

Level 3 Project Study Plan

2008 Cuyahoga River and Nearshore Lake Erie Fish Tissue Collection & Analysis

(1) Objective

One of the beneficial use impairments for the Cuyahoga River is restrictions on fish consumption. Fish and other organisms that are living in the river and nearshore Lake Erie can be exposed to contaminants found in discharges, overflows, runoff, and sediments and accumulate them in their bodies. This can potentially cause health-related problems for humans and wildlife that eat the fish and are thus exposed to these contaminants. The purpose of this study is to conduct sampling and analysis to determine current concentrations of mercury, PCBs, and pesticides in the tissues of fish living in the Cuyahoga River and nearshore Lake Erie. These contaminants were chosen due to their historical significance, their ability to bioaccumulate in fish, and/or because of possible water quality criteria that may be adopted by the U.S. EPA. The results will be compared to those from previous studies that took place from 1989 to 1992 and in 2005 to determine if any changes in fish contaminant levels have occurred since that time. The results will also be compared to applicable federal and state standards to evaluate potential ecological or human health risks.

(2) Nonpoint/Point Sources

The Cuyahoga River receives effluent from industrial and municipal discharges in addition to overflows from combined sanitary and storm sewers. Two of the largest municipal dischargers are the Northeast Ohio Regional Sewer District's (NEORS) Southerly Wastewater Treatment Center (WWTC) and the City of Akron Wastewater Treatment Plant (WWTP). The river also receives pollutants from nonpoint sources such as agricultural, suburban and urban runoff, sediments, and atmospheric deposition.

(3) Parameters Covered

Fish tissue samples will be analyzed to determine concentrations of mercury, PCBs, and pesticides. The list of pesticides that will be analyzed is shown in Table 1.

Aldrin	Alpha- BHC
Beta-BHC	Delta-BHC
Gamma-BHC	Chlordane
4,4'-DDD	4,4'-DDE
4,4'-DDT	Dieldrin
Endrin	Endrin aldehyde
Endosulfan I	Endosulfan II
Endosulfan sulfate	Heptachlor
Hepachlor epoxide	Methoxychlor
Toxaphene	

(4) Field Collection and Data Assessment Techniques

Two types of fish samples will be collected during this study. Fillet samples will be collected to represent potential impacts to humans who consume contaminated fish. Whole-body samples will be collected to represent potential impacts to piscivorous wildlife and to apply certain standards that are applicable to whole-body samples. These samples will be collected at all sites.

Mercury/PCBs/Pesticides Fillet Samples

The mercury, PCBs, and pesticides fillet samples will be a composite of three to five fish fillets of the same species and size class. Fish are considered to be of the same size class if the minimum and the maximum lengths of individual fish do not vary by more than 10%. The weight of the composite sample ready for laboratory analysis should equal or exceed 150 grams (g). A composite of more than five smaller fish may be used to meet the minimum sample weight requirement.

Each station will have samples from two bottom-feeding species and two sport species. The bottom-dwellers may represent worst-case risk through human consumption for certain pollutants, and the sport fish represent most likely human consumption. The largest size class(es) from each species found at a station will be used to also represent worst-case risk. Another consideration in species and size class selection is the desire to standardize samples between stations as much as possible. The information in Table 2 will be used as a tentative guide for the selection of fish for tissue collection. The final decision on the actual species and size class to be

collected for the sample will be made in the field based upon the type and size of fish captured during the collection effort.

<u>River Sites</u>		<u>Lake Sites</u>	
Bottom Feeders	Sport Fish	Bottom Feeders	Sport Fish
1. Carp	1. Smallmouth bass	1. Carp	1. Walleye, Sauger, N. Pike
2. Brown bullhead catfish	2. Largemouth bass	2. Channel catfish	2. Yellow perch
3. Yellow bullhead catfish	3. Members of Sunfish family	3. Brown bullhead catfish	3. Largemouth bass
4. White sucker	4. Rock bass	4. Yellow bullhead catfish	4. White bass
5. Channel catfish	5. White crappie	5. Golden redhorse	5. White perch
6. Golden redhorse	6. Black crappie		6. Freshwater drum
7. Northern Hog sucker	7. Walleye		7. Smallmouth bass

Mercury Whole Body Samples

The mercury whole-body samples will consist of 12 individuals of a sport species belonging to the same size class. Fish are considered to be of the same size class if the minimum and the maximum lengths of individual fish do not vary by more than 10%.

Collection Techniques

The primary method of collection will be a boat-mounted electrofishing unit based upon standardized Ohio EPA methods (Ohio EPA, Biological Criteria for the Protection of Aquatic Life: Volume II: Users Manual for Biological Assessment of Ohio Surface Waters, (1987, updated January 1, 1988 and November 8, 2006). For those sites in which a boat cannot be used, longline electrofishing equipment will be used instead. All fish shocked at a station will be collected and placed in a live well for processing. Precautions will be taken to keep all of the fish alive and to release unharmed those fish not used as a sample. All fish collected will be kept in the live well until the fish to be prepared as samples are selected, to prevent them from being shocked more than once. Non-targeted species collected that are not used in analysis will be documented on the field sheet (Appendix x). Care will be taken to prevent the fish from coming into contact with oil, plastic, sediment, etc. that could contaminate the tissue samples. The fish will be weighed (to the nearest gram), and a measurement (to the nearest millimeter) of the total length will be taken.

A sample information form, including individual records of each fish retained for analysis with information on species, weight, length, and notations of physical deformities or parasites, will be completed at each site. The presence of other fish collected during the sampling effort, but not prepared as samples, will be recorded, but not quantified or measured.

The fish will then be immediately wrapped in aluminum foil that has been cleaned with acetone and put into a plastic bag. Whole-body samples will be put into a cooler filled with dry ice. The coolers will be washed with hot water and 10% nitric acid and rinsed with DI water prior to use. Samples to be filleted will be put into a cooler filled with regular ice. All samples will then be transported to the NEORSD Environmental & Maintenance Services Center (EMSC) for processing.

Sample Preparation

In order to determine the age of the fish, dorsal spines, scales or pectoral spines (catfish) will be collected from each fish used as a sample. The largest dorsal spine is clipped at the base and scales are collected from the left side of the fish between the lateral line and the dorsal insertion. Catfish pectoral spines are rotated and removed from their joint. The scales and/or spines will be placed in paper envelopes with date, sample code and species information. Scales will be sent to the Ohio Department of Natural Resources in Portage Lakes for aging.

Fillets

The fish will be de-scaled and filleted at EMSC in order to reduce possible contamination in the field. The fish will be placed upon an aluminum foil-lined cutting board (dull side towards the fish). The aluminum foil will be changed between each new size class or species prepared. The foil and fillet knife will be rinsed with acetone or similar solvent compatible with the laboratory sample preparation. Fillets are to be prepared as illustrated in Appendix C and taken from both sides of the fish. The skin will be removed for channel catfish, bullheads, carp, and suckers. The skin will be left on for all other species. The fillets for each species will be composited and homogenized using a blender. Enough dry ice will be added to the blender to ensure that the entire sample is frozen and no moisture is visible. The resulting powder will be placed in glass jars with Teflon lids and labeled with date, sample code and species. Care will be taken to exclude any internal organs from the tissue sample. The blender and all utensils used during preparation will be washed between each sample.

Whole Body

Fish collected as whole-body samples will be kept as individuals instead of making a composite sample. The samples will be cut into chunks using a clean butcher saw and/or meat cleaver. The chunks will be put through the meat grinder with enough dry ice to ensure that the entire sample is frozen and no moisture is visible. The resulting ground tissue will then be homogenized using a blender. The resulting powder will be placed in glass jars with Teflon lids and labeled with date, sample code and species. The grinder, blender, and all utensils used during preparation will be washed between each sample.

Preservation and Holding Times

Fillet and whole-body samples will immediately be placed in a freezer at -30°C or placed in a cooler with dry ice prior to transportation to the laboratory freezer. Samples will be analyzed within one year of collection.

Fish fillet samples to be analyzed for pesticides and PCBs will be shipped to the contract laboratory using common carrier. The integrity of the samples and chain of custody will be maintained. The laboratory will be called prior to shipment to be sure they are ready to accept the fish. If possible, shipments will be made early in the week to avoid unforeseen delays that could result in weekend deliveries to the lab and potential confusion regarding their receipt.

Chemical Analysis

NEORSD Analytical Services will analyze fish fillet and whole-body samples for mercury using EPA Method 245.2. All results will be reported on a wet-weight basis.

A contract laboratory will be used to analyze the fish fillet samples for PCBs and organochlorine pesticides.

(5) Sampling Locations

The Cuyahoga fish tissue collection stations have been selected to meet the stated objectives of this study. Factors that were considered in their selection include: heavily fished areas, areas of known pollution sources, areas that show degradation or recovery, and reference sites. Field adjustments of the exact sampling locations may be needed due to climatic, hydraulic, or boat access concerns. Sampling locations will mostly duplicate the sites used in the 1989-1992 and 2005 studies and are detailed in Table 2.

Table 2. Sampling Locations

Location	Latitude (°N)	Longitude (°W)	River Mile	Description	Quadrangle	Purpose
Cuyahoga River at Shalersville (FTCS-01)	41.2449	81.2862	64.30	Upstream from State Route 303	Kent	Reference
Cuyahoga River Upstream of Akron (FTCS-02)	41.1195	81.4912	45.10	Ohio Edison Dam Pool	Akron East	AOC
Cuyahoga River Upstream of Akron WWTP (FTCS-03)	41.1288	81.5382	41.20	Upstream of Portage Path and Downstream of the Little Cuyahoga River	Peninsula	AOC
Cuyahoga River Downstream of Akron WWTP (FTCS-04)	41.1816	81.5836	35.30	Near Ira Road	Peninsula	Impact of Akron WWTP/AOC
Cuyahoga River Near Route 82 (FTCS-05)	41.3152	81.5835	21.00	Upstream of canal diversion dam	Northfield	AOC
Cuyahoga River at Southwest Interceptor (FTCS-06)	41.4291	81.6694	9.4578	Downstream of Southerly WWTC	Cleveland South	Impact of SWWTC/AOC
Cuyahoga River Navigation Channel (FTCS-07)	41.49455	81.7033	0.80	Irishtown Bend	Cleveland South	AOC
Lake Erie West Harbor (FTCS-08)	41.4995	81.7191	NA	Between Edgewater Marina and Cuyahoga River	Cleveland North/ Cleveland South	AOC
Lake Erie East Harbor (FTCS-09)	41.5410	81.6393	NA	Between East 72 nd Marina and East 55 th Street	Cleveland North	AOC
Lake Erie off Eastlake (FTCS-10)	41.6758	81.4403	NA	West of Chagrin River	Eastlake	Reference
Lake Erie off Wildwood (FTCS-11)	41.5860	81.5675	NA	Between Wildwood Park Marina and Villa Angela Beach	East Cleveland	AOC
Lake Erie off Lakewood (FTCS-12)	41.4981	81.8203	NA	Between Rocky River and Lakewood Park	Lakewood	Reference
Chagrin River at Daniels Park (FTCS-13)	41.6228	81.4015	5.54	Upstream of the confluence with the East Branch	Eastlake	Reference

(6) Schedule

Fish tissue collections will be made between August 15 and October 15, 2008. Actual sampling dates will depend upon weather, equipment and personnel availability.

(7) QA/QC

The laboratory will follow an in-house QA/QC program based upon U.S. EPA Contract Lab Program (CLP) QA/QC protocols. Duplicate samples will be prepared for 10% of the samples taken. The duplicate samples shall be made by splitting the homogenized powder prepared by blending. The duplicates are intended to be blind samples and will be labeled as if they were from another station. Field notes will be taken to assure the proper comparisons are made following the results. The sample stations will be identified by numeric or alphanumeric codes so as not to readily disclose the location of the sampling station. The NEORSO Analytical Services Quality Manual and associated Standard Operating Procedures are on file with Ohio EPA. The Quality Assurance Officer at Analytical Service will send updates, revisions and any information on document control to Ohio EPA as needed. A quality assurance manual for the contract laboratory analyzing the pesticide and PCB samples will be submitted once that laboratory is selected.

(8) Work Products

Within one year of completion of the project, a spreadsheet that presents data collected during the study and highlights any excursions from applicable criteria will be submitted to the Ohio EPA. Additionally, reports summarizing, interpreting, graphically presenting, and discussing the data will be prepared.

(9) Qualified Data Collectors

The following Level 3 Qualified Data Collectors for chemical water quality assessment will be involved with this study:

Name	Address	Email Address	Phone Number	QDC Number
*John W. Rhoades	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	rhoadesj@neorsd.org	216-641-6000	008
Cathy Zamborsky	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	zamborskyc@neorsd.org	216-641-6000	009
Seth Hothem	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	hothems@neorsd.org	216-641-6000	010
Kathryn Crestani	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	crestanik@neorsd.org	216-641-6000	011
Tiffany Moore	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	mooret@neorsd.org	216-641-6000	017
Tom Zablontny	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	zablontnyt@neorsd.org	216-641-6000	018
Ron Maichle	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	maichler@neorsd.org	216-641-6000	145 CWQA
*Lead Project Manager				

The following is a list of persons not qualified as level 3 data collectors who may also be involved in the project. Prior to the start of sampling, the lead project manager or QDC will explain to each of these and any other individuals the proper methods for collecting and processing the fish samples. These activities will only be completed under the direct observation of a QDC. The lead project manager will also be responsible for reviewing all reports and data analysis prepared by these individuals prior to completion.

Name	Address	Email Address	Phone Number
Joseph Broz	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	brozj@neorsd.org	216-641-6000
Tim Dobriansky	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	dobrianskyt@neorsd.org	216-641-6000
Rae Grant	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	grantr@neorsd.org	216-641-6000
Lateefah Hafeez	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	hafeezl@neorsd.org	216-641-6000
Mike Pavlik	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	pavlikm@neorsd.org	216-641-6000
Francisco Rivera	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	riveraf@neorsd.org	216-641-6000
Kevin Roff	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	roffk@neorsd.org	216-641-6000
Frank Schuschu	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	schuschuf@neorsd.org	216-641-6000
Elizabeth Toot-Levy	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	toot-levye@neorsd.org	216-641-6000
Wolfram vonKiparski	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	vonkiparskiw@neorsd.org	216-641-6000
Timothy Whipple	4747 East 49 th Street Cuyahoga Hts., Ohio 44125	whipplet@neorsd.org	216-641-6000

(10) Documentation of approval of project manager as level 3 qualified data collector.

See attached (Appendix A).

(11) Contract laboratory contact information

A contract laboratory for analysis of pesticides and PCBs has not been selected at this time. The contact information for this laboratory will be submitted once they are chosen.

(12) Copy of ODNR collector's permit

See attached (Appendix B).

(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.

(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.

2008 Cuyahoga River and Nearshore Lake Erie Fish Tissue Study Plan
August 18, 2008

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

Print/Signature: Cathy Zamborsky / Date: _____

Print/Signature: Seth Hothem / Date: _____

Print/Signature: Kathryn Crestani / Date: _____

Print/Signature: Tiffany Moore / Date: _____

Print/Signature: Tom Zablotny / Date: _____

Print/Signature: Ron Maichle / Date: _____