2009 Study Plan for the Central Ohio River tributaries

Belmont, Monroe and
Washington Counties,
Ohio

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- Belmont Co: Brian Baker (740) 589-9981
- Monroe Co: Reid VanCleve (740) 589-9989
- Washington Co: Eric Bear (740) 589-9998
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County Sheriff Offices

- Belmont Co: (740) 695-7933 (Dial 911 for emergency help)
- Monroe Co: (740) 472-1612 (Dial 911 for emergency help)
- Washington Co: (740) 373-2833 (Dial 911 for emergency help)

Hospitals

- Barnesville Hospital, 639 West Main Street, Barnesville, Ohio 740-425-3941
- Eastern Ohio Regional Hospital, 106 Plaza Drive, St. Clairsville, Ohio 740-695-2364
- Marietta Memorial Hospital, 401 Matthew Street, Marietta, Ohio (740) 374-1598
- Wetzel County Hospital, 3 E Benjamin Dr, New Martinsville, WV 26155 (304) 455-8000

INTRODUCTION

During the 2009 field season (June through October) chemical, physical, and biological sampling will be conducted in the central Ohio River tributaries to assess and characterize water quality conditions. The study area is a Total Maximum Daily Load (TMDL) basin, so the survey will incorporate a study design and some assessment techniques which are more comprehensive than a targeted sampling strategy alone would entail. The study area includes 4 HUC 10s: 0503010607, 0503010609, 0503010612, and 0503020101.

The sampling effort is structured to characterize point source and nonpoint source impacts, including those from coal mining activities, unsewered communities and agricultural activities. Table 1 contains a list of NPDES facilities in the basin. Sampling locations and types of sampling scheduled for the study area are listed in Table 2. Sample locations with geographical coordinates are included in Table 3.

Sampling Objectives:

- Monitor and assess the chemical, physical, and biological integrity of the water bodies within the central Ohio River tributaries study area.
- Assess physical habitat influences on stream biotic integrity.
- Determine recreational water quality.
- Evaluate the appropriateness of existing use designations and assign uses to undesignated streams.
- Characterize the amount of aquatic resource degradation attributable to various land uses, including agricultural practices, coal mining and urbanization.
- Determine any aquatic impacts from known potential sources, including point source dischargers, and from unsewered communities.
- Collect fish samples for the Ohio Sport Fish Tissue Monitoring Program (used to assess chemical contaminant levels in fish).

SAMPLING ACTIVITIES

Chemical/Physical Water and Sediment

Chemical sampling locations within the study area are listed in Tables 2&3. Conventional chemical/physical water quality samples will be collected 5 times at each designated location. Sediment samples will be collected at 21 locations. Datasondes© will be deployed at 19 locations. Chemical parameters to be tested are listed in Table 4. Surface water sampling will occur across a variety of flow conditions, from lower flows to moderate and higher flows. Public Water Supply intakes will be evaluated at two locations and will be tested for pesticides in addition to the normal suite of parameters. DDAGW will coordinate with SEDO staff for sampling times that occur before the official sampling season begins in June.

Bacteriological Sampling

Water samples will be collected at all chemistry sites for bacteriological analyses to determine the attainment status of the Primary Contact recreational use of the streams within the study area. Testing will include *Escherichia coli* (E. coli) bacteria. Each site will be sampled at least 5 times, while sentinel sites may have 5-10 bacteriological samples.

Macroinvertebrate and Fish Assemblages

Macroinvertebrate sampling methods will be used as listed in Table 2. Fish assemblages will be sampled as listed in Table 2. QHEI scores will be calculated on the habitat at all fish sampling locations.

Fish Tissue

Fish tissue samples will be collected from 7 locations as part of the Ohio Fish Tissue Consumption Monitoring Program. Fillet samples of edible size sport fish will be tested for organochlorinated pesticides, PCBs, mercury, lead, cadmium, arsenic, and selenium. Results will be used in the Ohio Sport Fish Consumption Advisory Program.

QUALITY ASSURANCE/SAMPLING METHODS

Ohio EPA Manuals

All biological, chemical, EPA laboratory, data processing, and data analysis methods and procedures adhere to those specified in the Manual of Ohio EPA Surveillance Methods and Quality Assurance Practices (Ohio EPA 2006), Biological Criteria for the Protection of Aquatic Life, Volumes II – III (Ohio Environmental Protection Agency 1987, 1989a, 1989b), The Qualitative Habitat Evaluation Index (QHEI); Rationale, Methods, and Application (Rankin 1989) for habitat assessment, Ohio EPA Sediment Sampling Guide and Methodologies (Ohio EPA 2001), and Ohio EPA Fish Collection Guidance Manual (Ohio EPA 2004) .

Use Attainment

Attainment/non-attainment of aquatic life uses will be determined by using biological criteria codified in Ohio Administrative Code (OAC) 3745-1-07, Table 7-17. Numerical biological criteria are based on multimetric biological indices including the Index of Biotic Integrity (IBI) and modified Index of Well-Being (Miwb), indices measuring the response of the fish community, and the Invertebrate Community Index (ICI), which indicates the response of the macroinvertebrate community.

Performance expectations for the basic aquatic life uses (Warmwater Habitat [WWH], Exceptional Warmwater Habitat [EWH], and Modified Warmwater Habitat [MWH] were developed using the regional reference site approach (Hughes et al. 1986; Omernik 1987). This fits the practical definition of biological integrity as the biological performance of the natural habitats within a region (Karr and Dudley 1981). Attainment of an aquatic life use is FULL if all three indices (or those available) meet the applicable criteria, PARTIAL if at least one of the indices did not attain and performance did not fall below the fair category, and NON if all indices either fail to attain or any index indicates poor or very poor performance. The results will be compared to WWH biocriteria for the Western Allegheny Plateau (WAP) ecoregion.

Recreational use attainment will be determined using fecal coliform bacteria and *E. coli* bacteria. Both types of organisms are indicator organisms for the potential presence of pathogens in surface water resulting from the presence of untreated human or animal wastes, and they are the basis for recreational use water quality criteria in Rule 3745-1-07 of the Ohio Administrative Code (OAC).

Stream Habitat Evaluation

Physical habitat is evaluated using the Qualitative Habitat Evaluation Index (QHEI) developed by the Ohio EPA for streams and rivers in Ohio (Rankin 1989). Various attributes of the available habitat are scored based on their overall importance to the establishment of viable, diverse aquatic faunas. Evaluations of type and quality of substrate, amount of instream cover, channel morphology, extent of riparian canopy, pool and riffle development and quality, and stream gradient are among the metrics used to evaluate the characteristics of a stream segment, not just the characteristics of a single sampling site. As such, individual sites may have much poorer physical habitat due to a localized disturbance yet still support aquatic communities closely resembling those sampled at adjacent sites with better habitat, provided water quality conditions are similar. QHEI scores from hundreds of segments around the state have indicated that values higher than 60 were generally conducive to the establishment of warmwater faunas while those which scored in excess of 75-80 often typify habitat conditions which have the ability to support exceptional faunas.

Biological Community Assessment

Macroinvertebrates will be collected from artificial substrates and from the natural habitats. Quantitative sampling will be conducted at reference sites and at sites with drainage areas in excess of 20 mi^2. Qualitative sampling will be conducted in headwater sites with drainages smaller than 20 mi^2. The artificial substrate collection provides quantitative data and consists of a composite sample of 5 modified Hester-Dendy (HD) multiple-plate samplers colonized for six weeks. At the time of the artificial substrate collection, a qualitative multihabitat composite sample is also collected. This sampling effort consists of an inventory of all observed macroinvertebrate taxa from the natural habitats at each site with no attempt to quantify populations other than notations on the predominance of specific taxa or taxa groups within major macrohabitat types (e.g., riffle, run, pool, margin). Fish will be sampled at each sampling location with pulsed DC current. Two passes will be conducted at sites larger than 20 mi^2 and at reference sites. Detailed biological sampling protocols are documented in the Ohio EPA manual Biological Criteria for the Protection of Aquatic Life, Volume III (1989).

Sediment
Fine grained multi-incremental sediment samples will be collected in the upper 4 inches of bottom material using either decontaminated stainless steel scoops or Ekman dredges. Collected sediment will be placed into appropriate containers, placed on ice (to maintain 4°C) and shipped to the Ohio EPA lab. Sampling and decontamination protocols will follow those listed in the Ohio EPA Sediment Sampling Guide and Methodologies, November, 2001.

Surface Water
Surface water grab samples will be collected from the upper 12 inches of river water into appropriate containers. Collected water will be preserved using appropriate methods, as outlined in Parts II and III of the Manual of Ohio EPA Surveillance Methods and Quality Assurance Practices (Ohio EPA 2006) and shipped overnight via courier to the Ohio EPA lab for analysis. Field measurements of dissolved oxygen, pH, temperature, and conductivity will be made using YSI 556MPS meters along with all grab samples for surface water chemistry. Datasonde© continuous recorders will be placed at select locations to evaluate diurnal measurements of dissolved oxygen, pH, temperature, and conductivity.

Bacteria
Water samples will be collected into appropriate containers, cooled to 4°C, and transported to the contract lab, Jones & Henry in Northwood, Ohio, within 6 hours of sample collection. All samples will be analyzed for *E. coli* bacteria using U.S.EPA approved methods (STORET Parameter Code 31648).

Fish Tissue
Tissue fillet samples will be collected from fish of edible size, and species preferred for analysis may include spotted bass, largemouth bass, smallmouth bass, flathead catfish, walleye, saugeye, white bass, common carp, freshwater drum, and channel catfish. When possible, composite samples (by species) will be collected using a minimum of three fish and a minimum of 150 grams of material. At each sampling location, an attempt will be made to collect five fish species for fillet tissue analysis. Fish will be sampled using electrofishing boat methods at the reservoir and wading method at the remainder sites. Sampling locations are listed in Table 2.

Fish used for tissue analysis will be filleted in the field using decontaminated stainless steel fillet knives. Filleted samples will be wrapped in aluminum foil, placed in a sealed plastic bag, and placed on dry ice. Sampling and decontamination protocols will follow those listed in the Ohio EPA Fish Collection Guidance Manual (2004); however, it is not necessary to clean aluminum foil which is used directly from the roll. Fish tissue samples will be stored in chest freezers at the Ohio EPA Groveport Field Facility prior to delivery to DES.

Field Quality Control Samples
Ten percent of the sediment, water, and bacteria samples will be submitted to the lab as field duplicates. One Datasonde© recorder site will have two instruments placed in the river as field duplicates. Field blanks will occur at a minimum of 5 percent of the water samples. Field instruments will be calibrated daily, using manufacturer guidelines and requirements noted in the Manual of Ohio EPA Surveillance Methods and Quality Assurance Practices (Ohio EPA 2006). Matrix spike duplicates will be collected for organic water samples at a minimum of 5 percent.

Table 1. Facilities regulated by the National Pollution Discharge Elimination System in the Central Ohio River tributaries study area.

US EPA ID	OHIO EPA ID	Type	Facility Name	Expiration	County
OH0059633	0IL00001	Minor	Oklahoma Coal Co Lynn Tipple	7/31/2008	Belmont
OH0011681	0IL00041	Minor	Bellaire Corporation Powhatan Mine No 1	6/30/1981	Belmont
OH0011541	0IL00042	Minor	Bellaire Corp Powhatan No 3 Mine	6/30/1981	Belmont
OH0011576	0IL00043	Minor	Bellaire Corp Powhatan No 5 Mine Town Run	6/30/2008	Belmont
OH0012661	0IL00046	Minor	Ohio Valley Coal Co Powhatan No 6 Mine	6/30/2005	Belmont
OH0012211	0IL00071	Minor	Quarto Mining Co Powhatan No 4 Mine	10/31/2013	Monroe
OH0028487	0IL00072	Minor	Quarto Mining Co Powhatan No 7 Mine	4/30/2012	Monroe
OH0059552	0IL00091	Minor	American Energy Corp Century Mine	7/31/2007	Belmont
OH0076864	0IL00101	Minor	Marietta Coal Co Bellaire Refuse Disposal Site	7/31/2008	Belmont
OH0059676	0IL00109	Minor	Lamira Coal Preparation Plant	7/31/2008	Belmont
OH0135143	0IL00143	Minor	Bellaire Harbor Service LLC	8/31/2011	Belmont
OH0076040	0IN00037	Minor	Tonkovich Trucking Co Dilles Bottom Disposal Site	6/30/2008	Belmont
OH0076813	0IN00107	Minor	Tri State Asphalt Landfill	12/9/1990	Belmont
OH0091103	0IN00117	Minor	ODOT Duffy Outpost Building	3/31/2013	Monroe
OH0099449	0IN00143	Minor	Ohio Oil Gathering Corp Bells Run Terminal	8/31/2011	Washington
OH0120839	0IN00218	Minor	BP Amoco Oil Corp Bulk Plant Clarington	5/31/2012	Monroe
OH0108766	0IP00668	Minor	Northshore Coal Co	10/28/1996	Jackson
OH0106411	0IP00675	Minor	Marietta Coal Co	10/28/1996	Belmont
OH0086703	0IP83432	Minor	Bennoc Inc	5/31/1988	Belmont
OH0030384	0IV00130	Minor	Woodsfield WTP	5/31/2008	Monroe
OH0032433	0IX00010	Minor	Bridgeport WTP	9/30/2012	Belmont
OH0020885	0PA00000	Minor	Beallsville WWTP	3/31/2013	Monroe
OH0021636	0PA00037	Minor	Clarington WWTP	8/31/2013	Monroe
OH0091316	0PA00099	Minor	St Clairsville West WWTP	6/30/2008	Belmont
OH0021121	0PB00001	Minor	Bethesda WWTP	8/31/2011	Belmont

US EPA ID	OHIO EPA ID	Type	Facility Name	Expiration	County
OH0022331	0PB00029	Minor	New Matamoras WWTP	6/30/2013	Washington
OH0028177	0PB00051	Minor	Woodsfield STP	8/31/2013	Monroe
OH0022543	0PB00052	Minor	Yorkville STP	3/31/2008	Belmont
OH0090891	0PB00085	Minor	Tiltonsville WWTP	7/31/2013	Jefferson
OH0024015	0PC00001	Major	Barnesville WWTP	1/31/2013	Belmont
OH0027383	0PC00009	Minor	Shadyside WWTP	12/31/2007	Belmont
OH0041173	0PQ00004	Minor	Newport W & SD	4/30/2012	Washington
OH0059323	0PT00005	Minor	Frontier High School	7/31/2010	Washington
OH0135275	0PR00153	Minor	G & N Sportsbar and Grill	8/31/2013	Monroe
OH0103560	0IP00733	Minor	Weirton Construction Co	10/29/1996	Jefferson

Table 2. Central Ohio River tributaries study area sampling sites in alphabetical order.

Storet	Name	RM	Drainage	Sampling	Location	Issue	Topo	County
203458	Baker Fork	1.20	8.0	C,F,M,D,S	Adj. Twp Rd 81 at Township Line	Reference site	Woodsfield	Monroe
C02S44	Bend Fork	8.35	9.0	C,F*,M	SE Bethesda @ TR 192	Spatial coverage	Hunter	Belmont
C02S43	Bend Fork	3.59	19.6	C,F2*,MT	TR 101	Spatial coverage	Armstrong Mills	Belmont
C02S81	Bend Fork	0.26	27.0	C,B,F2,MT,D,S	N Alledonia, near mouth @ first ford, T-101	Reference site	Armstrong Mills	Belmont
C02S64	Big Run	0.45	4.0	C,F*,M	Upst. AMD impacted area, upst. SR 7	Upst. impacted AMD area	Businessburg	Belmont
300644	Big Run	0.05	4.5	C,F*,M	Dwnst. AMD issue, near Ohio River, Pipe Creek Road	Dwnst. AMD issue	Businessburg	Belmont
C02S37	Captina Creek	23.12	75.4	C,B,F2,MT, S	Dwnst. Casey Run, @ SR 148	Potential coal mining issue	Hunter	Belmont
C02K05	**Captina Creek**	**22.10**	**87.1**	**FT C,F2,MT,S,**	**Upst. Alledonia at SR 148/ DST Perkins Run**	**Fish Tissue, High TDS/DST Ohio Valley Coal discharge**	**Armstrong Mills**	**Belmont**
300391	Captina Creek	20.90	87.9	C,F2,MT,S	Dwnst. Ohio Valley Coal, adj. SR 148	Potential coal mining issue	Armstrong Mills	Belmont
C02S36	Captina Creek	20.54	96.0	C,F2,MT,D,S	Adj. SR 148 and Pugh Ridge Road	Reference site	Armstrong Mills	Belmont
C02S80	Captina Creek	17.60	125.0	C,F2,MT,D,S	end of road, 0.4 mile Dwnst. Bend Fork	Reference site	Armstrong Mills	Belmont
C02S35	Captina Creek	16.00	134.0	C,B,F2,MT,D,S	Dwnst. Armstrongs Mills @ gage	Sentinel site	Armstrong Mills	Belmont
C02S34	Captina Creek	11.70	141.0	C,F2,MT	Upst. Cravat Coal Co., Adj. SR148	Potential coal mining issue	Armstrong Mills	Belmont
C02K03	Captina Creek	8.40	157.0	FT	East of Captina at SR 148	Fish Tissue	Businessburg	Belmont
C02S32	Captina Creek	6.71	157.0	C,F2,MT,D,S	SR 148	Reference site	Businessburg	Belmont
C02S31	Captina Creek	3.33	163.0	C,B,F2,MT	Upst. Steinersville @ SR 148	Spatial coverage	Powhatan Point	Belmont
C02K01	Captina Creek	0.50	180.0	FT,S	Near mouth (Ohio River impounded)	Fish tissue & Sediment only	Powhatan Point	Belmont
C02K13	Casey Run	0.1	0.5	C,F*,M	At mouth, near SR148	Proposed mining activities	Hunter	Belmont

Storet	Name	RM	Drainage	Sampling	Location	Issue	Topo	County
C02K06	Cat Run	3.30	8.2	C,F*,M,D,S	Upst. pipeline @ CR 56 (Cat Run Road)	Reference site	Cameron	Monroe
C02S38	Cat Run	0.25	12.8	C,B,F*,M	near mouth @ CR 56 (Cat Run Road)	Spatial coverage	Powhatan Point	Belmont
C02S49	Crabapple Creek	0.46	8.2	C,F*,M	W of Alledonia @ TR 103	Spatial coverage	Armstrong Mills	Belmont
C02S58	Jakes Run	0.10	5.1	C,F*,M	Adj. SR 148 (Hike in along N. Fk.)	Not verified	Hunter	Belmont
C02S47	Joy Fork	0.30	6.0	C,F*,M	Hatcher Road	Spatial coverage	Hunter	Belmont
C01S02	Leith Run	2.80	7.0	C,B,F*,M,D,S	Leith Run Road	Reference site	Raven Rock	Washington
203440	Little McMahon Creek	2.80	9.8	C,F,M	Dwnst. Aults Run, Adj. Willow Grove	Trend	Lansing	Belmont
C02S19	Little McMahon Creek	0.85	14.2	C,B,F,M,D, S	Dwnst. Kings Run @ Wozniak Rd. TR 316	Sentinel, Trend	Lansing	Belmont
C02S59	Long Run	0.04	10.6	C,F*,M	SE of Barnesville @ SR 148	Potential slurry impoundment	Hunter	Belmont
300643	McMahon Creek	24.10	6.9	C,F,M	Upst. Barkcamp Creek, adj. SR 149 across from mailbox # 43798. Do not block driveway.	Upstream Barkcamp Creek	Bethesda	Belmont
C02W25	McMahon Creek	22.58	15.7	C,F,M	Lamira @ CR 78	Spatial coverage	St. Clairsville	Belmont
203439	McMahon Creek	18.60	26.0	C,F2,MT	NW Warnock, Dwnst. lane off SR 149	Bracketing Warnock	St. Clairsville	Belmont
300642	McMahon Creek	17.58	29.3	C,B,F2,MT	Dwnst. Warnock, Adj. Whitney Rd at Ford	Bracketing Warnock	St. Clairsville	Belmont
203438	McMahon Creek	12.10	51.0	C,B,F2,MT,D, S	E of Glencoe at SR 149	Sentinel, Dwnst. Williams Creek	St. Clairsville	Belmont
203437	McMahon Creek	11.30	53.0	FT	Adj. SR 149	Fish Tissue	Lansing	Belmont
C02S12	McMahon Creek	7.00	78.5	C,F2,MT	At Neffs, Dwnst. Little McMahon Creek	Potential bacteria issues	Lansing	Belmont

Storet	Name	RM	Drainage	Sampling	Location	Issue	Topo	County
C02L04	McMahon Creek	4.40	82.6	FT	Upst. SR 149	Fish Tissue	Lansing	Belmont
C02K28	McMahon Creek	2.30	85.0	C,F2,MT,D,S	2ND RR bridge Upst. TR 476	Reference site	Lansing	Belmont
203411	Mill Creek	0.70	9.1	C,B,F*,M	NE of New Matamoras @ TR 66	Spatial coverage	New Matamoras	Washington
300639	Narrows Run	0.10	3.4	C,B,F*,M	Adj. Narrows Road	Spatial	Paden City	Monroe
203392	Newell Run	1.70	7.0	C,B,F*,M	Dwnst. Peggs Fork, Adj. Newells Run Road	Historical	Belmont	Washington
C02W01	North Fork Captina Creek	10.60	1.0	Chem only	Upst. Barnesville WWTP, adj. Slabtown Road	Upst. WWTP	Barnesville	Belmont
C02W02	North Fork Captina Creek	10.50	1.0	Chem only	Barnesville WWTP outfall	Wet weather discharge	Barnesville	Belmont
C02S82	North Fork Captina Creek	10.10	1.0	Chem only	Dwnst. Barnesville WWTP	Dwnst. Barnesville WWTP	Barnesville	Belmont
C02W05	North Fork Captina Creek	6.65	7.0	Ccla, F*, M, D	SE Barnesville @ SR 148	Dwnst. Barnesville	Hunter	Belmont
C02S68	North Fork Captina Creek	3.94	24.3	C,F2,MT	Dwnst. Long Run @ CR 26	Spatial coverage	Hunter	Belmont
C02S54	North Fork Captina Creek	0.43	32.6	C,Co, B,F2,MT,D, S	near mouth @ CR 92	Reference & sentinel site	Hunter	Belmont
203415	Opossum Creek	2.20	22.2	C,F2,MT	Adj. Beautiful Ridge Road, Dwnst. Alum Run	Spatial coverage	Round Bottom	Monroe
300664	Opossum Creek	1.05	24.0	C,B,F2,MT	At Ford	Dwnst. Powhatten mine	New Martinsville	Monroe
C02S40	Pea Vine Creek	0.15	9.9	C,F*,M	SE Armstrongs Mills @ CR 5	Spatial coverage	Armstrong Mills	Belmont
C02S51	Piney Creek	0.02	9.9	C,F*,M	NW Alledonia @ SR 148	Spatial coverage	Hunter & Armstrong Mills	Belmont
300665	Piney Fork	4.20	5.0	C,F,M	Kings Road, CR 1	Spatial coverage	Woodsfield	Monroe
C02S04	Piney Fork	0.30	15.5	C,B,F*,M,D, S	TR 152	Reference & sentinel site	Woodsfield	Monroe
203417	Pipe Creek	1.20	11.2	C,B,F*,M	near Vadis, adj. Pipe Creek Road	Spatial coverage	Businessburg	Belmont

Storet	Name	RM	Drainage	Sampling	Location	Issue	Topo	County
C02S70	South Fork Captina Creek	9.48	16.4	C,F*,M	S of Somertown @ TR 35 (Skinner Grimes TR 38)	Spatial coverage	Barnesville	Belmont
C02S69	South Fork Captina Creek	2.97	33.7	C,F2,MT	N of New Castle @ SR 26	Spatial coverage	Hunter	Belmont
C02S60	South Fork Captina Creek	0.10	36.1	C,Co,B, F2,MT,D, S	at mouth @ CR 92	Reference & sentinel site	Hunter	Belmont
C02K32	Sunfish Creek	27.10	9.9	C,F,M	NW Woodsfield, adj. TR 923	Spatial coverage	Lewisville	Monroe
300663	Sunfish Creek	25.10	21.0	C,F2,MT	Upst. WTP, Adj. T-999	Upst. WTP, potential livestock issues	Woodsfield	Monroe
C02S84	Sunfish Creek	23.85	22.5	C,B,F2,MT,D, S	N of Woodsfield @ CR 76	Reference site	Woodsfield	Monroe
C02S03	Sunfish Creek	22.80	31.0	C,F2,MT	Just Dwnst. Baker Fork, end of OP Jackson Road	Baker Fork influence	Woodsfield	Monroe
C02S01	Sunfish Creek	17.30	50.0	C,F2,MT,D, S	Dwnst. Standingstone Run, adj. CR 29	Reference & sentinel site	Woodsfield	Monroe
203457	Sunfish Creek	15.10	54.7	C,B,F2,MT,FT	Upst. Piney Fork @ Altitude-Miller Hill Road	Spatial coverage	Woodsfield	Monroe
203456	Sunfish Creek	9.30	79.0	C,F2,MT,D,S	Upst. Cameron, Sunfish Creek Road at ford	Reference site	Cameron	Monroe
609200	Sunfish Creek	7.10	99.0	C,F2,MT,D, S	Dwnst. Cameron, Donald Brown Road off SR78	Reference site	Cameron	Monroe
C02S79	Sunfish Creek	1.80	105.0	C,B,F2,MT	W of Powhatan Point, upst. Negro Run	Spatial coverage	Cameron	Monroe
203451	Sunfish Creek	0.20	114.0	FT	At mouth, impounded at Clarington	Fish Tissue	Cameron	Monroe
C02L05	Weege Creek	2.21	9.3	C,B,F*,M,S	SW Shadyside, dwnst. Stone Coal Run	LRW site	Businessburg	Belmont
C02K30	Williams Creek	1.40	11.4	C,B,F,M,D,S	Adj. Jacobsburg-Glencoe Road	Reference site, Upst. Discharge	Armstrong Mills	Belmont

C – Inorganic water chemistry
B - E-Coli bacteria
Co -525 (with tics) and 8270 (organics collected twice)
D- Datasonde
F – Single pass fish site
F*- Single pass fish site that Kelly will complete fish work
F2 – Two-pass fish site (for reference sites, or drainage area 20 sq. miles or greater)
F2* - Two-pass fish site that Kelly will complete fish works
FT – Fish Tissue
M – Macroinvertebrate qualitative site
MT – Macroinvertebrate quantitative site (for reference sites, or drainage area 20 sq. miles or greater)
PO4 – Orthophosphates
S – Sediment metals/8270 BNAs/8081
Sp – S and 8082 PCBs

Type	Number of Sites
Total	67
Water chemistry	61
Bacteria	19
Fish	1 Pass 29 (Kelly=20) 2 Pass 29 (Kelly=1)
Macroinvertebrate	Qual 29 Quant 29
Fish Tissue	7
Sediment	21
Datasonde©	19

Table 3. Central Ohio River tributaries site locations by 10-digit Hydrologic Unit Code (HUC).

Storet	Name	RM	Drainage	Sampling	Location	Longitude	Latitude	HUC 12
HUC 10 – 0503010607 McMahon Creek								
C02K30	Williams Creek	1.40	11.4	C,B,F,M,D,S	Adj. Jacobsburg-Glencoe Road	-80.90093347	39.99306016	050301060701
300643	McMahon Creek	24.10	6.9	C,F,M	Upst. Barkcamp Creek, Adj. SR 149	-81.00960769	40.02799745	050301060702
C02W25	McMahon Creek	22.58	15.7	C,F,M	Lamira @ CR 78	-80.98954329	40.02149682	050301060702
203439	McMahon Creek	18.60	26.0	C,F2,MT	NW Warnock, Dwnst. lane off SR 149	-80.94440000	40.02420000	050301060702
300642	McMahon Creek	17.58	29.3	C,B,F2,MT	Dwnst. Warnock, Adj. Whitney Rd at Ford	-80.93942061	40.01883477	050301060702
203440	Little McMahon Creek	2.80	9.8	C,F,M	Dwnst. Aults Run, Adj. Willow Grove	-80.85560000	40.04670000	050301060703
C02S19	Little McMahon Creek	0.85	14.2	C,B,F,M,D,S	Dwnst. Kings Run @ Wozniak Rd. TR 316	-80.82534495	40.03450743	050301060703
203438	McMahon Creek	12.10	51.0	C,B,F2,MT,D,S	E of Glencoe at SR 149	-80.87760860	40.00272203	050301060704
203437	McMahon Creek	11.30	53.0	FT	Adj. SR 149	-80.86716917	40.00673838	050301060704
C02S12	McMahon Creek	7.00	78.5	C,F2,MT	At Neffs, Dwnst. Little McMahon Creek	-80.81280000	40.02440000	050301060704
C02L04	McMahon Creek	4.40	82.6	FT	Upst. SR 149	-80.78832215	40.01890985	050301060704
C02K28	McMahon Creek	2.30	85.0	C,F2,MT,D,S	2ND RR bridge Upst. TR 476	-80.77310000	40.01670000	050301060704
HUC 10 – 0503010609 Captina Creek								
C02S58	Jakes Run	0.10	5.1	C,F*,M	Adj. SR 148 (Hike in along N. Fk.)	-81.06742541	39.92634628	050301060901
C02S59	Long Run	0.04	10.6	C,F*,M	SE of Barnesville @ SR 148	-81.08640000	39.93280000	050301060901
C02W01	North Fork Captina Creek	10.60	1.0	Chem only	Upst. Barnesville WWTP, adj. Slabtown Road	-81.16564121	39.97215920	050301060901
C02W02	North Fork Captina Creek	10.50	1.0	Chem only	Barnesville WWTP outfall	-81.16318656	39.97018071	050301060901
C02S82	North Fork Captina Creek	10.10	1.0	Chem only	Dwnst. Barnesville WWTP	-81.16185938	39.96900812	050301060901
C02W05	North Fork Captina Creek	6.65	7.0	Ccla, F*, M, D	SE Barvesville @ SR 148	-81.12060000	39.93920000	050301060901
C02S68	North Fork Captina Creek	3.94	24.3	C,F2,MT	Dwnst. Long Run @ CR 26	-81.08670000	39.93220000	050301060901
C02S54	North Fork Captina Creek	0.43	32.6	C,Co,B,F2,MT,D,S	near mouth @ CR 92	-81.04750000	39.91190000	050301060901

Storet	Name	RM	Drainage	Sampling	Location	Longitude	Latitude	HUC 12
C02S70	South Fork Captina Creek	9.48	16.4	C,F*,M	S of Somertown @ TR 35 (Skinner Grimes TR 38)	-81.13420000	39.89280000	050301060902
C02S69	South Fork Captina Creek	2.97	33.7	C,F2,MT	N of New Castle @ SR 26	-81.08030000	39.90530000	050301060902
C02S60	South Fork Captina Creek	0.10	36.1	C,Co,B,F2,MT,D,S	at mouth @ CR 92	-81.04360000	39.90640000	050301060902
C02S44	Bend Fork	8.35	9.0	C,F*,M	SE Bethesda @ TR 192	-81.03610000	39.96670000	050301060903
C02S43	Bend Fork	3.59	19.6	C,F2*,MT	TR 101	-80.99140000	39.93810000	050301060903
C02S81	Bend Fork	0.26	27.0	C,B,F2,MT,D,S	N Alledonia, near mouth @ first ford, T-101	-80.96420000	39.91720000	050301060903
C02S47	Joy Fork	0.30	6.0	C,F*,M	Hatcher Road	-81.00047349	39.94444779	050301060903
C02S37	Captina Creek	23.12	75.4	C,B,F2,MT	Dwnst. Casey Run, @ SR 148	-81.00360000	39.91110000	050301060904
C02K05	Captina Creek	22.10	87.1	FT, C,F2,MT	Upst. Alledonia at SR 148/Dst Perkins Run	-80.98943446	39.90814588	050301060904
300391	Captina Creek	20.90	87.9	C,F2,MT	Dwnst. Ohio Valley Coal, adj. SR 148	-80.97125200	39.90535000	050301060904
C02S36	Captina Creek	20.54	96.0	C,F2,MT,D,S	Adj. SR 148 and Pugh Ridge Road	-80.96811911	39.90031651	050301060904
C02K13	Casey Run	0.1	0.5	C,F,M	At mouth, near SR148	-81.010295	39.910131	050301060904
C02S49	Crabapple Creek	0.46	8.2	C,F*,M	W of Alledonia @ TR 103	-80.97561622	39.89828539	050301060904
C02S51	Piney Creek	0.02	9.9	C,F*,M	NW Alledonia @ SR 148	-81.00000000	39.91140000	050301060904
C02S80	Captina Creek	17.60	125.0	C,F2,MT,D,S	end of road, 0.4 mile Dwnst. Bend Fork	-80.95280000	39.91670000	050301060905
C02S35	Captina Creek	16.00	134.0	C,B,F2,MT,D,S	Dwnt. Armstrongs Mills @ gage	-80.93392362	39.90526267	050301060905
C02S34	Captina Creek	11.70	141.0	C,F2,MT	Upst. Cravat Coal Co., Adj. SR148	-80.90310000	39.89360000	050301060905
C02K03	Captina Creek	8.40	157.0	FT	East of Captina at SR 148	-80.87296375	39.88893988	050301060905
C02S32	Captina Creek	6.71	157.0	C,F2,MT,D,S	SR 148	-80.86940000	39.88670000	050301060905
C02S31	Captina Creek	3.33	163.0	C,B,F2,MT	Upst. Steinersville @ SR 148	-80.84170000	39.87170000	050301060905
C02S40	Pea Vine Creek	0.15	9.9	C,F*,M	SE Armstrongs Mills @ CR 5	-80.90360000	39.89280000	050301060905
C02K01	Captina Creek	0.50	180.0	FT,S	Near mouth (Ohio River impounded)	-80.80720000	39.86080000	050301060906

Storet	Name	RM	Drainage	Sampling	Location	Longitude	Latitude	HUC 12
C02K06	Cat Run	3.30	8.2	C,F*,M,D,S	Upst. pipeline @ CR 56 (Cat Run Road)	-80.88670000	39.85080000	050301060906
C02S38	Cat Run	0.25	12.8	C,B,F*,M	near mouth @ CR 56 (Cat Run Road)	-80.84860000	39.87000000	050301060906
HUC 10 – 0503010612 Short Creek-Ohio River								
C02L05	Weege Creek	2.21	9.3	C,B,F*,M	SW Shadyside, dwnst. Stone Coal Run	-80.78560000	39.95690000	050301061206
C02S64	Big Run	0.45	4.0	C,F*,M	Upst. AMD impacted area, upst. SR 7	-80.78403604	39.92392012	050301061207
300644	Big Run	0.05	4.5	C,F*,M	Dwnst. AMD issue, near Ohio River, Pipe Creek Road	-80.78684280	39.91896378	050301061207
203417	Pipe Creek	1.20	11.2	C,B,F*,M	near Vadis, adj. Pipe Creek Road	-80.82690000	39.92440000	050301061207
HUC 10 – 0503020101 Sunfish Creek								
203458	Baker Fork	1.20	8.0	C,F,M,D,S	Adj. Twp Rd 81 at Twonship Line	-81.10882356	39.80502167	050302010101
C02K32	Sunfish Creek	27.10	9.9	C,F,M	NW Woodsfield, adj. TR 923	-81.16052957	39.78560068	050302010101
300663	Sunfish Creek	25.10	21.0	C,F2,MT	Upst. WTP, Adj. T-999	-81.11678946	39.78668984	050302010101
C02S84	Sunfish Creek	23.85	22.5	C,B,F2,MT,D,S	N of Woodsfield @ CR 76	-81.10810000	39.79310000	050302010101
300665	Piney Fork	4.20	5.0	C,F,M	Kings Road, CR 1	-81.05158150	39.81211245	050302010102
C02S04	Piney Fork	0.30	15.5	C,B,S,F*,M,D,S	TR 152	-81.01107544	39.77901571	050302010102
C02S03	Sunfish Creek	22.80	31.0	C,F2,MT	Just Dwnst. Baker Fork, end of OP Jackson Road	-81.09395614	39.79383230	050302010103
C02S01	Sunfish Creek	17.30	50.0	C,F2,MT,D,S	Dwnst. Standingstone Run, adj. CR 29	-81.04720000	39.77250000	050302010103
203457	Sunfish Creek	15.10	54.7	C,B,F2,MT,FT	Upst. Piney Fork @ Altitude-Miller Hill Road	-81.01860000	39.77560000	050302010103
203456	Sunfish Creek	9.30	79.0	C,S,F2,MT,D,S	Upst. Cameron, Sunfish Creek Road at ford	-80.96079882	39.76681038	050302010104
609200	Sunfish Creek	7.10	99.0	C,S,F2,MT,D,S	Dwnst. Cameron, Donald Brown Road off SR78	-80.93543405	39.76843833	050302010104
C02S79	Sunfish Creek	1.80	105.0	C,B, F2,MT	W of Powhatan Point, upst.	-80.88860000	39.75690000	050302010104

Storet	Name	RM	Drainage	Sampling	Location	Longitude	Latitude	HUC 12
					Negro Run			
203451	Sunfish Creek	0.20	114.0	FT	At mouth, impounded at Clarington	-80.87303780	39.76473410	050302010104
HUC 10 – 0503020110 French Creek-Ohio River								
203415	Opossum Creek	2.20	22.2	C,F2,MT	Adj. Beautiful Ridge Road, Dwnst. Alum Run	-80.87860000	39.72110000	050302011002
300664	Opossum Creek	1.05	24.0	C,B,F2,MT	At Ford upst Gilmore Run	-80.85916398	39.72612261	050302011002
300639	Narrows Run	0.10	3.4	C,B,F*,M	Adj. Narrows Road	-80.93568426	39.61576010	050302011005
203411	Mill Creek	0.70	9.1	C,B,F*,M	NE of New Matamoras @ TR 66	-81.05310000	39.53940000	050302011006
C01S02	Leith Run	2.80	7.0	C,B,F*,M,D,S	Leith Run Road	-81.14577568	39.48064183	050302011007
203392	Newell Run	1.70	7.0	C,B,F*,M	Dwnst. Peggs Fork, Adj. Newells Run Road	-81.26920000	39.40190000	050302011009

Table 4. List of chemical/physical water quality parameters to be analyzed/measured in surface water, sediment, and fish tissue from the Central Ohio River tributaries sampling locations. Not all sites will be samples for all parameters. Water samples will be collected 5 times (organics once), sediment once. Bacteria samples will be collected 5 times during the recreation season (5– 10 times at sentinel sites). Select sampling locations will be monitored for dissolved oxygen, pH, temperature, and conductivity using Datasonde© continuous recorders (Table 2).

Parameters	Test Method	Water	Sediment	Fish Tissue
Cbod, 20 day	?	X		
SOLIDS, DISSOLVED (TDS)	USEPA 160.1	X		
SOLIDS, SUSPENDED (TSS)	USEPA 160.2	X		
AMMONIA	USEPA 350.1	X		
TKN	USEPA 351.2	X		
NITRATE-NITRITE	USEPA 353.1	X		
Nitrite	USEPA 354.1	X		
Chloride	USEPA 325.1	X		
COD	USEPA 410.4	X		
TOTAL PHOSPHORUS	USEPA 365.4	X		
ORTHOPHOSPHATE, Dissolved	?	X		
GLYPHOSATE	USEPA 547	X		
ICP 1 (Al,Ba,Ca, Fe, Mg, Mn, Na, Ni, K, Sr, Zn, Hardness)	USEPA 200.7	X		
ICP 3 (Al,Ba,Ca,Fe,Mg,Mn,Na,K,Sr,Zn)	USEPA 200.7		X	
ICPMS 1 (As,Cd,Cr,Cu,Ni,Pb,Se)	USEPA 200.9, SM 3113B	X		X
ICPMS 2 (As,Cd,Cr,Cu,Ni,Pb,Se)	USEPA 200.9, SM 3113B		X	
MERCURY, TOTAL	USEPA 245.1,7470A,7471A	X	X	X (245.1)
pH – grab	YSI 556MPS meter	X – field		
Conductivity – grab	YSI 556MPS meter/ USEPA 120.1	X – field / lab		
Dissolved Oxygen – grab	YSI 556MPS meter	X – field		
Temperature – grab	YSI 556MPS meter	X – field		
VOCs	USEPA 624/USEPA 8260	X	X	
Herbicides	USEPA 525.2	X		
SVOCs (BNAS)	USEPA 625/ USEPA 8270C	X	X	
Pesticides/PCBs/ Chlordane	USEPA 608/ USEPA 8081A, 8082	X (PCBs only)	X (PCBs olnly)	X (OEPA 590.1)
E.coli	USEPA 1103.1/ 640.1	X		
Percent Solids	SM 2540G		X	X

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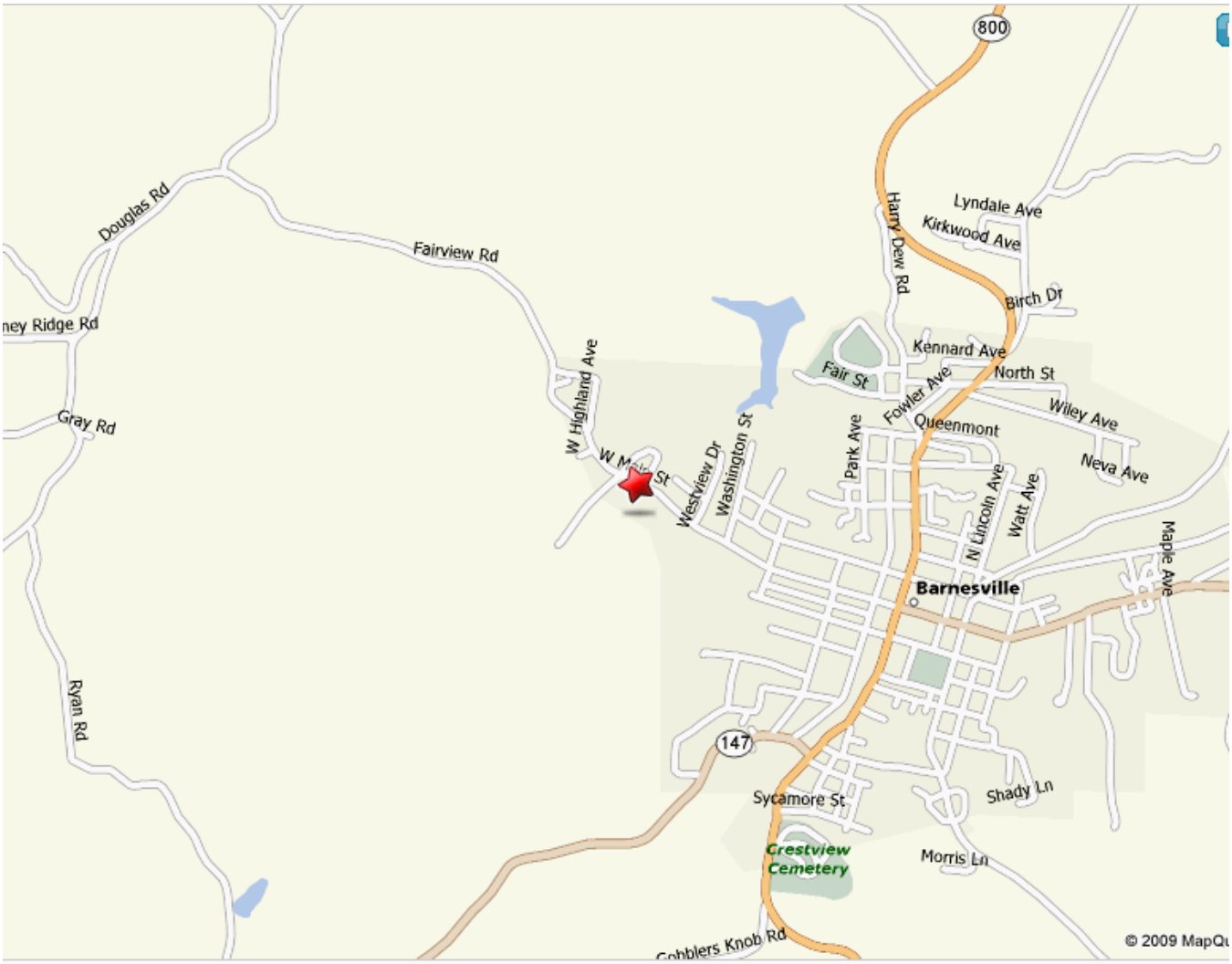
Appendix A

Hospital Directions and Maps

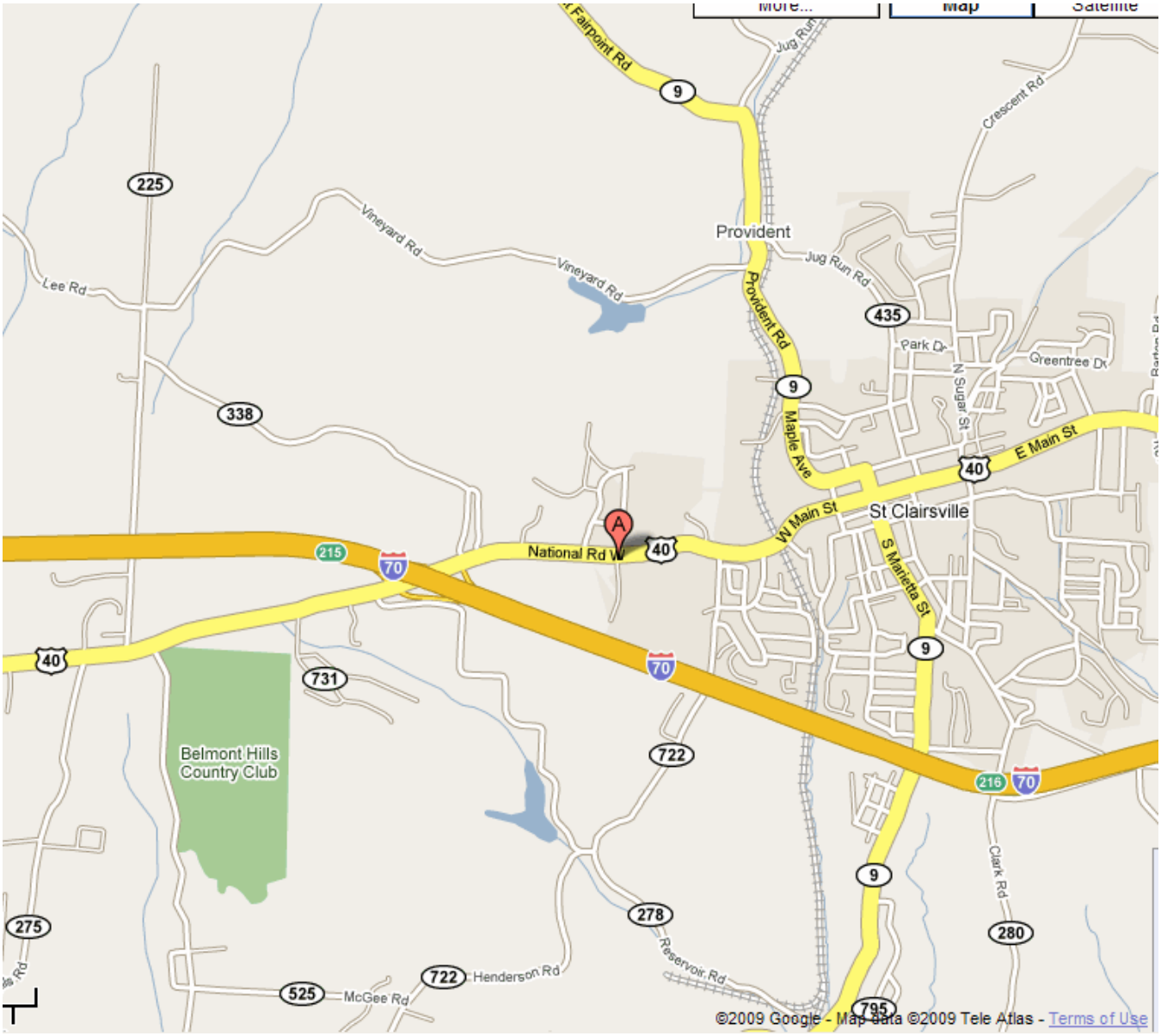
Barnesville Hospital

639 W. Main Street
Barnesville, OH 43713
(740) 425-3941



Eastern Ohio Hospital

106 Plaza Drive
St. Clairsville, Ohio
740-695-2364



Marietta Memorial Hosptial

401 Matthew Street
Marietta, Ohio
740-374-1596

Directions to Marietta Memorial Hospital

From Parkersburg - Wood County Airport

When coming down the airport road, turn left onto Rt. 31 and follow that North to Rt. #14. Turn left at Rt. 14 and follow this through Williamstown - it will include two stop lights. When you get to the second stop light, go straight across the bridge. Turn left onto Pike Street. Take Pike Street to Third Street and turn right. (There is a Rite Aid at this intersection). Follow Third Street about 1.5 miles to Matthew Street. Turn right on Matthew.

From Columbus,OH

Take 70 East to 77 South.Follow 77 South to the Marietta exit,Exit 1.When you exit,go to the right and you 'll merge with Pike Street traffic.

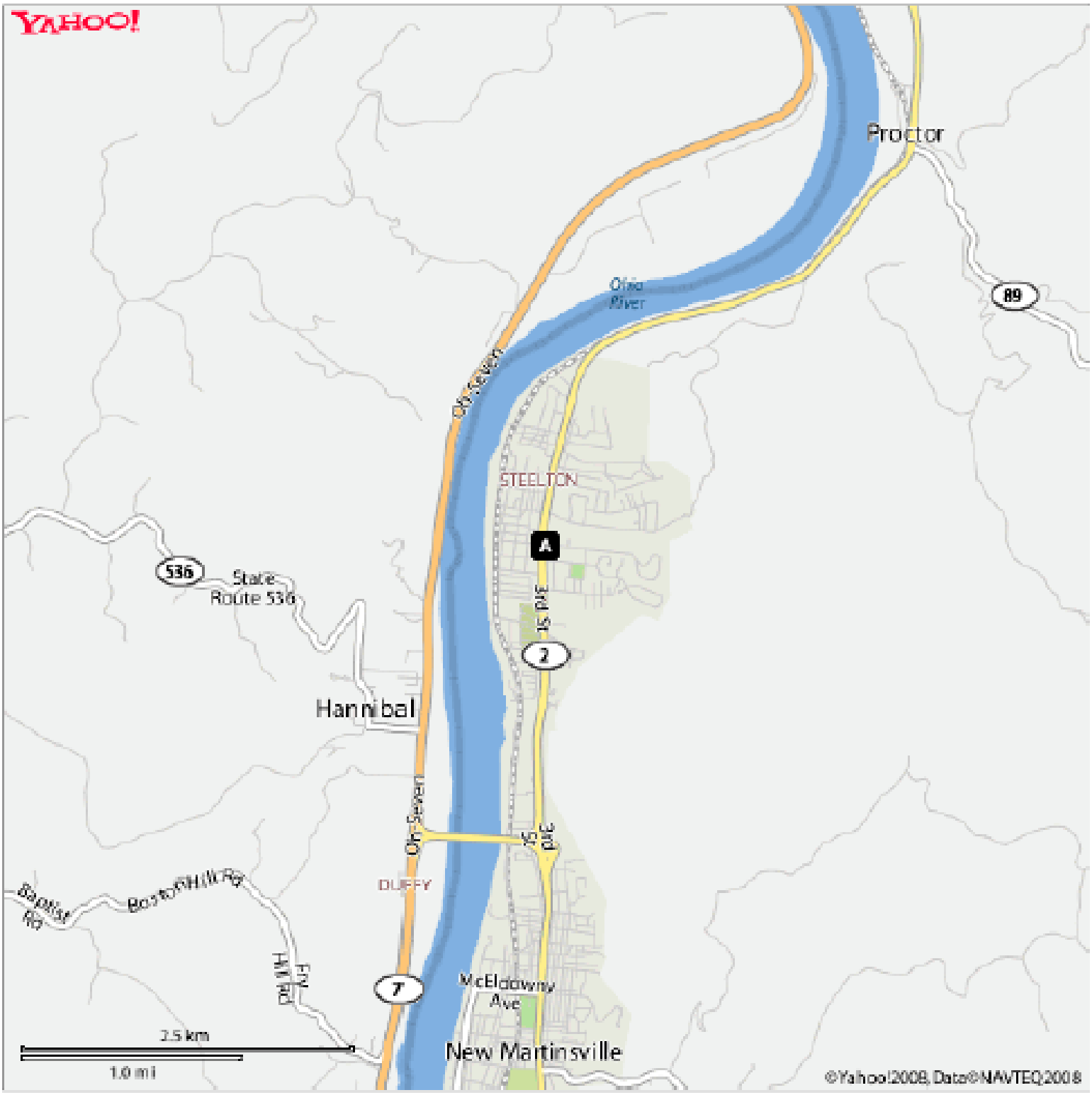
Take Pike Street to Third St.and turn right.There is a Rite Aid Pharmacy at this intersection. Follow Third about 1.5 miles to Matthew St.Turn right on Matthew.

Parking is available in the garage off the main entrance from Matthew Street.

From Charleston,WV

Follow 77 North to Marietta exit,Exit 1. Follow above directions,including turning right and merging with Pike Street traffic.

From Athens, OH

Take US-50 E / OH-32 E toward BELPRE. Merge left to on-ramp to Ohio Route 7 North. Follow Route 7 all the way to where Route 7 turns into Washington Street. Go over the Washington Street Bridge to Third Street. Turn left on Third. Follow Third for about three blocks to Matthew Street. Turn Right on Matthew. Follow directions to the parking garage.

Map of Wetzel County Hospital 3 E Benjamin Dr, New Martinsville, WV 26155-2705