Water-

Color: Clear Muddy Tea Milky Other: _____
Clarity: Clear Low Sediment Med Sed. High Sed. Algae Other: _____
Odor: Normal Petroleum Anaerobic Sewage Chemical Other: _____
Surface Coating: None Foam Oily Scum Other: _____
Algae: 1. None 2. Some 3. Visible Floating 4. Thick Layer 5. Multiple Thick Layers
Debris: 1. None 2. Some 3. Visible Floating 4. Thick Layer 5. Multiple Thick Layers
Fecal Material: 1. None 2. Sparse 3. Some 4. Some Multiple Areas 5. All Along Shoreline
Lake Surface Condition: Calm Ripples Moderate Waves Whitecaps Other: _____
Field Parameters: Conductivity (µmhos/cm): _____ Temperature (°C): _____
Turbidity (NTU): 1) _____ 2) _____ Avg. Turbidity: _____ pH (s.u.): _____
Wave Height (inches): Max (+): _____ Min (-): _____ Total: _____
Other- Total (ft): _____
Number of Birds: Geese: _____ Gulls: _____ Other: _____ Total: _____
General Comments: _____

(Label Here)

Sample ID:

Time (hrs): _____ Site: _____

Water-

Color: Clear Muddy Tea Milky Other: _____
Clarity: Clear Low Sediment Med Sed. High Sed. Algae Other: _____
Odor: Normal Petroleum Anaerobic Sewage Chemical Other: _____
Surface Coating: None Foam Oily Scum Other: _____
Algae: 1. None 2. Some 3. Visible Floating 4. Thick Layer 5. Multiple Thick Layers
Debris: 1. None 2. Some 3. Visible Floating 4. Thick Layer 5. Multiple Thick Layers
Fecal Material: 1. None 2. Sparse 3. Some 4. Some Multiple Areas 5. All Along Shoreline
Lake Surface Condition: Calm Ripples Moderate Waves Whitecaps Other: _____
Field Parameters: Conductivity (µmhos/cm): _____ Temperature (°C): _____
Turbidity (NTU): 1) _____ 2) _____ Avg. Turbidity: _____ pH (s.u.): _____
Wave Height (inches): Max (+): _____ Min (-): _____ Total: _____
Other- Total (ft): _____
Number of Birds: Geese: _____ Gulls: _____ Other: _____ Total: _____
General Comments: _____

(Label Here)

Sample ID:

Edgewater Model Parameters:

Avg. East Turbidity (NTU): _____ Avg. West Turbidity (NTU): _____ East Site Temperature (°F): _____

Avg. Wave Height (feet): _____ *or Backup* Estimated Average Wave Height: _____

Radar Rain (in): 24 hrs: _____ 48 hrs: _____ *or Backup* NWS Rain (in) 24 hrs: _____ 48 hrs: _____

Predicted E. coli CFU/100mL: _____ Lower: _____ Upper: _____ Probability >235: _____

(Radar Rainfall - May 1-June 15 ≥ 28%; June 16- Aug 10 ≥ 32%; Aug 11-Sep 15 ≥ 30%) NOWCAST: GOOD / POOR

(Hopkins Rainfall - May 1 - Sep 15 ≥ 30%) BEACH POSTED? GOOD / POOR

Modified January 25, 2012

NEORSD Villa/Euclid Beach Sampling Field Data Form

Location: _____ Date: _____ Collectors: _____

Weather: Clear Partly Cloudy Overcast Light Rain/Showers Heavy Rain
Steady Rain Heavy Snow Melt Other: _____

Wind Direction (°): _____ Wind Speed Max: _____ Average: _____ Air Temp (°C): _____

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

Pictures: Overall: _____ West: _____ East: _____

Water Quality Meters Used: _____ Total Number of Swimmers: _____

Time (hrs): _____ Site: _____

Water-

Color: Clear Muddy Tea Milky Other: _____

Clarity: Clear Low Sediment Med Sed. High Sed. Algae Other: _____

Odor: Normal Petroleum Anaerobic Sewage Chemical Other: _____

Surface Coating: None Foam Oily Scum Other: _____

Algae: 1. None 2. Some 3. Visible Floating 4. Thick Layer 5. Multiple Thick Layers

Debris: 1. None 2. Some 3. Visible Floating 4. Thick Layer 5. Multiple Thick Layers

Fecal Material: 1. None 2. Sparse 3. Some 4. Some Multiple Areas 5. All Along Shoreline

Lake Surface Condition: Calm Ripples Moderate Waves Whitecaps Other: _____

Field Parameters: Conductivity (µmhos/cm): _____ Temperature (°C): _____

Turbidity (NTU): 1) _____ 2) _____ Avg. Turbidity: _____ pH (s.u.): _____

Wave Height (inches): Max (+): _____ Min (-): _____ Total: _____

Other- Total (ft): _____

Number of Birds: Geese: _____ Gulls: Other: Total: _____

Sand Erosion Factor (ft): _____

Wave Run-up (ft): _____ **Swash Zone (ft):** _____

Long Shore Current Velocity (ft/sec): _____ (32.8ft ÷ time in sec) **Sand Moisture (%H20):** _____

General Comments: _____

(Label Here)

Sample ID:

Time (hrs): _____ Site: _____

Water-

Color: Clear Muddy Tea Milky Other: _____

Clarity: Clear Low Sediment Med Sed. High Sed. Algae Other: _____

Odor: Normal Petroleum Anaerobic Sewage Chemical Other: _____

Surface Coating: None Foam Oily Scum Other: _____

Algae: 1. None 2. Some 3. Visible Floating 4. Thick Layer 5. Multiple Thick Layers

Debris: 1. None 2. Some 3. Visible Floating 4. Thick Layer 5. Multiple Thick Layers

Fecal Material: 1. None 2. Sparse 3. Some 4. Some Multiple Areas 5. All Along Shoreline

Lake Surface Condition: Calm Ripples Moderate Waves Whitecaps Other: _____

Field Parameters: Conductivity (µmhos/cm): _____ Temperature (°C): _____

Turbidity (NTU): 1) _____ 2) _____ Avg. Turbidity: _____ pH (s.u.): _____

Wave Height (inches): Max (+): _____ Min (-): _____ Total: _____

Other- Total (ft): _____

Number of Birds: Geese: _____ Gulls: Other: Total: _____

Sand Erosion Factor (ft): _____

Wave Run-up (ft): _____ **Swash Zone (ft):** _____

Long Shore Current Velocity (ft/sec): _____ (32.8ft ÷ time in sec) **Sand Moisture (%H20):** _____

General Comments: _____

(Label Here)

Sample ID:

Additional Comments:

NEORSD Euclid Creek Sampling Field Data Form

Location: _____ Date: _____ Collectors: _____

Weather: Clear Partly Cloudy Overcast Light Rain/Showers Heavy Rain
Steady Rain Heavy Snow Melt Other: _____

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

Pictures: RM 0.55: _____ Flow Direction (+/-): _____

Water Quality Meters Used: _____

Time (hrs): _____ Site: _____

Water-

Color: Clear Muddy Tea Milky Other: _____

Clarity: Clear Low Sediment Med Sed. High Sed. Algae Other: _____

Odor: Normal Petroleum Anaerobic Sewage Chemical Other: _____

Surface Coating: None Foam Oily Scum Other: _____

Algae: 1. None 2. Some 3. Visible Floating 4. Thick Layer 5. Multiple Thick Layers

Debris: 1. None 2. Some 3. Visible Floating 4. Thick Layer 5. Multiple Thick Layers

Fecal Material: 1. None 2. Sparse 3. Some 4. Some Multiple Areas 5. All Along Shoreline

Field Parameters: Conductivity (µmhos/cm): _____ Temperature (°C): _____

Turbidity (NTU): 1) _____ 2) _____ Avg. Turbidity: _____ pH (s.u.): _____

Other-

Number of Birds: Geese: _____ Gulls: _____ Other: _____ Total: _____

General Comments: _____

(Label Here)

Sample ID:

Additional Comments:

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.)

Y S I Environmental

YSI 556 Multiparameter System

Versatile, multiparameter handheld instrument

The 556 has multiple language capabilities and graphing!

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

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.

Pure Data for a Healthy Planet.®

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

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ISO 9001
ISO 14001

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 lenth (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.

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ISO 9001
ISO 14001
Yellow Springs Ohio Facility

CE

*Sensors with the ETV logo were submitted to the ETV program on the NAVFACELIN. Information on the performance characteristics of YSI water quality sensors can be found at www.epa.gov/etv, or call YSI at 800 897 4151 for the ETV verification report. Use of the ETV name or logo does not imply approval or certification of this product nor does it make any explicit or implied warranties or guarantees as to product performance.

YSI Incorporated
Who's Minding the Planet?

YSI 600XL & 600XLM Sensor Specifications

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

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

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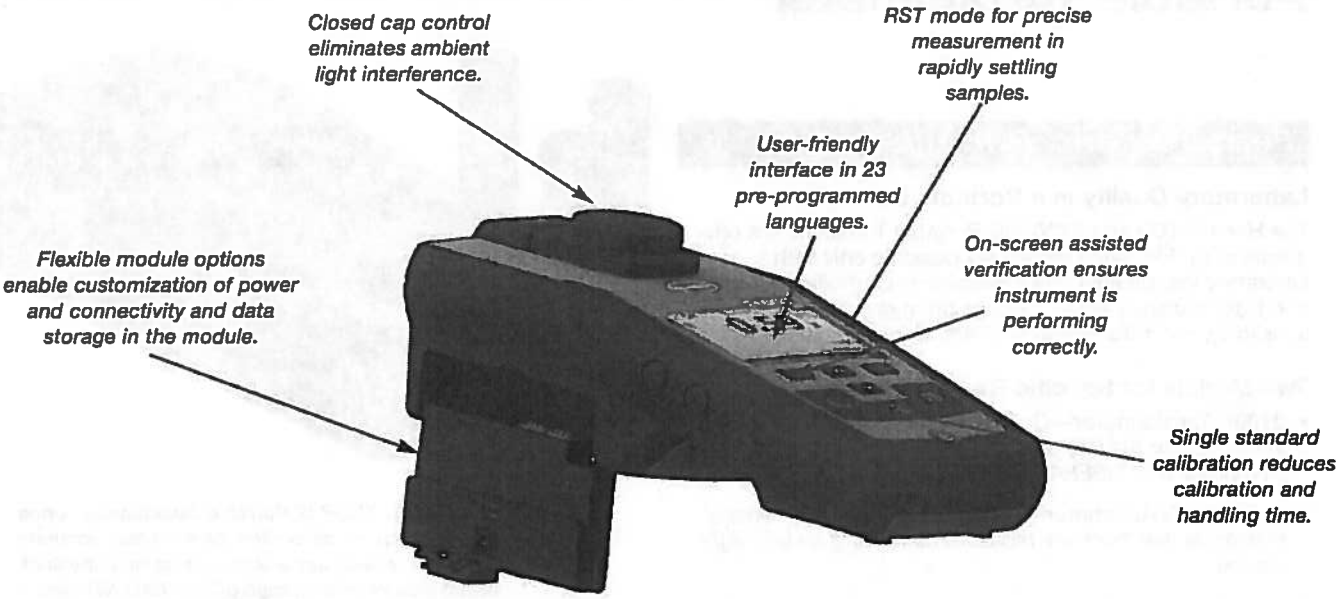
Key Features



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

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.

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.

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

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2020we & 2020wi Portable Turbidity Meters

The Clear Choice for Turbidity Measurement!

Industry-leading precision, sensitivity, and dependability in one of the most innovative handheld meters available on the market!

- **Waterproof** to IP67
- Lithium rechargeable battery
- USB port
- 7 languages
- Backlit display
- EPA and ISO versions

2020we Complies with USEPA 180.1 Standard

2020wi Complies with ISO 7027 Standard

Kit supplied with 0, 1, and 10 NTU standard, sample bottle, 4 sample tubes, USB cable, USB computer/wall adapter, and waterproof carrying case.

Order Codes	
1970-EPA	**2020we Kit:** Portable turbidity meter complies with USEPA 180.1 Standard
1970-ISO	**2020wi Kit:** Portable turbidity meter complies with ISO 7027 Standard

Turbidity Specifications Meter Features Order Codes

Turbidity Specifications:	
Unit of Measure:	2020we: NTU, AU, ASBC, EBC 2020wi: FNU, FAU, ASBC, EBC
Range:*	0-4000 NTU/FNU, 0-10,500 ASBC, 0-150 EBC
Resolution:*	0.01 NTU/FNU 10.00-10.99 0.1 NTU/FNU 11.00-109.9 1 NTU/FNU 110-4000
Accuracy:*	From 0-2.5 NTU the accuracy is ±0.05 NTU From 2.5-100 NTU the accuracy is ±2% From 100 NTU the accuracy is ±3%
Detection Limit:	0.05 NTU/FNU
Range Selection:	Automatic
Reproducibility:*	0.02 NTU/FNU or 1%
Light Source:	Tungsten (EPA) complies with EPA 180.1 Standard 860 LED (ISO) complies with ISO 7027

**Over 600 NTU/FNU units expressed as AU/FAU*

Water Quality Turbidity Meter

Orion AQUAfast AQ4500 Turbidimeter

Thermo Electron introduces the Orion AQ4500 Turbidimeter which offers advanced features not available on any other benchtop or portable turbidimeter. The AQ4500 offers a dual source LED which allows readings that comply with both EPA 180.1 and ISO 7027. Turbidity can be read in the range of 0 - 1,000 NTU with a choice of units: NTU, FTU, FNU, ASBC, and EBC. In the range of 0 - 40 NTU the AQ4500 offers a ratiometric range which will give EPA, GLI method 2 equivalent numbers. This portable field unit is truly IP67 waterproof with typical battery life of over 1000 hours on one set of batteries and datalog capacity of 100 points which can later be downloaded to a printer or computer. The AQ4500 accepts 24 mm cuvettes and comes with a two year warranty.

FEATURES

- **Nephelometric and Ratiometric measurements with Autoranging**
- **Data log capacity of up to 100 data points**
- **Readings in the range of 0 - 1000 NTU with a choice of units:**
  NTU, FTU, FNU, ASBC, or EBC
- **Includes Turbidity Standards kit, rugged carrying case, and replacement cuvettes**
- **Orion AQ4500 is truly IP67 waterproof to a depth of 3 meters**

SPECIFICATIONS

Type	Turbidity Meter
Principle of Operation	Nepeholmetric
Operating Modes	Automatic
Measurement Modes	Automatic
Ranges	
NTU	0 - 2000
Nephelometric	0 - 4000
EPA	0 - 4000 NTU
ISO - NEPH (7027)	0 - 150 FNU
ISO - ABSB	40 - 4000 FAU
IR RATIO	0 - 4000 NTU
EBC	0 - 24.5
ASBC	0 - 236
Accuracy	± 2% of reading plus 0.01 NTU (0 - 500 NTU)
	± 3% of reading (500 - 1000 NTU)
	± 5% of reading (1000 - 2000 NTU)
Resolution	0.01 NTU (0 - 9.99)
	0.1 NTU (10 -99.9)
	1 NTU (100 - 1000)

Repeatability	± 1% of reading or 0.01 NTU
Response Time	< 8 seconds
Calibration	1, 10, 100, 1000 NTU
Signal Averaging	Yes
Sample Cell Size	24 mm
Sample Size	~12 mL
Display	Custom LED
RTC	Yes
Input/Output	RS-232 Serial Port
Power	Battery - four AA's (2,500 hours Alkaline, 10, 000 lithium)
Environmental Conditions	
Operating Temperature	-40° to 140°F (-40° to -60°C)
Humidity	90% RH at 30.0C max
Light Source	White, IR
Warranty	2 years
Weight	8 lbs (3.63 kg)
Safety Rating	UL, CSA, CE, FCC

CALL GEOTECH TODAY (800) 833-7958

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Appendix F

2012 Sampling Schedule

		Edgewater Beach		Villa Angela Beach		Euclid Beach		
Day	Date	East	West	East	West	East	West	RM 0.55
Tuesday	5/1/2012	O	O	O	O	O	O	O
Wednesday	5/2/2012	O	O	O	O	O	O	O
Thursday	5/3/2012	O	O	O	O	O	O	O
Friday	5/4/2012							
Saturday	5/5/2012							
Sunday	5/6/2012							
Monday	5/7/2012	O	O	O	O	O	O	O
Tuesday	5/8/2012	O	O	O	O	O	O	O
Wednesday	5/9/2012	O	O	O	O	O	O	O
Thursday	5/10/2012	O	O	O	O	O	O	O
Friday	5/11/2012							
Saturday	5/12/2012							
Sunday	5/13/2012							
Monday	5/14/2012	O	O	O	O	O	O	O
Tuesday	5/15/2012	O	O	O	O	O	O	O
Wednesday	5/16/2012	O	O	O	O	O	O	O
Thursday	5/17/2012	O	O	O	O	O	O	O
Friday	5/18/2012	O	O	O	O	O	O	O
Saturday	5/19/2012	O	O	O	O	O	O	O
Sunday	5/20/2012	O	O	O	O	O	O	O
Monday	5/21/2012	O	O	O	O	O	O	O
Tuesday	5/22/2012	O	O	O	O	O	O	O
Wednesday	5/23/2012	O	O	O	O	O	O	O
Thursday	5/24/2012	O	O	O	O	O	O	O
Friday	5/25/2012	O	O	O	O	O	O	O
Saturday	5/26/2012	O	O	O	O	O	O	O
Sunday	5/27/2012	O	O	O	O	O	O	O
Monday	5/28/2012	O	O	O	O	O	O	O
Tuesday	5/29/2012	O	O	O	O	O	O	O
Wednesday	5/30/2012	O	O	O	O	O	O	O
Thursday	5/31/2012	O	O	O	O	O	O	O
Friday	6/1/2012	O	O	O	O	O	O	O
Saturday	6/2/2012	O	O	O	O	O	O	O
Sunday	6/3/2012	O	O	O	O	O	O	O
Monday	6/4/2012	O	O	O	O	O	O	O
Tuesday	6/5/2012	O	O	O	O	O	O	O
Wednesday	6/6/2012	O	O	O	O	O	O	O
Thursday	6/7/2012	O	O	O	O	O	O	O
Friday	6/8/2012	O	O	O	O	O	O	O
Saturday	6/9/2012	O	O	O	O	O	O	O
Sunday	6/10/2012	O	O	O	O	O	O	O
Monday	6/11/2012	O	O	O	O	O	O	O
Tuesday	6/12/2012	O	O	O	O	O	O	O
Wednesday	6/13/2012	O	O	O	O	O	O	O
Thursday	6/14/2012	O	O	O	O	O	O	O
Friday	6/15/2012	O	O	O	O	O	O	O
Saturday	6/16/2012	O	O	O	O	O	O	O
Sunday	6/17/2012	O	O	O	O	O	O	O

		Edgewater Beach		Villa Angela Beach		Euclid Beach		
Day	Date	East	West	East	West	East	West	RM 0.55
Monday	6/18/2012	O	O	O	O	O	O	O
Tuesday	6/19/2012	O	O	O	O	O	O	O
Wednesday	6/20/2012	O	O	O	O	O	O	O
Thursday	6/21/2012	O	O	O	O	O	O	O
Friday	6/22/2012	O	O	O	O	O	O	O
Saturday	6/23/2012	O	O	O	O	O	O	O
Sunday	6/24/2012	O	O	O	O	O	O	O
Monday	6/25/2012	O	O	O	O	O	O	O
Tuesday	6/26/2012	O	O	O	O	O	O	O
Wednesday	6/27/2012	O	O	O	O	O	O	O
Thursday	6/28/2012	O	O	O	O	O	O	O
Friday	6/29/2012	O	O	O	O	O	O	O
Saturday	6/30/2012	O	O	O	O	O	O	O
Sunday	7/1/2012	O	O	O	O	O	O	O
Monday	7/2/2012	O	O	O	O	O	O	O
Tuesday	7/3/2012	O	O	O	O	O	O	O
Wednesday	7/4/2012	O	O	O	O	O	O	O
Thursday	7/5/2012	O	O	O	O	O	O	O
Friday	7/6/2012	O	O	O	O	O	O	O
Saturday	7/7/2012	O	O	O	O	O	O	O
Sunday	7/8/2012	O	O	O	O	O	O	O
Monday	7/9/2012	O	O	O	O	O	O	O
Tuesday	7/10/2012	O	O	O	O	O	O	O
Wednesday	7/11/2012	O	O	O	O	O	O	O
Thursday	7/12/2012	O	O	O	O	O	O	O
Friday	7/13/2012	O	O	O	O	O	O	O
Saturday	7/14/2012	O	O	O	O	O	O	O
Sunday	7/15/2012	O	O	O	O	O	O	O
Monday	7/16/2012	O	O	O	O	O	O	O
Tuesday	7/17/2012	O	O	O	O	O	O	O
Wednesday	7/18/2012	O	O	O	O	O	O	O
Thursday	7/19/2012	O	O	O	O	O	O	O
Friday	7/20/2012	O	O	O	O	O	O	O
Saturday	7/21/2012	O	O	O	O	O	O	O
Sunday	7/22/2012	O	O	O	O	O	O	O
Monday	7/23/2012	O	O	O	O	O	O	O
Tuesday	7/24/2012	O	O	O	O	O	O	O
Wednesday	7/25/2012	O	O	O	O	O	O	O
Thursday	7/26/2012	O	O	O	O	O	O	O
Friday	7/27/2012	O	O	O	O	O	O	O
Saturday	7/28/2012	O	O	O	O	O	O	O
Sunday	7/29/2012	O	O	O	O	O	O	O
Monday	7/30/2012	O	O	O	O	O	O	O
Tuesday	7/31/2012	O	O	O	O	O	O	O
Wednesday	8/1/2012	O	O	O	O	O	O	O
Thursday	8/2/2012	O	O	O	O	O	O	O
Friday	8/3/2012	O	O	O	O	O	O	O
Saturday	8/4/2012	O	O	O	O	O	O	O
Sunday	8/5/2012	O	O	O	O	O	O	O
Monday	8/6/2012	O	O	O	O	O	O	O

		Edgewater Beach		Villa Angela Beach		Euclid Beach		
Day	Date	East	West	East	West	East	West	RM 0.55
Tuesday	8/7/2012	O	O	O	O	O	O	O
Wednesday	8/8/2012	O	O	O	O	O	O	O
Thursday	8/9/2012	O	O	O	O	O	O	O
Friday	8/10/2012	O	O	O	O	O	O	O
Saturday	8/11/2012	O	O	O	O	O	O	O
Sunday	8/12/2012	O	O	O	O	O	O	O
Monday	8/13/2012	O	O	O	O	O	O	O
Tuesday	8/14/2012	O	O	O	O	O	O	O
Wednesday	8/15/2012	O	O	O	O	O	O	O
Thursday	8/16/2012	O	O	O	O	O	O	O
Friday	8/17/2012	O	O	O	O	O	O	O
Saturday	8/18/2012	O	O	O	O	O	O	O
Sunday	8/19/2012	O	O	O	O	O	O	O
Monday	8/20/2012	O	O	O	O	O	O	O
Tuesday	8/21/2012	O	O	O	O	O	O	O
Wednesday	8/22/2012	O	O	O	O	O	O	O
Thursday	8/23/2012	O	O	O	O	O	O	O
Friday	8/24/2012	O	O	O	O	O	O	O
Saturday	8/25/2012	O	O	O	O	O	O	O
Sunday	8/26/2012	O	O	O	O	O	O	O
Monday	8/27/2012	O	O	O	O	O	O	O
Tuesday	8/28/2012	O	O	O	O	O	O	O
Wednesday	8/29/2012	O	O	O	O	O	O	O
Thursday	8/30/2012	O	O	O	O	O	O	O
Friday	8/31/2012	O	O	O	O	O	O	O
Saturday	9/1/2012	O	O	O	O	O	O	O
Sunday	9/2/2012	O	O	O	O	O	O	O
Monday	9/3/2012	O	O	O	O	O	O	O
Tuesday	9/4/2012	O	O	O	O	O	O	O
Wednesday	9/5/2012	O	O	O	O	O	O	O
Thursday	9/6/2012	O	O	O	O	O	O	O
Friday	9/7/2012	O	O	O	O	O	O	O
Saturday	9/8/2012							
Sunday	9/9/2012							
Monday	9/10/2012	O	O	O	O	O	O	
Tuesday	9/11/2012	O	O	O	O	O	O	
Wednesday	9/12/2012	O	O	O	O	O	O	
Thursday	9/13/2012	O	O	O	O	O	O	
Friday	9/14/2012							
Saturday	9/15/2012							
Sunday	9/16/2012							
Monday	9/17/2012	O	O	O	O	O	O	
Tuesday	9/18/2012	O	O	O	O	O	O	
Wednesday	9/19/2012	O	O	O	O	O	O	
Thursday	9/20/2012	O	O	O	O	O	O	
Friday	9/21/2012							
Saturday	9/22/2012							
Sunday	9/23/2012							
Monday	9/24/2012	O	O	O	O	O	O	
Tuesday	9/25/2012	O	O	O	O	O	O	

		Edgewater Beach		Villa Angela Beach		Euclid Beach		
Day	Date	East	West	East	West	East	West	RM 0.55
Wednesday	9/26/2012	O	O	O	O	O	O	
Thursday	9/27/2012	O	O	O	O	O	O	
Friday	9/28/2012							
Saturday	9/29/2012							
Sunday	9/30/2012							
Monday	10/1/2012	O	O	O	O	O	O	
Tuesday	10/2/2012	O	O	O	O	O	O	
Wednesday	10/3/2012	O	O	O	O	O	O	
Thursday	10/4/2012	O	O	O	O	O	O	
Friday	10/5/2012							
Saturday	10/6/2012							
Sunday	10/7/2012							
Monday	10/8/2012	O	O	O	O	O	O	
Tuesday	10/9/2012	O	O	O	O	O	O	
Wednesday	10/10/2012	O	O	O	O	O	O	
Thursday	10/11/2012	O	O	O	O	O	O	
Friday	10/12/2012							
Saturday	10/13/2012							
Sunday	10/14/2012							
Monday	10/15/2012	O	O	O	O	O	O	
Tuesday	10/16/2012	O	O	O	O	O	O	
Wednesday	10/17/2012	O	O	O	O	O	O	
Thursday	10/18/2012	O	O	O	O	O	O	
Friday	10/19/2012							
Saturday	10/20/2012							
Sunday	10/21/2012							
Monday	10/22/2012	O	O	O	O	O	O	
Tuesday	10/23/2012	O	O	O	O	O	O	
Wednesday	10/24/2012	O	O	O	O	O	O	
Thursday	10/25/2012	O	O	O	O	O	O	
Friday	10/26/2012							
Saturday	10/27/2012							
Sunday	10/28/2012							
Monday	10/29/2012	O	O	O	O	O	O	
Tuesday	10/30/2012	O	O	O	O	O	O	
Wednesday	10/31/2012	O	O	O	O	O	O	

O= Bacteriological Sampling

Shading= No Sampling

Appendix G

Beach Training

Signature: _____ Project Manager: _____

	Yes	No	Initials	Date
Method Review				
1. Review "2012 Lake Erie Bacteriological Sampling of Edgewater, Villa Angela and Euclid Beaches."				
2. Review "Beach Sampling" SOP.				
3. Review all 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 "Image and File Upload for Beach Project" SOP.				
8. Review "NRS Compact Throw Bag Usage" 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 and upload images to computer.				
3. Can scan beach observation sheets.				
4. Can transfer images and beach sheets to J:\ drive.				
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 East and West sites.				
2. Uses proper sample bottles and technique to sample.				
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. Uses buddy system.				
LabLynx Skills				
1. Can log in field parameters and approve.				
2. Adds water quality advisory to "Flag" column (only for Edgewater).				

Revised 12/22/11 JN

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)				
2. Sterile bacti bottles (enough for all sites being sampled)				
3. Sample tags				
4. Bottles for turbidity samples				
5. pH/Conductivity/Temp meter				
6. Turbidity meter				
7. Wind aenometer				
8. Wave height stick				
9. Digital camera				
10. Cooler with ice				
11. Ziploc bags				
12. Laptop (Edgewater crew only)				
13. Edgewater tote with supplies (Edgewater crew only)				
Method Review	**Yes**	**No**	**Initials**	**Date**
1. Samplers obtained samples at appropriate sites.				
East				
West				
Creek (RM 0.55)				
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 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.				
3. Can use digital camera and upload images to computer.				
4. Can scan beach observation sheets.				
5. Can transfer images and beach sheets to J:\ drive.				
6. Can check and use turbidity meter.				
7. Can use wind anemometer to measure wind speed.				
8. Can use wave height stick to measure wave height.				
LabLynx Skills	**Yes**	**No**	**Initials**	**Date**
1. Can enter field parameters and approve.				
2. Adds water quality advisory to "Flag" column (only for Edgewater).				
Edgewater NOWCAST Model	**Yes**	**No**	**Initials**	**Date**
1. Can access email for 24 and 48 hour rainfall.				
2. Obtains Hopkins Rainfall from internet.				
3. Can plug in appropriate parameters into the model.				
4. Can post to the NOWCAST website.				
5. Updates NEORSD phone line (if needed).				
6. Updates NEORSD internet page to reflect forecast.				
7. Changes signs at beach to GOOD or POOR as appropriate.				

Comments:

Appendix I

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

OFFICE OF FIELD OPERATIONS
BUREAU OF LABORATORIES

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 Laboratory Accreditation
(27 Pa. C.S. §§4101-4113) and the
National Environmental Laboratory Accreditation Conference Standard

is hereby approved as an

Accredited Laboratory

As more fully described in the attached Scope of Accreditation

Expiration Date: **11/30/2012**
Certificate Number: **005**

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

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

1500-FM-LAB0016 Rev. 8/2009

Pennsylvania Department of Environmental Protection

Laboratory Scope of Accreditation

Attachment to Certificate of Accreditation 005, expiration date November 30, 2012. This listing of accredited analytes should be used only when associated with a valid certificate of accreditation.

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

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

Program Non-Potable Water

Method	Analyte	Accreditation Type	Primary	Effective Date
ASTM D4839-03	Total organic carbon (TOC)	NELAP	PA	11/17/2010
Colilert QT (SM 9223 B 20th Ed)	E. coli (Enumeration)	NELAP	PA	11/29/2007
Colilert QT (SM 9223 B 20th Ed)	Total coliform (Enumeration)	NELAP	PA	11/22/2010
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	Mercury	NELAP	PA	3/31/2008
EPA 1664 Rev A	Oil and grease	NELAP	PA	11/29/2007
EPA 180.1	Turbidity	NELAP	PA	12/31/2007
EPA 200.7	Aluminum	NELAP	PA	11/29/2007
EPA 200.7	Antimony	NELAP	PA	11/29/2007
EPA 200.7	Arsenic	NELAP	PA	11/29/2007
EPA 200.7	Barium	NELAP	PA	11/29/2007
EPA 200.7	Beryllium	NELAP	PA	11/29/2007
EPA 200.7	Cadmium	NELAP	PA	11/29/2007
EPA 200.7	Calcium	NELAP	PA	11/29/2007
EPA 200.7	Chromium	NELAP	PA	11/29/2007
EPA 200.7	Cobalt	NELAP	PA	11/29/2007
EPA 200.7	Copper	NELAP	PA	12/31/2007
EPA 200.7	Iron	NELAP	PA	11/29/2007
EPA 200.7	Lead	NELAP	PA	11/29/2007
EPA 200.7	Magnesium	NELAP	PA	11/17/2010
EPA 200.7	Manganese	NELAP	PA	11/29/2007
EPA 200.7	Molybdenum	NELAP	PA	11/29/2007
EPA 200.7	Nickel	NELAP	PA	11/29/2007
EPA 200.7	Potassium	NELAP	PA	12/31/2007
EPA 200.7	Selenium	NELAP	PA	11/29/2007
EPA 200.7	Silver	NELAP	PA	11/29/2007
EPA 200.7	Sodium	NELAP	PA	12/31/2007
EPA 200.7	Thallium	NELAP	PA	11/29/2007
EPA 200.7	Tin	NELAP	PA	11/29/2007
EPA 200.7	Titanium	NELAP	PA	11/29/2007
EPA 200.7	Vanadium	NELAP	PA	11/29/2007
EPA 200.7	Zinc	NELAP	PA	12/31/2007

Attachment to Certificate of Accreditation 005, expiration date November 30, 2012. This listing of accredited analytes should be used only when associated with a valid certificate of accreditation.

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

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

Program Non-Potable Water

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 245.1	Mercury	NELAP	PA	11/29/2007
EPA 300.0	Bromide	NELAP	PA	11/22/2010
EPA 300.0	Chloride	NELAP	PA	11/22/2010
EPA 300.0	Fluoride	NELAP	PA	11/22/2010
EPA 300.0	Nitrate as N	NELAP	PA	11/22/2010
EPA 300.0	Nitrite as N	NELAP	PA	11/22/2010
EPA 300.0	Orthophosphate as P	NELAP	PA	11/22/2010
EPA 300.0	Sulfate	NELAP	PA	11/22/2010
EPA 3005A	Preconcentration under acid	NELAP	PA	11/29/2007
EPA 3010A	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	11/17/2010
EPA 325.2	Chloride	NELAP	PA	11/17/2010
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
EPA 365.1	Orthophosphate as P	NELAP	PA	11/29/2007
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 6010B	Aluminum	NELAP	PA	11/29/2007
EPA 6010B	Antimony	NELAP	PA	11/29/2007
EPA 6010B	Arsenic	NELAP	PA	11/29/2007
EPA 6010B	Barium	NELAP	PA	11/29/2007
EPA 6010B	Beryllium	NELAP	PA	11/29/2007
EPA 6010B	Cadmium	NELAP	PA	11/29/2007
EPA 6010B	Calcium	NELAP	PA	11/29/2007
EPA 6010B	Chromium	NELAP	PA	11/29/2007
EPA 6010B	Cobalt	NELAP	PA	11/29/2007
EPA 6010B	Copper	NELAP	PA	12/31/2007
EPA 6010B	Iron	NELAP	PA	11/29/2007
EPA 6010B	Lead	NELAP	PA	11/29/2007
EPA 6010B	Magnesium	NELAP	PA	11/29/2007
EPA 6010B	Manganese	NELAP	PA	11/29/2007

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

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

Program Non-Potable Water

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 6010B	Molybdenum	NELAP	PA	11/29/2007
EPA 6010B	Nickel	NELAP	PA	11/29/2007
EPA 6010B	Potassium	NELAP	PA	12/31/2007
EPA 6010B	Selenium	NELAP	PA	11/29/2007
EPA 6010B	Silver	NELAP	PA	11/29/2007
EPA 6010B	Sodium	NELAP	PA	12/31/2007
EPA 6010B	Thallium	NELAP	PA	11/29/2007
EPA 6010B	Tin	NELAP	PA	11/29/2007
EPA 6010B	Titanium	NELAP	PA	11/29/2007
EPA 6010B	Vanadium	NELAP	PA	11/29/2007
EPA 6010B	Zinc	NELAP	PA	12/31/2007
EPA 7470	Mercury	NELAP	PA	11/29/2007
Enterolert	Enterococci (Enumeration)	NELAP	PA	11/22/2010
HACH 8048	Orthophosphate as P	NELAP	PA	11/22/2010
Lachat 10-204-00-1X	Cyanide	NELAP	PA	11/17/2010
OIA 1677	Available (free) cyanide	NELAP	PA	11/29/2007
SM 2340 B	Total hardness as CaCO3	NELAP	PA	10/22/2008
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 (20th ed.)	Chromium VI	NELAP	PA	11/29/2007
SM 4500-CN- C	Cyanide distillation	NELAP	PA	10/22/2008
SM 4500-CN- E	Total cyanide	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-H+ B	pH	NELAP	PA	11/29/2007
SM 4500-NO2- B	Nitrite as N	NELAP	PA	11/29/2007
SM 4500-Norg B	Kjeldahl nitrogen, total (TKN)	NELAP	PA	10/22/2008
SM 4500-S D	Sulfide	NELAP	PA	11/22/2010
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 B	Total coliform (Enumeration)	NELAP	PA	11/22/2010
SM 9222 D	Fecal coliform (Enumeration)	NELAP	PA	11/29/2007
SM 9222 D	Fecal coliforms with chlorine present (Enumeration)	NELAP	PA	10/22/2008

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

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

Program Solid and Chemical Materials

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 245.1	Mercury	NELAP	PA	11/22/2010
EPA 3051	Microwave digestion of solids (HNO3 only)	NELAP	PA	11/17/2010
EPA 6010B	Aluminum	NELAP	PA	11/22/2010
EPA 6010B	Antimony	NELAP	PA	11/22/2010
EPA 6010B	Arsenic	NELAP	PA	11/22/2010
EPA 6010B	Barium	NELAP	PA	11/22/2010
EPA 6010B	Beryllium	NELAP	PA	11/22/2010
EPA 6010B	Boron	NELAP	PA	11/22/2010
EPA 6010B	Cadmium	NELAP	PA	11/22/2010
EPA 6010B	Calcium	NELAP	PA	11/22/2010
EPA 6010B	Chromium	NELAP	PA	11/22/2010
EPA 6010B	Cobalt	NELAP	PA	11/22/2010
EPA 6010B	Copper	NELAP	PA	11/22/2010
EPA 6010B	Iron	NELAP	PA	11/22/2010
EPA 6010B	Lead	NELAP	PA	11/22/2010
EPA 6010B	Magnesium	NELAP	PA	11/22/2010
EPA 6010B	Manganese	NELAP	PA	11/22/2010
EPA 6010B	Molybdenum	NELAP	PA	11/22/2010
EPA 6010B	Nickel	NELAP	PA	11/22/2010
EPA 6010B	Potassium	NELAP	PA	11/22/2010
EPA 6010B	Selenium	NELAP	PA	11/22/2010
EPA 6010B	Silver	NELAP	PA	11/22/2010
EPA 6010B	Sodium	NELAP	PA	11/22/2010
EPA 6010B	Thallium	NELAP	PA	11/22/2010
EPA 6010B	Titanium	NELAP	PA	11/22/2010
EPA 6010B	Vanadium	NELAP	PA	11/22/2010
EPA 6010B	Zinc	NELAP	PA	11/22/2010