

June 16, 2008

Jeff Reynolds
Ohio EPA, Division of Surface Water
Standards & Technical Support Section
50 West Town Street, Suite 700
P.O. Box 1049
Columbus, Ohio 43216-1049

Dear Mr. Reynolds:

Please find enclosed the revised Level 3 Project Study Plan titled "2008 Lake Erie Bacteriological Sampling of Edgewater, Euclid and Villa Angela Beaches". Revisions include all of the issues mentioned in your letter of May 13, 2008 as well as additional changes to sampling and personnel since submission of the original sampling plan. Carol Turner, our QA/QC Specialist will be submitting the QA/QC Manual with revisions under separate cover. If you have any questions regarding the content of this study plan, please do not hesitate to contact me. I can be reached by email at ehatvani@neorsd.org or phone (216) 641-6000 ext. 2513.

Sincerely,



Eva Hatvani
Analytical Services –NEORS
Supervising Chemist

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Level 3 Project Study Plan

2008 Lake Erie Bacteriological Sampling of Edgewater, Euclid and Villa Angela Beaches

(1) Objective

The purpose of this study is to evaluate the impact of Northeast Ohio Regional Sewer District (NEORS) facilities and other sources on water quality in Lake Erie at Edgewater, Euclid, and Villa Angela beaches and to support the NEORS Combined Sewer System Operational Plan. Microorganisms from urban runoff, combined sewer overflows (CSOs), wildlife, bather shedding, and nonpoint sources are potentially a determinant of illness for individuals swimming in contaminated water. The U.S. Environmental Protection Agency has defined *Escherichia coli* (*E. coli*) as one of the best indicator organisms at freshwater bathing beaches because the presence of these bacteria indicates that pathogenic microorganisms may also be present. *E. coli* densities will be monitored at these three beaches during the recreation season. 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. As in the past, the data will most likely to be used by Ohio EPA to assess attainment in the Integrated Report.

In addition to beach sampling, water samples will be collected from Euclid Creek to determine the impact on water quality at Villa Angela and Euclid Beaches. NEORS will use the results of this study to determine water quality standards attainment in Lake Erie. Additionally, NEORS will assist the United States Geological Survey (USGS) in research and development of alternative methods for prediction of *E. coli* and assist with utilizing the "Nowcast" system to predict water quality at Edgewater Beach based on a predictive model developed over the past two years.

(2) Nonpoint/Point Sources

Edgewater Beach

Point Sources:

Publicly Owned Treatment Works, CSOs, storm sewers and area streams

Nonpoint Sources: urban runoff (specifically also runoff from Route 2), bathers, feces from birds, dogs and other wildlife

Euclid Beach and Villa Angela Beach

Point Sources:

Publicly Owned Treatment Works, CSOs, storm sewers and area streams

Nonpoint Sources: urban runoff, bathers, feces from birds, dogs and other wildlife

(3) Parameters Covered

Samples collected will be analyzed for *E. coli* densities as outlined by NEORSD SOP 2014-1, Analysis of *E. coli*, effective date 4/25/2006. Field parameters to be measured during the study will include: pH, water temperature, conductivity and turbidity. Dissolved oxygen may be analyzed as necessary, but will not be a routine analysis. In addition, overall beach observations will be assessed and recorded such as: number of swimmers and birds, wave direction, minimum/maximum wave height, and category, wind speed and direction, water clarity, weather/sky conditions.

(4) Field Collection and Data Assessment Techniques

Water samples will be collected from an east and west location at each of the three beaches. The samples will be analyzed separately and a portion of the east and west sample will be combined at the laboratory to serve as an integrated grab sample. The samples will be collected at a depth of 3 feet at each location and approximately 6-12 inches below the surface (approximately two feet from the bottom) as stated in Section 7.4.4 of Attachment A. At the time of collection, field parameters will be taken. Notes and observations pertaining to the beach and water conditions will be recorded using the observation sheet included in SOP 3004-4 Beach Sampling. All water samples and field parameters will be collected as specified in NEORSD SOP 3004 Beach Sampling (Attachment A), *The Ohio Department of Health, Ohio Bathing Beach Monitoring Program Quality Assurance Project Plan, April 2006*, (Effective dates of 9/29/06-9/28/08) and *Manual of Ohio EPA Surveillance Methods and Quality Assurance, 2006*.

E. coli results will be compared to the bathing water quality standard to determine when water quality criteria have been exceeded. The data from the integrated grab sample will be reported 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. NEORSD will use the data from all samples to determine possible trends in water quality.

Data from analysis of the integrated grab samples described herein will be Level 3 credible upon approval of this study plan unless otherwise determined and expressed by Ohio EPA. Upon the study plan approval, analysis of the individual grab samples may be discontinued. Studies conducted by USGS and NEORSD at local Lake Erie beaches have demonstrated that *E. coli* densities from averaged multiple-point samples and from integrated samples are not significantly different

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and yield similar measures of recreational water quality. Results from these studies are presented in Attachments F, G, and H.

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

Source Tracking work and research

In continued coordinated efforts with the USGS to identify sources of *E. coli* contamination and work to validate and refine the Edgewater predictive model, NEORSD will take additional samples for research purposes. Samples will be collected at two locations at Euclid Creek, Monday thru Friday to monitor its impact on Villa Angela beach during wet and dry weather events.

A portion of the integrated grab sample will be prepared for Quantitative Polymerase Chain Reaction (QPCR) Monday through Friday. Additional aliquots will be prepared for comparative analysis by the USGS at their laboratory in Columbus. The research work will compare results obtained from the QPCR analysis with the standard plate count method to determine the correlation between methodologies and determine the viability of the rapid methods.

An integrated grab sample will be a sample 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 samples will be analyzed for *E. coli* and turbidity. The results obtained from the integrated grab sample and individual samples at Villa Angela and Euclid Beaches will be compared and analyzed statistically to validate that integrated grab samples provide a realistic representation of the water quality while reducing analytical cost.

NEORSD has a defined Emergency Response Plan and will take additional samples at Edgewater Beach after a discharge has occurred from CSO 069 (3PA0002069), a storm water outlet for the Northwest Interceptor. The CSO location is near a highly utilized public recreation area; therefore, such sampling is necessary in the event of a CSO discharge. These samples will be taken 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

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added depending upon environmental conditions. An outline for actions and sampling during a discharge at CSO-069 is located in ERP 2.2.4 Edgewater Overflow. All samples are collected as specified in the *Manual of Ohio EPA Surveillance Methods and Quality Assurance*, 2006. All samples will be analyzed using an approved EPA method as specified by the Analytical Services Quality Manual.

(5) Sampling Locations

Two locations each will be sampled at Edgewater Beach and Euclid and Villa Angela Beaches in Cleveland for the duration of the study. Locations for the sampling are included in SOP 3004-4 Beach Sampling as Attachment A. One of the sampling locations will be on the east side of the beach, while the other will be on the west side. Additional samples will be taken from two (2) locations within Euclid Creek. The following table details the sampling locations and additional pictures to facilitate sampling can be found in SOP 3004-4 Beach Sampling as Attachment A.

Location	Latitude	Longitude	River Mile	Description	Quadrangle	Purpose
Edgewater Beach	N41.4893°	W81.7392°	NA	Eastern half of beach in line with the brick stack on the other side of the freeway.	Cleveland South	Impact determination of point and nonpoint sources, Public swimming safety awareness and determination of water quality standard attainment
Edgewater Beach	N41.4887°	W81.7404°	NA	Western half of beach in line with the large metal pole that is on the other side of the freeway.	Cleveland South	
Euclid Beach	N41.5843°	W81.5686°	NA	Eastern half of beach inline with the East side of the pile of stones on the beach.	East Cleveland	
Euclid Beach	N41.5838°	W81.5694	NA	Western half of beach between the 2 break walls at the second set of stairs from the structure at	East Cleveland	

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Location	Latitude	Longitude	River Mile	Description	Quadrangle	Purpose
				Euclid Beach.		
Euclid Creek	N41.5831°	W81.5594°	0.55	Downstream of Lakeshore Avenue	East Cleveland	
Euclid Creek	N41.5854°	W81.5641°	0.16	Downstream of Wildwood Bridge	East Cleveland	
Villa Angela Beach	N41.5851°	W81.5677°	NA	Eastern half of beach mid-distance between the 3 rd and 4 th break walls.	East Cleveland	
Villa Angela Beach	N41.5861°	W81.5667°	NA	Western half of beach at the beginning of the 2 nd break wall.	East Cleveland	

(6) Schedule

Sampling will be performed seven days a week Monday through Sunday from approximately May 19, 2008, until September 12, 2008, for Edgewater and Villa Angela Beach, and Monday through Friday for Euclid Creek starting June 2, 2008. Sampling may continue to occur through October at a reduced frequency. Euclid Beach sampling will start approximately May 19, 2008, and continue until August 29, 2008. Due to increased crowds during the week of July 4th, NEORSD will sample all three beaches during the weekend of July 4th and the July 4th holiday. All sampling will be dependent on weather conditions. A detailed sample schedule is included in SOP 3003-4 Beach Sampling.

(7) QA/QC

A controlled copy of our Quality Manual and SOPs were submitted to EPA in 2007. The specific SOPs are referenced below. Controlled copies of all SOPs can be audited or reviewed on-site. Due to the fact that all SOP information is time sensitive and may be revised at any time, copies of SOPs given to third parties are uncontrolled documents. Copies of the SOPs submitted with this study plan are considered valid at the time of submission. Updated and revised copies can be obtained by contacting Carol Turner, Quality Assurance Officer for Analytical Services 216-641-6000 ext. 2502.

All field equipment and laboratory instrumentation utilized throughout the project will be calibrated, validated and maintained as defined within the standard operating procedures referenced below. Routine calibration or maintenance will be recorded in the appropriate logbook and equipment malfunction will be noted.

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- SOP 6000-0 Hanna pH EC/TDS Effective 6/20/2005
- SOP 2007-0 Turbidity Effective 3/15/2007

NEORSD quality control procedures utilized for sampling and analysis procedures are outlined in the following SOPs:

- SOP 5001-4 Quality Manual Effective 1/8/2008
- SOP 3004-4 Beach Sampling Effective 6/11/2008
- SOP 2016-1 Bacteria Counting Methods Effective 6/11/2008
- SOP 2014-2 Analysis of *E. coli* Effective 6/11/2008

All *E. coli* Quality Control guidelines will be met based on the specific USEPA: Microbiological Methods for Monitoring the Environment (EPA 600/8-78-017), NEORSD's Standard Operating Procedures (SOP #2016-Bacteria Counting and #2014 *E. coli*), and standards outlined by the National Environmental Laboratory Accreditation Committee (NELAC) Chapter 5.0 "Quality Systems".

Field measurements

pH measurements below 6.0 and above 9.0 will be re-analyzed immediately in the field. If after re-analysis the sample is still out of range the measurement will be verified upon return to the laboratory on another instrument. If the laboratory results do not concur with the field results corrective action will be taken. If the laboratory results concur with the field results an investigation will occur.

Conductivity measurements greater than 800 umhos/cm will be re-measured in the field. If after re-analysis the sample result is still greater than 800 umhos/cm, the measurement will be verified upon return to the laboratory on another instrument. If the laboratory results do not concur with the field results corrective action will be taken. If the laboratory results concur with the field results an investigation will occur.

All samples will be analyzed in duplicate for turbidity. If any turbidity measurement exceeds 100 NTU the sample will be reanalyzed and/or re-sampled. For values less than 10 NTU, the duplicate measurements must agree within 1 NTU. For results greater than 10 NTU, the duplicate measurements must agree within 10 percent. If the duplicates do not agree, with the criteria of 1 NTU or 10%, the analysis must be repeated until the criteria are met. If results can not be obtained, corrective action will be initiated to determine the cause.

Laboratory Tests

One field blank will be collected each month (June, July and August) for *E. coli* analysis. If contamination is found, additional field blanks will be collected. If the contamination continues, a corrective action will begin to find the cause.

One duplicate sample is 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 the supervisor. Since the test does not allow for re-analysis results will be accepted based on method performance. If the *E. coli* density exceeds the water quality criteria for an extended period of time, additional afternoon sampling may occur in addition to the routine morning sampling.

All analysts performing the membrane filtration technique go through an extensive hands-on training. Training includes reviewing the SOP, shadowing another analyst, and setting up samples while being supervised and reading out while being supervised. After training, they need to 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 is measured by having multiple analysts reading the colonies on the same plate. Analyst must demonstrate that the values obtained from the multiple readings are within 10% of the initial analyst count. Failure to meet performance levels of these samples will result in initiation of a corrective action to determine where the deficiencies are.

(8) Work Products

A summary report will be prepared and sent to ODH Monday through Friday before 3:00 pm. This report will contain the sampling results from the integrated samples from each beach. A copy of this report is included as Attachment C. A second internal report and the field observation sheets will be sent to personnel from NEORS and the USGS Monday through Friday before 3:00 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 C. Following the completion of the project, a summary report that includes all the data collected during the study will be prepared. This summary report, along with the field observation sheets, laboratory bench sheets and chain of custody information, will be sent to the ODH. Other reports summarizing, interpreting, graphically presenting, and discussing the data will also be prepared and used for internal discussions.

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

Results obtained from the east and west locations for Villa Angela and Euclid Beaches will be compared to the combined results of those locations. The analysis reported will be utilized to validate that integrated grab samples provide a realistic representation of the water quality, while reducing analytical cost. This report will be compiled and distributed internally.

(9) Qualified Data Collectors

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

Name	Address	Email Address	Phone Number
Ben Tedrick (QDC number 048)	4747 E. 49 th St., Cuyahoga Heights, OH 44125	tedrickb@neorsd.org	216-641-6000
Eva Hatvani (QDC number 180)	4747 E. 49 th St., Cuyahoga Heights, OH 44125	hatvanie@neorsd.org	216-641-6000

Samplers will receive extensive training. Training consists of videos on safety; review all of the pertinent SOPs, completion of all required demonstrations of capabilities for parameters measured in the field. Training on sampling techniques and field analysis is demonstrated by accompanying the QDC to all sites and shadowing while the techniques are being demonstrated. Proficiency with the techniques will be determined by the QDC while observing sampling 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 training is provided in Appendix D (*Beach Sampling Training Checklist*). Once samplers have met the outlined criteria, they will be permitted to sample. The QDC will perform monthly audits of the sampling and correct deficiencies through re-training. Re-training will consist of accompaniment to the sampling site, instruction and observation by the QDC until deficiencies are no longer noted. A complete list of the beach sampling auditing is provided in Appendix E.

Official letters for QDC approval are included as Attachment B.

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The following is a list of persons not qualified as level 3 data collectors who may also be involved in the project. The QDCs, Eva Hatvani and Ben Tedrick will provide training on sampling methodology and analytical operating procedures, and conduct the monthly audits. The lead project manager will also be responsible for the final review all reports and data analysis prepared by these individuals prior to completion.

Name	Address	Email Address	Phone Number
Atemus Carter	4747 E. 49 th St., Cuyahoga Heights, OH 44125	cartera@neorsd.org	216-641-6000
Ildiko Kubiak	4747 E. 49 th St., Cuyahoga Heights, OH 44125	kubiaki@neorsd.org	216-641-6000
Steve Lizewski	4747 E. 49 th St., Cuyahoga Heights, OH 44125	lizewskis@neorsd.org	216-641-6000
Catherine Perciado	4747 E. 49 th St., Cuyahoga Heights, OH 44125	perciadoc@neorsd.org	216-641-6000
Gina Senes	4747 E. 49 th St., Cuyahoga Heights, OH 44125	senesg@neorsd.org	216-641-6000
Brittany Schultz	4747 E. 49 th St., Cuyahoga Heights, OH 44125	schultzb@neorsd.org	216-641-6000
Sara English	4747 E. 49 th St., Cuyahoga Heights, OH 44125	englishs@neorsd.org	216-641-6000

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Name	Address	Email Address	Phone Number
Tom Vasel	4747 E. 49 th St., Cuyahoga Heights, OH 44125	vaselthomas@neorsd.org	216-641-6000
Joseph Carbonaro	4747 E. 49 th St., Cuyahoga Heights, OH 44125	carbonaroj@neorsd.org	216-641-6000
Kayla Perry	4747 E. 49 th St., Cuyahoga Heights, OH 44125	perryk@neorsd.org	216-641-6000

The following individuals will be responsible for the compilation, approval and distribution of the 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
Eva Hatvani*	4747 E. 49 th St., Cuyahoga Heights, OH 44125	hatvanie@neorsd.org	216-641-6000
Kristen Greenwood	4747 E. 49 th St., Cuyahoga Heights, OH 44125	greenwoodk@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

* Project Managers

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(10) Documentation of approval of project manager and other personnel as level 3 qualified data collector is included as Attachment B.

(11) Contract laboratory contact information

Not applicable.

(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).

Signature: Ben Tedrick Date: 6/16/08

Signature: Eva Habrani Date: 6/16/08

(14) Voucher Specimen Statement

Not applicable.

(15) Trespassing Statement

I, Ben Tedrick, 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.

Signature: Ben Tedrick Date: 6/16/08

Trespassing Statement

I, EVA HABRANI, 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.

Signature: Eva Habrani Date: 6/16/08