Stillwater Creek

Biological and Water Quality Study Plan
2012
Harrison, Belmont, Guernsey & Tuscarawas Counties

Ohio Environmental Protection Agency
Division of Surface Water
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Columbus, OH 43215

Ecological Assessment Section
4675 Homer Ohio Lane
Groveport, Ohio 43125

Southeast District Office
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February 19, 2009

Ohio Environmental Protection Agency

CONTACTS

WARNING – Before crews sample below the spillways of Piedmont, Clendening and Tappan Lake, make sure you contact the USACE office. Hydrogen sulfide gas has been detected below the dams at dangerous levels and you need to wear a monitor if you are sampling for any period of time. Contact names are listed below for each dam.

USCOE/Muskingum Area			
Assistant Operations Manager	**Piedmont Lake** 32665 Belmont Ridge Rd, Piedmont, OH	**Clending Lake** Clendenning Dam Rd , Tippecanoe, OH	**Tappan Lake** 86801 Eslick Rd. Uhrichsville, Ohio
Thomas T. Leach **PH: 330.343.4661** **CELL: 330.260.0754**	**Tim Butler** **740-968-4440**	**Anthony Gardner** **740-658-3743**	**Levi Gladman** **(740) 269-2681**

Ohio EPA/ODNR		
Groveport/CO	**SEDO**	**ODNR-MRM**
Ben Rich 614 -836-8772 Mike Bolton 614-836-8781 cell 614-542-7668 Keith Orr 614-644-2885 cell 614–395-1862 Holly Tucker 614-836-8777 Jeff Deshon 614-836-8780	Kelly Capuzzi 740-380-5283 cell:740-603-5627 Randy Spencer 740-380-5240 Joann Montgomery 740-380- 5433 Tim Campbell 740-380-5426 Jennifer Witte 740-380-5206	Chad Kinney 330-339-2207 ext 222 Cell 740-541-3331 Mike Mozena 740-439-3640 Ben McCament 740-592-3748

Safety

Hospitals		
Harrison	**Belmont**	**Tuscarawas**
Harrison Community Hospital 951 East Market Street Cadiz, OH 43907 (740) 942-4631	Barnesville Hospital Assoc., Inc. 639 West Main Street Barnesville, OH 43713 (740) 425-5101	Twin City Medical Group 819 North 1st Street Dennison, OH 44621 (740) 922-7474
		Union Hospital 659 Boulevard Street Dover, OH 44622 (330) 343-3311

Sheriff			
Belmont County	**Guernsey County**	**Harrison County**	**Tuscarawas County**
Belmont County Sheriff (m-y) 68137 Hammond Rd. St. Clairsville, OH 43950 **(740) 695-7933**	Guernsey County Sheriff (m-n) 601 Southgate Pkwy. Cambridge , OH 43725 **(740) 439-4455**	Harrison County Sheriff (m-y) 114 Court St. Cadiz , OH 43907 **(740) 942-2197**	Tuscarawas County Sheriff (m-n) 2295 Reiser Ave S.E. New Philly, OH 44663 **(330) 339-2000**
Ohio State Highway Patrol			
St. Clairsville Patrol Post 51400 National Road St. Clairsville, OH 43950 **(740) 695-0915**	Cambridge Patrol Post 7051 Glenn Highway Road Cambridge, OH 43725 **(740) 439-1388**	Steubenville Pat. Post 1377 Cadiz Road Wintersville, OH 43953 **(740) 264-1641**	New Philadelphia Patrol Post 2454 East High Avenue New Philadelphia, OH 44663 **(330) 339-1103**
ODNR Wildlife Officers			
Belmont Brian Baker (740) 589-9981	Guernsey Roby Williams (740) 589-9984	Harrison Nick Turner (330) 245-3049	Tuscarawas Wade Dunlap (330) 245-3047

Muskingum Watershed Conservancy District	
Scott Barnhart Muskingum Watershed Conservancy District Chief of Recreation / Chief Ranger 330-343-6647 ext. 2261	Mark Swiger Conservation Administrator 330-343-6647 ext. 2273 877-363-8500 mswiger@mwcd.org

INTRODUCTION

During the 2012 field seasons (June through October) chemical, physical, and biological sampling will be conducted in the Stillwater Creek basin to assess and characterize water quality conditions. The study area is composed of 16 watershed assessment units (HUC 12s) with a total of 49 sampling stations. The Stillwater Creek watershed has not been thoroughly assessed so most of the mainstem and tributaries have unverified use designations. Table 1 contains a list of all the NPDES facilities on the mainstem. The sampling effort is structured to characterize point source and non point source impacts, including those from historic and active mining, unsewered communities and agricultural activities. Sampling locations, geographical coordinates, and types of sampling scheduled for the study area are listed in Table 2.

Objectives:

- Monitor and assess the chemical, physical and biological integrity of the Stillwater Creek watershed
- Determine aquatic impacts from known potential pollution sources including point source dischargers and active/historic mining impacts
- Assess physical habitat influences on stream biotic integrity
- Determine recreational water quality
- Support of, coordination with, and incorporation of DDAGW PWS sampling.
- Support of, coordination with, and incorporation of modeler sampling requirements if initial sampling indicates potential non-attainment.
- Coordinate with ODNR-Mineral Resources Management (MRM) to determine beneficial reclamation projects within the watershed.

SAMPLING ACTIVITIES

Chemical/Physical Water

Chemical sampling locations within the study area are listed in Table 2. Conventional chemical/physical water quality samples will be collected 5 times at each designated location during the survey. Datasondes© will be deployed at ten locations. Surface water sampling will occur across a variety of flow conditions, from lower flows to moderate and higher flows. Nine sentinel locations will be monitored monthly from November 2011 to November 2013 for modeling purposes.

Bacteriological Sampling

Water samples will be collected at 20 sites for bacteriological analyses to determine the attainment status of the Primary Contact recreational use. Testing will include Escherichia coli (E. coli) bacteria. Each site will be sampled 5 to 10 times.

Macroinvertebrate and Fish Assemblages

Quantitative or qualitative macroinvertebrate sampling methods will be used as for stations noted in Table 2. Fish assemblages will be sampled once for locations with a drainage area less than 20 square miles and twice at locations with a drainage area greater than 20 square miles (listed in Table 2). QHEI scores will be calculated at all fish sampling locations.

Lake Sampling

Piedmont, Clendening and Tappan Lakes will be sampled 5 times in 2012 and 5 times in 2013 from May through September. Lake sampling procedures will follow the protocols developed by the OEPA and the Lakes Sampling Manual

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 2008), Biological Criteria for the Protection of Aquatic Life, Volumes II - III (Ohio Environmental Protection Agency 1987, 1989a, 1989b), and The Qualitative Habitat Evaluation Index (QHEI); Rationale, Methods, and Application (Rankin 1989) for habitat assessment. Fish Tissue samples will follow the Fish Tissue Collection Manual (April 2012)

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 ecoregion.

Recreational use attainment will be determined using E. coli bacteria. E. coli is an indicator organism for the potential presence of pathogens in surface water resulting from the presence of untreated human or animal wastes, and is 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

The macroinvertebrates will be sampled quantitatively. Macroinvertebrates will be collected from artificial substrates and from the natural habitats. 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 twice at each sampling location with pulsed DC current boat electrofishing. Detailed biological sampling protocols are documented in the Ohio EPA manual Biological Criteria for the Protection of Aquatic Life, Volume III (1989).

Surface Water
Surface water grab samples will be collected from the upper 12 inches of river water and sampled directly 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 2012) and delivered to the Ohio EPA lab for analyses. Datasonde© continuous recorders will be placed at select locations to evaluate diurnal measurements of dissolved oxygen, pH, temperature, and conductivity. Continuous temperature recorders will be placed for a minimum of 6 weeks (with the placement of HD samplers) at three sites – sites located upstream and downstream from the Picway power station.

Bacteria
Water samples will be collected directly from the river into sterilized polyethylene containers, cooled to 4°C, and transported to the Ohio EPA lab in Columbus within 6 hours of sample collection. All samples will be analyzed for E. coli bacteria using U.S.EPA approved methods.

Field Quality Control Samples
Five percent of the 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 2012). An acid blank will be run on new lots of acid ampules. A cubitainer blank will be run on new lots of cubitainers.

Table 1 Facilities regulated by the National Pollution Discharge Elimination System (NPDES) permit

Permit No.	Permit Name	Oufall	Receiving Waters	Design Flow (GPD)	Latitude	Longitude	HUC 12
0IJ00049	Egypt Valley Stone - Shugert Mine	001	UTO Stillwater Cr	120222	40.07385	-81.12778	050400011304
0IL00141	Rosebud Mining Co - Tusky Mine	001	Little Stillwater Creek	28800	40.39473	-81.30582	050400011505
0IL00141	Rosebud Mining Co - Tusky Mine	004	Little Stillwater Creek	19400	40.39879	-81.31483	050400011505
0IL00141	Rosebud Mining Co - Tusky Mine	005	Little Stillwater Creek	14100	40.39649	-81.31009	050400011505
0IL00152	Rosebud Mining Co - Vail Mine	001	Craborchard Creek	7839	40.20877	-81.29375	050400011403
0IL00152	Rosebud Mining Co - Vail Mine	002	Craborchard Creek	3456	40.21083	-81.29306	050400011403
0IN00237	Harrison County Sanitary Landfill	001	UT to UT to Clear Fork	2197158	40.30951	-81.0055	050400011501
0IN00237	Harrison County Sanitary Landfill	002	UT to Clear Fork	0	40.31622	-80.99407	050400011501
0IN00237	Harrison County Sanitary Landfill	003	UT to Clear Fork	0	40.31192	-80.98975	050400011501
0IN00237	Harrison County Sanitary Landfill	004	UT's to Clear Fork	0	40.30524	-80.99798	050400011501
0IV00100	Twin City Water District WTP	001	Stillwater Creek	42000	40.37626	-81.33556	050400011604
0IV00100	Twin City Water District WTP	002	Stillwater Creek	7000	40.38222	-81.33167	050400011604
0PD00015	Twin City WWTP	001	Stillwater Creek	1700000	40.4057	-81.3425	050400011604

Table 2 Sampling stations in the Stillwater Creek Watershed 2012.

River Mile	Sample Type	Location	Latitude	Longitude	Drainage Area	Station
1.34	F, M, C^L, B	STILLWATER CREEK N OF URICHSVILLE @ Johnson Drive	40.426900	-81.355300	483.0	611720
2.60	F, M, C^L, D	STILLWATER CREEK 0.48 MI. DST. TWIN CITIES WWTP	40.412500	-81.346400	481.0	R09W03
3.08	C^L, B	TWIN CITIES WWTP 001 OUTFALL TO STILLWATER CREEK	40.406400	-81.342800	481.0	R09W02
3.10	F, M, C^L	STILLWATER CREEK JUST UPST. TWIN CITIES WWTP	40.406100	-81.342500	481.0	R09W01
5.10	F, M, C^L, D, FT	STILLWATER CREEK AT URICHSVILLE @ Trenton Ave (DST dam)	40.388071	-81.346628	367.0	301959
7.00	F, M, C, O	STILLWATER CREEK SE OF URICHSVILLE, NEAR FILTRATION PLANT	40.376400	-81.337500	364.0	R09K05
9.93	F, M, C	STILLWATER CREEK Wolford Rd	40.348425	-81.337166	357.5	301960
18.51	F, M, C, B, FT	STILLWATER CREEK AT STILLWATER @ ST. RT. 800	40.317500	-81.311100	345.0	R09S07
25.50	F, M, **C**, D, FT	STILLWATER CREEK AT TIPPECANOE @ NORRIS RD.	40.269700	-81.290600	282.0	R09K06
33.00	F, M, C, B	STILLWATER CREEK NW OF FREEPORT, JUST DST. CRABORCHARD CREEK	40.218300	-81.278900	189.0	R09S10
38.24	F, M, **C**, B, D, FT	Stillwater Cr., dst of Piedmont Lake	40.195000	-81.215600	86.0	R09S06
50.20	F, M, **C**, B, D	Stillwater Creek Farm Lane off Egypt Lane	40.095675	-81.131863	74.0	301718
52.80	F, M, C,	Stillwater Creek at Egypt N. Rd	40.060185	-81.120568	12.6	301961
54.00	F, M, C, B	Stillwater Creek at Olivett Rd	40.046873	-81.112227	9.4	301962
1.50	F, M, C,	ATKINSON CREEK NW OF FREEPORT @ RIGGS HOLLOW RD.	40.231700	-81.306700	11.8	R09S17
0.80	F, M, C,	CRABORCHARD CREEK W OF FREEPORT@ BIRMINGHAM RD.	40.213300	-81.290800	11.4	R09K09
2.80	F, M, C	L. STILLWATER CREEK AT DENNISON @ ST. RT. 800	40.393900	-81.324700	105.0	R09K12
5.50	F, M, C	L. STILLWATER at CR 37	40.405193	-81.288253	96.4	301963
10.50	F, M, **C**, B, D, FT	L. STILLWATER CREEK JUST DST. TAPPAN LAKE DAM	40.356700	-81.229200	71.0	R09S03
1.07	F, M, C	Plum Run at Plum Run Rd W of Tappan Lake	40.371856	-81.240009	3.9	301964
0.50	F, M, C	Trib to Little Stillwater (RM 7.6) at Yager Rd	40.389711	-81.256941	4.3	301965
3.50	F, M, **C**, B, D	CLEAR FORK Mizer Road TR 235	40.337030	-81.099205	22.1	301720
8.5	F, M, C	Clear Fork at Lower Clear Fork Rd NW of Cadiz	40.325357	-81.035298	9.9	301991

River Mile	Sample Type	Location	Latitude	Longitude	Drainage Area	Station
2.48	F, M, **C**, B, D	STANDINGTONE FORK at Mooreland Road	40.294859	-81.076017	7.7	301721
0.70	F, M, C, B	Crooked Creek at SR 258 east of Rock	40.308564	-81.323343	47.3	301966
4.00	F, M, C	Crooked Creek CR 33 at Rock	40.304672	-81.362274	14.9	301967
1.40	F, M, C	Watson Creek at Ripley Road	40.307056	-81.394698	7.9	301968
0.17	F, M, C, B	Laurel Creek (trib to Crooked) at SR 258	40.301984	-81.327762	28.7	301969
6.90	F, M, C	Laurel Creek (trib to Crooked) Laurel Run Rd	40.246241	-81.369782	10.8	301970
0.05	F, M, C	Fallen Timber Creek At SR 258	40.277845	-81.331814	9.5	301971
1.65	F, M, C, B	Weaver Run at Kinsey Rd	40.308510	-81.284805	8.5	301992
0.10	F, M, C	Hitchcock Run at Weaver Run Rd CR 39	40.311912	-81.270312	3.5	301973
0.29	F, M, **C**, B, D, FT	BRUSHY FORK JUST DST. CLENDENING LAKE DAM	40.268100	-81.280300	69.0	R09S05
12.50	F, M, **C**, B, D	BRUSHY FORK Spiker Road TR 346	40.257969	-81.127227	26.7	301719
18.80	F, M, C	BRUSHY FORK Freeman Road	40.247981	-81.052262	5.4	301836
0.20	F, M, C	Elk Run at Elk Run Rd	40.246866	-81.145344	5.6	301974
2.20	F, M, C, B	Skull Fork Covered Bridge Rd	40.183085	-81.268946	43.0	301975
6.80	F, M, C	Skull Fork at Skull Fork Rd	40.139167	-81.265409	26.9	301976
13.80	F, M, C	SKULL FORK 5.4 MI. SE OF LONDONDERRY, DST. PENNY-ROYAL RD.	40.082800	-81.266900	7.1	R09K31
0.62	F, M, C	Trib to Skull Fork at RM 13.87	40.078082	-81.258114	1.2	301977
0.90	F, M, C	Miller Fork at Tyson Mill Rd	40.124854	-81.294438	6.3	301978
1.30	F, M, C, B	Sixmile Run Murphy Ridge Road	40.127962	-81.139636	4.8	301979
0.60	F, M, C	TRIB TO Sixmile Run at Fairhill Road	40.134380	-81.141880	1.6	301986
0.75	F, M, C, B	BOGGS FORK at old Piedmont Rd.	40.190557	-81.203606	28.6	301980
6.70	F, M, C	BOGGS FORK N OF HOLLOWAY @ NOTTINGHAM-HOLLOWAY RD.	40.171400	-81.135000	13.2	R09K32
0.40	F, M, C	Plum Run (trib to Boggs) at old Piedmont Rd	40.194007	-81.198271	6.7	301981
0.75	F, M, C	TRAIL RUN at Holloway Pratt Street	40.161943	-81.137301	6.4	301982
0.30	F, M, C	Rush Run at Rush Run Road	40.176414	-81.135551	1.9	301983

River Mile	Sample Type	Location	Latitude	Longitude	Drainage Area	Station
6.85	F, M, C, B	SPENCER CREEK Hillcrest Road	40.020096	-81.156926	6.7	301985

C – Inorganic water chemistry AMD template(Bold is Sentinel Site – include CBOD20 and OrthoP)
C^L – Inorganic water chemistry large river template
O –Organic water chemistry (525.2 atrizine)
B – Bacteria
F – Fish (2 passes at site >20Sq Mi; 1pass at sties <20 Sq Mi)
M – Macroinvertebrate
D – Datasonde©
FT – Fish Tissue

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Type	Number of Sites
Inorganice water chemistry	49
Organic water chemistry	1
Bacteria	20
Fish	48
Macroinvertebrate	48
Datasonde©	10

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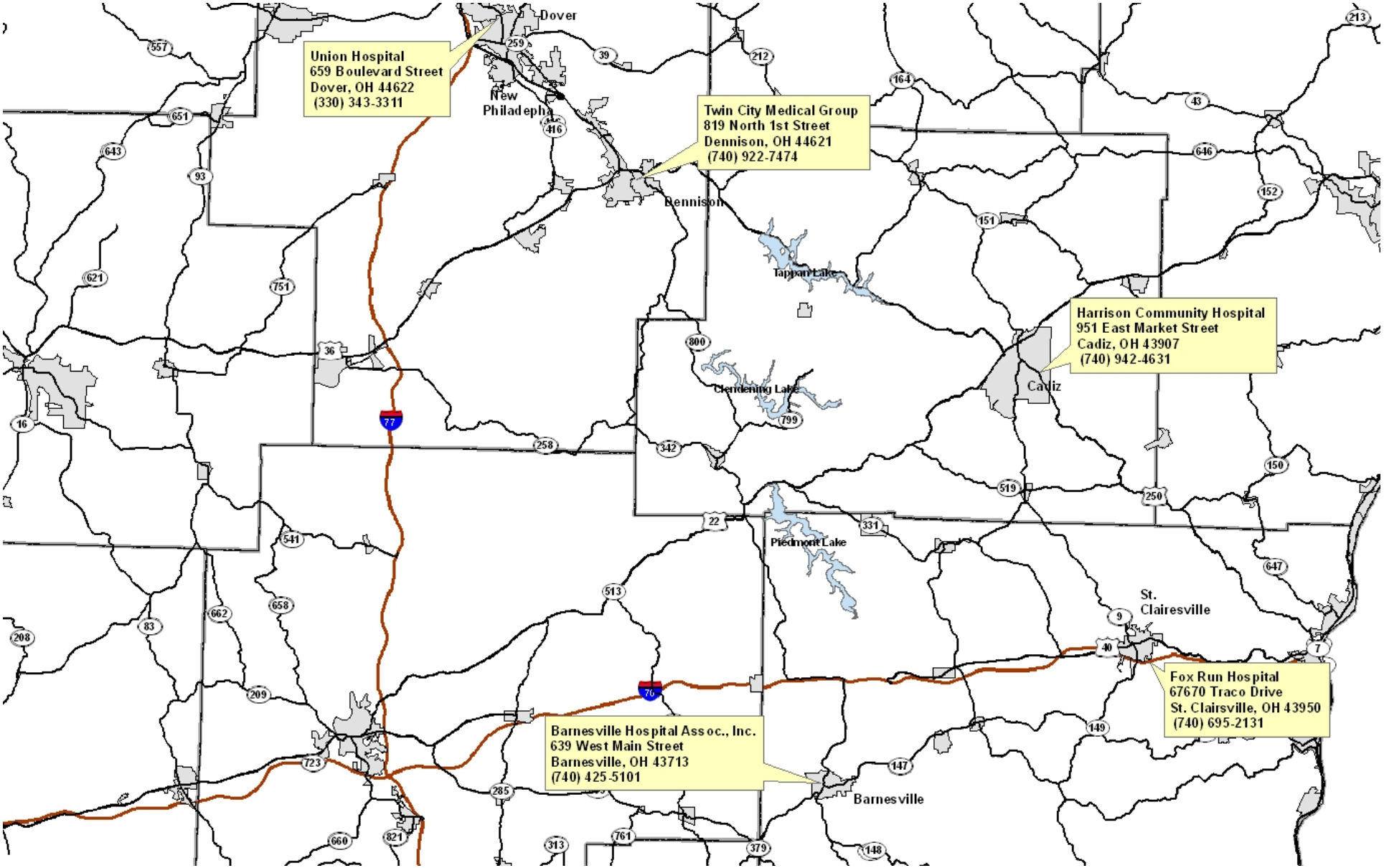
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