

Level 3 Project Study Plan

2010 Lake Erie Bacteriological Sampling of Edgewater, Euclid and Villa Angela Beaches

(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. Additionally, the study also addresses CSO Minimum Control #9, which requires monitoring to effectively characterize CSO impacts and the efficacy of CSO controls.

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* 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 at these three beaches throughout the recreation season. This sampling will be conducted by the NEORSD's Water Quality and Industrial Surveillance (WQIS) department and will occur from May 3, 2010 through October 28, 2010, weather permitting. NEORSD's Analytical Services department will oversee all testing of samples and the daily distribution of results. The data obtained from this sampling will be reported to the Ohio Department of Health (ODH) and may be 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 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. Additionally, NEORSD will assist the United States Geological Survey (USGS) in research and development of alternative methods for prediction of *E. coli* densities. This will include assisting in the use of the NOWCAST system to predict water quality at Edgewater Beach. The NOWCAST system is a model that has been developed and modified over the past four years. The model uses real-time field conditions to predict water quality.

(2) Non-point/Point Sources

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

A map has been provided in Attachment 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 include precipitation, wind, wave action, sand and beach morphology.

(3) Parameters

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. In addition, a field assessment of the beach will be conducted. Observations such as number of swimmers and birds, minimum/maximum wave height (or category), average and maximum wind speed and direction, water color, clarity, odor and surface coating, lake surface conditions, and weather conditions will be recorded on a *Beach Sampling Field Data Form* (refer to Attachment B).

(4) Field Collection and Data Assessment Techniques

Individual water samples will be collected from an east and west location at each of the three beaches and Euclid Creek in a 1-liter sterilized polypropylene container.

From June 7, 2010 to August 27, 2010, NEORSD plans to collect samples from Villa Angela and Euclid Beaches and Euclid Creek in an 8-liter sterilized polypropylene container in support of a collaborative research effort with Northeastern Ohio Universities Colleges of Medicine and Pharmacy (NEOUCOM) on rapid microbial detection methods. Of each 8-liter sample, 1 liter will be aliquoted in order for NEORSD Analytical Services to carry out the beach monitoring detailed in this study plan. The remaining 7 liters will be given to NEOUCOM for their research, which is not covered under this study plan. Sample collection at Edgewater Beach will not change during the NEOUCOM sampling. However, this research on rapid microbial detection methods with

NEOUCOM is dependent upon funding from the Great Lakes Restoration Initiative. A copy of the proposed sampling plan is available upon request. Should funding not be available, regular bacteriological sampling and field collection with a 1-liter sterilized bacteriological container will continue. One field blank will be collected once a month from a randomly selected beach.

All samples will be collected as grab samples where the total depth of water at each location is approximately three feet. If weather conditions prevent the sampler from wading out to a depth of three feet, a sampling pole will be used to collect the sample and/or wave height will be estimated from the shore. Refer to section 7.5 of Attachment B for an explanation of sample collection during inclement weather. The sample will be taken approximately 6-12 inches below the surface, as stated in the most current *Beach Sampling SOP* (see Attachment B). At the time of collection, field parameters will be measured directly in the lake or creek. Field analyses will include the use of a Hanna HI 98129 meter to measure pH, water temperature and conductivity. If necessary, a YSI-556 MPS Multi-Parameter Water Quality Meter or YSI 600XL Sonde may also be used to measure field parameters. Specifications for these meters are included in Attachment C. Turbidity will be measured for each sample at each beach and Euclid Creek. At Edgewater Beach, turbidity analysis will be conducted in the field using a portable field turbidity meter. The arithmetic average of the turbidity measurements will be used as a variable in the NOWCAST model. Turbidity analysis at Villa Angela and Euclid Beaches and Euclid Creek will be performed in the laboratory.

Notes and observations pertaining to the beach and water conditions will be recorded using the NEORSD *Beach Sampling Field Data Form* included in the most current *Beach Sampling SOP* (see Attachment B). All water samples and field parameters will be collected as specified in the most current NEORSD *Beach Sampling SOP* (see Attachment B), *The Ohio Department of Health, Ohio Bathing Beach Monitoring Program Quality Assurance Project Plan, April 2009*, (effective dates of 9/29/08-9/28/11) and *Manual of Ohio EPA Surveillance Methods and Quality Assurance* (2009). On sampling days during the recreation season, water samples will be collected from an east and west location and will be analyzed separately at the laboratory. Additionally, once a week, a portion of the east and west samples will be combined at the laboratory to serve as an integrated grab sample and analyzed as a single sample. The laboratory will report the arithmetic mean of the east and west sample to the ODH for a daily assessment of bathing water quality. The ODH will use this data to determine whether a beach advisory posting should occur. All sample results, except for those from the arithmetic mean and integrated grab samples, will be compared to the Ohio Water Quality Standards to determine whether any exceedances of the applicable water quality criteria have occurred.

NEORSD will use a predictive model developed by USGS to predict the bacteriological water quality at Edgewater Beach. The model uses water quality variables expected to affect *E. coli* densities including turbidity, wave height, water temperature, and rainfall. Upon entering a combination of these variables, the model calculates the probability that the *E. coli* densities will exceed the bathing water quality criteria. Water quality variables and results from the model are entered onto the NOWCAST Website located at <http://www.ohionowcast.info>.

Research and Source Tracking Work

An integrated grab sample will be obtained by combining aliquots from the samples collected from the east and west sampling locations from each beach. These samples will be combined at the laboratory into a single sample for each beach. The combined and east and west samples will be analyzed for *E. coli* by membrane filtration. The results obtained from the integrated grab sample and individual samples (east and west) at Edgewater, Villa Angela and Euclid Beaches will be compared and analyzed statistically to evaluate whether integrated grab samples continue to provide a realistic representation of the water quality. Past data has indicated that an integrated grab sample does provide a realistic representation of water quality, while reducing analytical cost, utilizing culture based methods.

As part of an analytical study by NEORSD, a portion of the east and west grab samples from Edgewater, Villa Angela and Euclid Beaches, will be prepared for Quantitative Polymerase Chain Reaction (qPCR) Monday through Friday. The research work will compare results obtained from the qPCR analysis and the membrane filtration method to determine the correlation between methodologies and determine the viability of the rapid methods.

Additionally, once a week, a portion of the integrated grab samples will also be analyzed using qPCR technology. The qPCR analysis of the integrated grab samples and the east and west grab samples will be compared to determine if a correlation exists between the different sampling types, similar to that seen with the culture based method comparison.

NEORSD will take additional samples at Edgewater Beach in the event of a discharge from CSO 069 (Permit Number 3PA0002069), in accordance with its Emergency Response Plan. CSO 069 (41.487253N/81.744972W) 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 in the event of a CSO discharge. These samples will be

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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. Further sampling locations may be added depending upon environmental conditions. An outline for actions and sampling during a discharge at CSO 069 is located in 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* (2009). All samples will be analyzed using approved EPA methods as specified by Analytical Services in the most current *Quality Manual SOP*.

(5) 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 east section at each beach and the other is in the west section at each beach. Additional samples will be collected from two locations on Euclid Creek at river miles (RM) 0.55 and 0.14. The following table details the sampling locations. Additional pictures and maps can be found in Attachment B.

Location	Site	Latitude	Longitude	Description	Quadrangle	Purpose
Edgewater Beach	East	N41.4893°	W81.7392°	Eastern half of the beach. In line with the brick stack on the other side of the freeway	Cleveland South	Public notification of water quality conditions at bathing beaches, determination of water quality standards attainment, determination of the impact of point and non-point sources
Edgewater Beach	West	N41.4887°	W81.7404°	Western half of the beach. In line with the large metal pole that is on the other side of the freeway.	Cleveland South	
Villa Angela Beach	East	N41.5851°	W81.5677°	Eastern half of beach mid-distance between the 3 rd and 4 th break walls.	East Cleveland	
Villa Angela Beach	West	N41.5861°	W81.5667°	Western half of beach at the beginning of the 2 nd break wall.	East Cleveland	
Euclid Beach	East	N41.5843°	W81.5686°	Eastern half of beach in line with the East side of the pile of stones on the beach.	East Cleveland	
Euclid Beach	West	N41.5838°	W81.5694	Western half of the beach between the two breakwalls at the second set of stairs from the structure at Euclid Beach	East Cleveland	
Euclid Creek	RM 0.55	N41.5831°	W81.5594°	Downstream of Lakeshore Boulevard.	East Cleveland	
Euclid Creek	RM 0.14	N41.5854°	W81.5641°	Downstream of Wildwood Bridge.	East Cleveland	

(6) Schedule

Beach monitoring is expected to begin on May 3, 2010 and end on October 28, 2010 (Attachment D). From May 3rd through May 13th water samples from the beach sites will be collected four days a week (Monday through Thursday). Beginning May 17th and lasting through September 10th, water quality samples will be collected seven days a week. From September 13th through October 28th water quality sampling will return to four days a week (Monday through Thursday). The two sites on Euclid Creek will be sampled daily, five times a week (Monday through Friday) from May 31st through September 10th. So that sample duplication does not occur at RM 0.55 on Euclid Creek during this study and the “2010 NEORS D Euclid Creek Environmental Monitoring Study” environmental assessment personnel will collect the sample at this site (during the biological field season) and the beach crew will be responsible for collecting the other water quality sample at RM 0.14 on Euclid Creek. Once sampling is finished for the “2010 NEORS D Euclid Creek Environmental Monitoring Study,” the beach crew will resume sampling at RM 0.55 on Euclid Creek. Samples will be collected as scheduled, unless surface water conditions are deemed unsafe. All sampling will be dependent on weather conditions.

(7) QA/QC

Field Collection and Measurements

Water 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 QDC log book and on the *Beach Sampling Field Data Form*. The samples will then be delivered immediately to the NEORS D 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 NEORS D Analytical Services Quality Manual and associated Standard Operating Procedures 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.

Laboratory Tests

Detailed quality control procedures are outlined in the laboratory’s analytical SOPs. Quality assurance activities are outlined in the laboratory’s Quality Manual. One duplicate sample will be analyzed per batch on a daily basis for *E.*

coli analysis using the membrane filtration method. Poor duplication indicates the need for additional training and monitoring by an Analytical Services supervisor. Since the test does not allow for re-analysis, results will be accepted based on method performance and the results will be averaged.

All analysts performing the membrane filtration technique go through an extensive hands-on training. Training includes reviewing the SOP, shadowing another analyst, setting up samples and reading plate results under supervision. After training, the analysts will complete a demonstration of capability by performing the test on externally purchased performance standards. Analysts will not be permitted to perform the test until demonstration of capabilities is shown. Monthly analyst variability will be measured by having multiple analysts enumerate the colonies on the same plate. The values obtained from the multiple readings must be within 10% of all of the analyst counts. Failure to meet performance levels of these samples will result in initiation of a corrective action to determine and eliminate any deficiencies.

(8) Work Products

A summary report will be prepared and sent to the ODH by Analytical Services Monday through Friday before 3:00 pm. This report will contain the arithmetic mean of the east and west samples for each beach. A copy of this report is included as Attachment E. A second internal report and the field observation sheets will be sent to personnel from NEORSD and the USGS by Analytical Services Monday through Friday before 4:30 pm. This internal report will contain the data from all samples collected and various parameters analyzed for the previous day. A copy of this report is included as Attachment E. Following the completion of the project, a summary report that includes all the data collected during the study will be prepared by Analytical Services. This 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 Analytical Services and WQIS for internal use.

Pictures will be taken during each sampling event by the samplers to document the conditions at the beach. These pictures will be stored electronically and posted on NEORSD's intranet website. Copies of the field observation sheets, daily reports, and pictures will be also stored electronically. Additionally, field observations will also be entered into the Laboratory Information Management Systems (LIMS).

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Results obtained from the east and west locations for Edgewater, Villa Angela and Euclid Beaches will be compared to the integrated results of those locations. The analytical reports will be utilized to validate that integrated grab samples provide a realistic representation of the water quality. This report will be compiled and distributed internally by Analytical Services.

(9) Qualified Data Collectors

Except for the project manager, where necessary, the following noted Level 3 Qualified Data Collectors will be the sample coordinators. The sample coordinators will be responsible for training, scheduling, sampling and data review of field parameters. A checklist of capabilities is included in Attachment F.

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 Zablontny	018	4747 E. 49th St., Cuyahoga Heights, OH 44125	zablontnyt@neorsd.org	216-641-6000
Ron Maichle	145	4747 E. 49th St., Cuyahoga Heights, OH 44125	maichler@neorsd.org	216-641-6000
Cathy Perciado	045	4747 E. 49 th St., Cuyahoga Heights, OH 44125	perciadoc@neorsd.org	216-641-6000
Benjamin Tedrick	048	4747 E. 49 th St., Cuyahoga Heights, OH 44125	tedrickb@neorsd.org	216-641-6000
Eva Hatvani	180	4747 E. 49 th St., Cuyahoga Heights, OH 44125	hatvanie@neorsd.org	216-641-6000
Francisco Rivera**	262	4747 E. 49 th St., Cuyahoga Heights, OH 44125	riveraf@neorsd.org	216-641-6000

*Project Manager / ** Project Leader

All samplers will receive extensive training. Training consists of videos on safety; review of all the pertinent SOPs; completion of all required demonstrations of capabilities for parameters measured in the field. Training on sampling techniques and field analysis is conducted by having the samplers shadow a QDC at the sites while the techniques are being demonstrated. Proficiency with the techniques will be determined by a QDC while observing sampling being performed and by assessing the sampler's techniques. All samplers must meet and complete all requirements satisfactorily to be permitted to sample. A complete checklist of

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training is provided in Attachment F (*Beach Sampling Training Checklist*). Once samplers have met the outlined criteria, they will be permitted to sample. The sample coordinators will perform monthly audits of the sampling, using a *Beach Sampling Audit Form* (Attachment G), and correct deficiencies through re-training. 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 included in Attachment H.

The following is a list of persons not qualified as level 3 data collectors who may also be involved in the project. Project leader Francisco Rivera, with assistance from the sample coordinators and Jillian Novak, will provide training on sampling methodology and conduct the monthly audits. The project manager and leader will be responsible for the final review of all reports and data analysis prepared by these individuals prior to completion.

Name	Address	Email Address	Phone Number
Nick Barille	4746 E. 49 th St., Cuyahoga Heights, OH 44125	barillen@neorsd.org	216-641-6000
Joseph Broz	4747 E. 49 th St., Cuyahoga Heights, OH 44125	brozj@neorsd.org	216-641-6000
Tim Dobriansky	4747 E. 49 th St., Cuyahoga Heights, OH 44125	dobrianskyt@neorsd.org	216-641-6000
Kyle Frantz	4748 E. 49 th St., Cuyahoga Heights, OH 44125	frantzk@neorsd.org	216-641-6000
Kristina Granlund	4747 E. 49 th St., Cuyahoga Heights, OH 44125	granlundk@neorsd.org	216-641-6000
Rae Grant	4747 E. 49 th St., Cuyahoga Heights, OH 44125	grantr@neorsd.org	216-641-6000
Eric Hinton	4747 E. 49 th St., Cuyahoga Heights, OH 44125	hintone@neorsd.org	216-641-6000
John Junkin	4748 E. 49 th St., Cuyahoga Heights, OH 44125	junkinj@neorsd.org	216-641-6000
Mark Matteson	4749 E. 49 th St., Cuyahoga Heights, OH 44125	mattesonm@neorsd.org	216-641-6001
Jillian Novak	4747 E. 49 th St., Cuyahoga Heights, OH 44125	novakj@neorsd.org	216-641-6000
Cathy O'Grady	4747 E. 49 th St., Cuyahoga Heights, OH 44125	ogradyc@neorsd.org	216-641-6000
Denise Phillips	4747 E. 49 th St., Cuyahoga Heights, OH 44125	phillipd@neorsd.org	216-641-6000
Kevin Roff	4747 E. 49 th St., Cuyahoga Heights, OH 44125	roffk@neorsd.org	216-641-6000

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Name	Address	Email Address	Phone Number
Frank Schuschu	4747 E. 49 th St., Cuyahoga Heights, OH 44125	schuschuf@neorsd.org	216-641-6000
Wolfram von Kiparski	4747 E. 49 th St., Cuyahoga Heights, OH 44125	vonkiparskiw@neorsd.org	216-641-6000
Summer Co-op	4747 E. 49 th St., Cuyahoga Heights, OH 44125	To Be Determined	216-641-6000
Summer Co-op	4747 E. 49 th St., Cuyahoga Heights, OH 44125	To Be Determined	216-641-6000
Summer Co-op	4747 E. 49 th St., Cuyahoga Heights, OH 44125	To Be Determined	216-641-6000
Summer Co-op	4747 E. 49 th St., Cuyahoga Heights, OH 44125	To Be Determined	216-641-6000
Summer Co-op	4748 E. 49 th St., Cuyahoga Heights, OH 44125	To Be Determined	216-641-6000
Summer Co-op	4749 E. 49 th St., Cuyahoga Heights, OH 44125	To Be Determined	216-641-6000

The following individuals will be responsible for the compilation, approval and distribution of the analytical data to the appropriate internal and external parties.

Name	Address	Email Address	Phone Number
Mark Citriglia*	4747 E. 49 th St., Cuyahoga Heights, OH 44125	citrigliam@neorsd.org	216-641-6000
Kristen Greenwood	4747 E. 49 th St., Cuyahoga Heights, OH 44125	greenwoodk@neorsd.org	216-641-6000
Eva Hatvani*	4747 E. 49 th St., Cuyahoga Heights, OH 44125	hatvanie@neorsd.org	216-641-6000
Laura Quinones	4747 E. 49 th St., Cuyahoga Heights, OH 44125	quinonesl@neorsd.org	216-641-6000
Cheryl Soltis-Muth	4747 E. 49 th St., Cuyahoga Heights, OH 44125	soltismuthc@neorsd.org	216-641-6000
Carol Turner	4747 E. 49 th St., Cuyahoga Heights, OH 44125	turnerc@neorsd.org	216-641-6000

*Analytical Services Project Managers

- (10) Documentation of approval of project manager and other personnel as level 3 qualified data collector is included as Attachment H.
- (11) Contract laboratory contact information
Not applicable.

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(12) Copy of ODNR collector's permit
Not applicable.

(13) 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 Specimen Statement
Not applicable.

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(15) 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 Zablony / Date: _____

Print/Signature: Ron Maichle / Date: _____

Print/Signature: Cathy Perciado / Date: _____

Print/Signature: Benjamin Tedrick / Date: _____

Print/Signature: Eva Hatvani / Date: _____

Print/Signature: Francisco Rivera / Date: _____

ATTACHMENTS A-H