Northeast Ohio Regional
SEWER
DISTRICT

Greater Cleveland Area
Environmental Water Quality Assessment
1996-1998

GREATER CLEVELAND AREA
ENVIRONMENTAL WATER QUALITY ASSESSMENT
1996 - 1998

NORTHEAST OHIO REGIONAL SEWER DISTRICT

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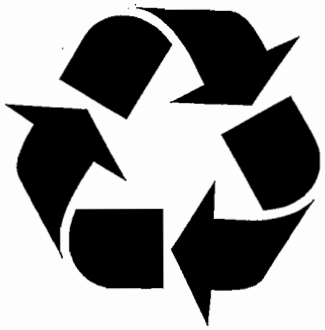

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Northeast Ohio Regional Sewer District
Water Quality & Industrial Surveillance
Environmental & Maintenance Services Center
4747 East 49th Street
Cuyahoga Heights, Ohio 44125-1011

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EXECUTIVE SUMMARY

The 1996-1998 Greater Cleveland Area Environmental Water Quality Assessment is the Northeast Ohio Regional Sewer District's sixth comprehensive report on water quality within its service area. Previous reports were prepared for 1987, 1988, 1989-1990, 1991-1992 and 1993-1995. Early responsibilities of the Water Quality and Industrial Surveillance Environmental Assessment program included visual surveys of area streams and follow-up inspections to environmental disruptions; in-field measurements of temperature, dissolved oxygen and stream flow rate; collection of samples for the analysis of chemical and bacteriological parameters; and qualitative sampling of benthic macroinvertebrates.

Since 1987, the Environmental Assessment program has been expanded to include the following:

- Routine monitoring of additional sites on a greater number of streams.
- The collection of samples for chemical and bacteriological analysis at 15 sites in the near shore area of Lake Erie.
- Quantitative and semi-quantitative sampling of benthic macroinvertebrates and the corresponding use of Ohio EPA's Invertebrate Community Index (ICI) and the Hilsenhoff Biotic Index (HBI) to evaluate macroinvertebrate communities.
- Quantitative sampling for fish using long-line and boat electroshocking techniques and the corresponding use of Ohio EPA's Modified Index of Well-Being (MIwb) and Index of Biotic Integrity (IBI) to evaluate fish communities.
- The evaluation of aquatic habitat using Ohio EPA's Qualitative Habitat Evaluation Index (QHEI).

The charge of the NEORSD Environmental Assessment program, which has remained in effect since the program's inception, is as follows:

1. To document water quality improvements due to NEORSD facilities and programs;

2. To determine sources of environmental disruptions and make recommendations for their elimination;

3. To coordinate monitoring activities with other agencies with interests in water quality;

4. To provide a scientifically sound current information basis for environmental planning and future abatement projects.

While past NEORSD Environmental Water Quality Assessment reports have presented data confirming the dramatic improvement in the area's surface water quality, a significant success of the program has been the discovery and resulting elimination of numerous unaddressed sources of pollution. The environmental disruptions discussed in this report, which include sewerage leaks and cross connections, dry weather combined/sanitary sewer overflows, industrial and commercial oil and chemical spills, and landfill leachate, were either discovered by NEORSD field personnel or reported to NEORSD by citizens or other agencies. In addition to the disruptions discussed in this report, WQIS investigators traced elevated concentrations of fecal coliform and/or *E. coli* bacteria discovered during dry weather outfall surveys conducted in conjunction with NEORSD Planning Department projects. In general, the results of those surveys are not included in this report.

When disruptions involving the dry weather discharge of sanitary sewage are caused by an acute problem, such as a blocked sewer, investigators contact the service department of the responsible community to report the occurrence. In cases involving the dry weather discharge of sanitary sewage which are caused by chronic problems, such as improper sanitary connections to storm sewers, investigators notify the NEORSD Planning Department, which prepares a letter notifying the Service Director of the responsible community.

When a petroleum product or chemical is inappropriately discharged to the environment, the discharger is responsible for the cost of remediation. In cases where a responsible party cannot be identified, the Ohio EPA and/or local fire department ordinarily arrange for remediation of the discharge.

This report cites 101 specific environmental disruptions identified and/or responded to by NEORSD investigators from 1996 through 1998. Sixty-eight of the investigations concluded with effective remedial action being taken.

During 1996, 1997 and 1998, investigators collected 279 routine water quality samples from 75 sites on 18 area streams. Each sample was analyzed for up to 38 physical, chernical and bacteriological parameters. Two hundred eighteen of the samples were collected at stream sites which have been designated as surface waters by Ohio EPA.

Because the frequency with which the NEORSD Environmental Assessment Group is able to collect samples at each location is limited, the following qualifications are employed when comparing routine water quality sampling data to Ohio Water Quality Standards.

1. When no maximum criterion exists for a certain chemical parameter, the failure of a single sample to meet the 30-day average criterion for that parameter is not considered to be an excursion from Ohio Water Quality Standards.

2. The numerical and narrative criteria for Ohio's recreational use designations are shown in Table ES-1. The criteria apply outside of mixing zones, and for each

designation, at least one of the two bacteriological standards (fecal coliform or *E. coli*) must be met. The first portion of the standard for each designation, which clearly requires the collection of at least five samples within a 30-day period, can not be applied to routinely collected NEORSD data. Only the second portion, which for the fecal coliform standard of the primary contact recreational use designation states: "...shall not exceed 2,000 per 100 ml in more than ten percent of the samples taken during any thirty-day period," is applied to routine samples collected by NEORSD.

With the conditions listed above and the exclusion of five concentrations which were measured at or below practical quantification levels[1], a total of 82 excursions from Ohio Water Quality Standards were recorded in 66 of the 279 samples. Forty of the excursions were for parameters typically associated with sanitary sewage - fecal coliform and/or *E. coli* bacteria and dissolved oxygen. Twenty-Eight of the excursions were for iron. Ohio Water Quality Standards revised as a result of the Great Lakes Initiative and effective October 31, 1997, eliminated the iron criterion. Samples also revealed excursions from criteria for zinc (5), copper (4), total chromium (1), hexavalent chromium (1), silver (1), and pH (2). Figure ES-1 illustrates the proportion of routine stream samples which exhibited excursions from Ohio Water Quality Standards and Figure ES-2 breaks the excursions down by parameter.

Thirty-four of the 82 excursions were caused by elevated concentrations of fecal coliform and/or *E. coli* bacteria. As noted in previous NEORSD Environmental Assessment reports, elevated fecal coliform levels have been the most valuable indicators in the identification of sources of stream pollution. Fecal coliform bacteria are found in the intestinal tracts of warm-blooded animals including humans. Elevation of their concentration by as much as several orders of magnitude in urban or suburban waterways provides an indication of contamination by sanitary sewage. Fecal coliform bacteria are not necessarily harmful to aquatic life or humans, but the sanitary sewage in which they are carried is likely to also carry heavy loads of decomposing organic waste, which is harmful to aquatic ecosystems, and pathogens, which can pose a threat of disease through human contact.

Another valuable indicator of environmental disruptions in streams is the benthic macroinvertebrate community. Benthic macroinvertebrates are aquatic organisms which inhabit the bottom regions of water bodies and include insect larvae, crustaceans, snails, clams, worms, etc. A high diversity of benthic macroinvertebrates is typically indicative of a healthy ecosystem, while a low diversity is usually indicative of an ecosystem under environmental stress, such as from pollution. Furthermore, various taxa of benthic macroinvertebrates exhibit various sensitivities to pollution, and through identification of the taxa and knowledge of their tolerance of pollution, the quality of a water body over time may be characterized. In this respect, benthic

[1]A practical quantification level is defined as the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions and is set at five times the method detection limit.

TABLE ES-1

Narrative and numerical criteria for Ohio EPA's Recreational Use Designations (O.A.C. 3745-1-07):

BATHING WATERS

Fecal coliform - geometric mean fecal coliform content (either MPN or MF), based on not less than five samples within a thirty-day period, shall not exceed 200 per 100 ml and fecal coliform content (either MPN or MF) shall not exceed 400 per 100 ml in more than ten per cent of the samples taken during any thirty-day period.

E. coli - geometric mean *E. coli* content (either MPN or MF), based on not less than five samples within a thirty-day period, shall not exceed 126 per 100 ml and *E. coli* content (either MPN or MF) shall not exceed 235 per 100 ml in more than ten per cent of the samples taken during any thirty-day period.

PRIMARY CONTACT

Fecal coliform - geometric mean fecal coliform content (either MPN or MF), based on not less than five samples within a thirty-day period, shall not exceed 1,000 per 100 ml and fecal coliform content (either MPN or MF) shall not exceed 2,000 per 100 ml in more than ten per cent of the samples taken during any thirty day period.

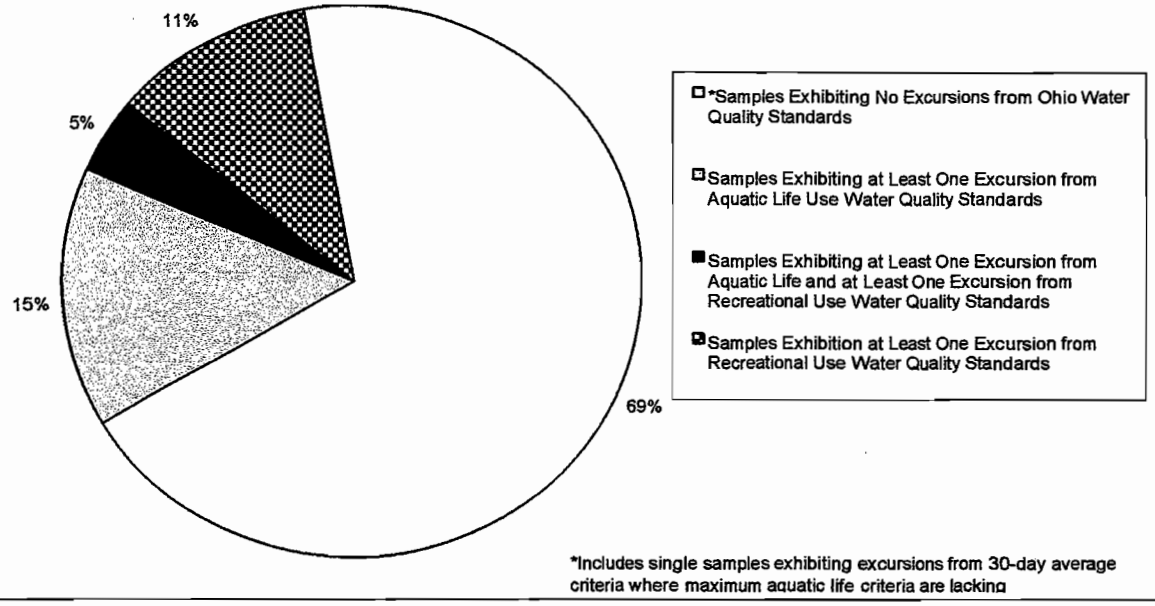
E. coli - geometric mean *E. coli* content (either MPN or MF), based on not less than five samples within a thirty-day period, shall not exceed 126 per 100 ml and *E. coli* content (either MPN or MF) shall not exceed 298 per 100 ml in more than ten per cent of the samples taken during any thirty-day period.

SECONDARY CONTACT

Fecal coliform - shall not exceed 5,000 per 100 ml (either MPN or MF) in more than ten per cent of the samples taken during any thirty-day period.

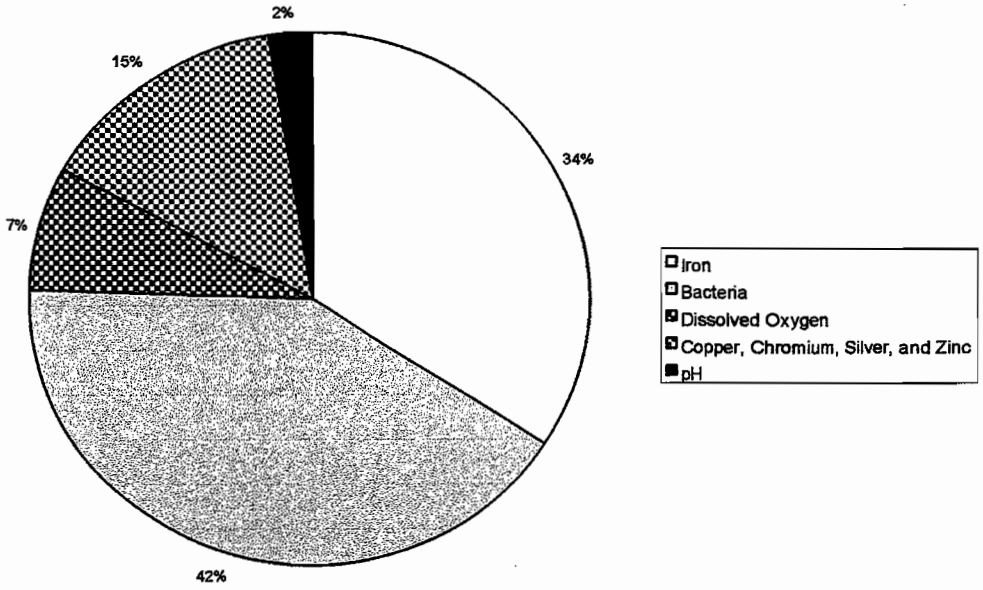
E. coli - shall not exceed 576 per 100 ml in more than ten per cent of the samples taken during any thirty-day period.

Figure ES-1
Comparison of Routine NEORSD Stream Samples to OEPA Water Quality Standards
1996-1998



*Includes single samples exhibiting excursions from 30-day average criteria where maximum aquatic life criteria are lacking

Figure ES-2
Breakdown of NEORSD Measured Water Quality Standards Excursions by Parameter, Routine Stream Samples
1996-1998



macroinvertebrate data can provide more information than chemical or bacteriological data, because the benthic community reflects all recent stream events and is not just a "snapshot" from the time at which sampling occurs.

Numerical indices of the benthic community utilized by the NEORSD include the Hilsenhoff Biotic Index (HBI) and Ohio EPA's Invertebrate Community Index (ICI). The HBI was calculated for 67 sites for the period 1996-1998. Twenty-seven of the sites for which the HBI was calculated during 1996-1998 also had HBI scores calculated for 1993-1995. Narrative ratings of water quality, based on the index, improved at six locations, remained constant at 14 locations and declined at seven locations. The ICI was calculated for a total of 13 sites on Big Creek and Euclid Creek for 1996 through 1998.

Despite the greater mobility of fish populations than of macroinvertebrate populations, fish community data can also provide useful water quality information. During 1997 and 1998, the NEORSD utilized its electrofishing boat to monitor the fish community upstream and downstream of the Southerly Wastewater Treatment Plant. Results indicated, as they had in the past, that the river was not meeting the biological standards which have been set by Ohio EPA. The results also indicated, however, that the fish communities in this area of the river are improving.

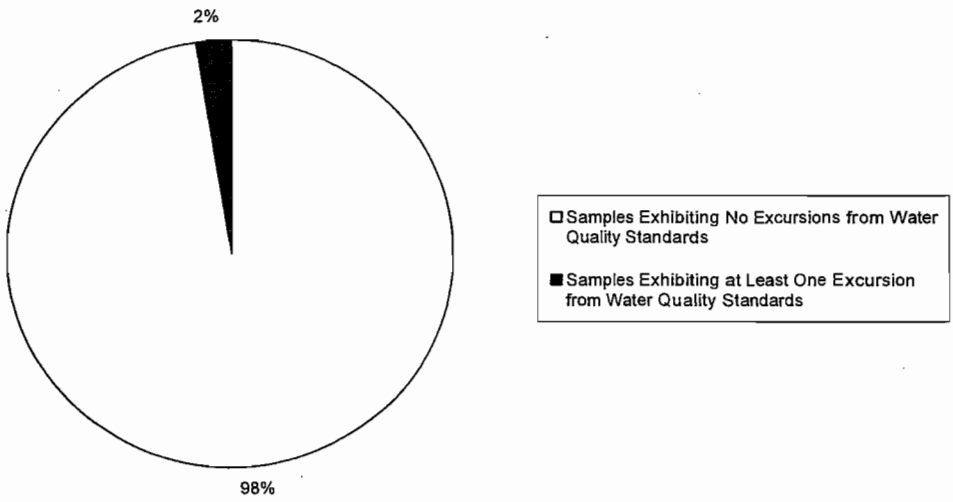
Electrofishing using NEORSD's longline electrofishing equipment was also conducted on the Rocky River and Blodgett Creek in 1994 and 1996. The Blodgett Creek sampling was conducted upstream and downstream of the former Strongsville "A" WWTP, before and after its decommissioning. Sample results indicated an improvement in the fish community downstream of the plant, following its decommissioning and the corresponding diversion of flow to the Southwest Interceptor. Investigators also conducted electrofishing on Euclid Creek and Brandywine Creek during the period from 1996 through 1998. Reports on these projects are included in the appendices to this report.

Because habitat quality is at least as important to the well-being of aquatic biota as water quality, the NEORSD Environmental Assessment group evaluates aquatic habitat using Ohio EPA's Qualitative Habitat Evaluation Index (QHEI). QHEI scores can provide insight into the extent to which differences in biota can be attributed to water quality versus habitat. This report contains the results of the most recent habitat evaluations conducted by investigators at 71 stream locations. Narrative ratings of habitat quality using the QHEI ranged from "poor" to "excellent."

NEORSD Environmental Assessment efforts for the period 1996 through 1998 also included sampling near the surface of Lake Erie at 12 sites along the greater Cleveland shoreline and near the surface and near the bottom at three sites further offshore near the City of Cleveland's public water supply intakes. Seventy-eight lake water samples were collected, each for analysis of up to 38 physical, chemical, and bacteriological parameters. Excluding seven mercury concentrations and one silver concentration which were at or below practical quantification levels, a total of 2 excursions from Ohio

Water Quality Standards were measured in 2 of the 78 samples. Figure ES-3 illustrates the proportion of routine Lake Erie samples which failed to meet Ohio Water Quality Standards. One of these excursions, which was for dissolved oxygen, was measured within the Cleveland Harbor, just northwest of the mouth of the Cuyahoga River. The other excursion was for zinc, and was measured at Site M.

Figure ES-3
Comparison of Routine NEORSD Lake Erie Samples to Ohio EPA Water Quality Standards
1996-1998



Reports on special projects conducted by the NEORSD Environmental Assessment group, in addition to routine monitoring activities, are contained in the appendices to this report. Two of those projects, Cuyahoga River monitoring upstream and downstream of the Southerly Wastewater Treatment Plant, and Blodgett Creek monitoring upstream and downstream of the former Strongsville "A" WWTP, have already been mentioned briefly. Another project merits discussion. During 1997, NEORSD investigators conducted a project in which *E. coli* bacteria concentrations were monitored during both wet and dry weather. Samples were collected between the Rocky River and East 185th Street from several Lake Erie locations and near the mouths of Lake Erie tributary streams. Samples were collected on 47 days from May through September of 1997. This project was conducted in conjunction with the United States Geological Survey's study entitled, "Factors Affecting *Escherichia coli* Concentrations at Lake Erie Bathing Beaches." Results of the project indicate, as would be expected, that *E. coli* concentrations are influenced to a greater extent by wet weather on Lake Erie tributaries located east of downtown Cleveland and at Euclid Beach than on the Rocky and Cuyahoga Rivers and at Edgewater Beach.

Like past NEORSD Environmental Assessment reports, copies of this report will be distributed to researchers, academia, governmental agencies, and the general public. Peer review and comment are invited.

ACKNOWLEDGMENTS

This report was authored by Cathy Zamborsky, Tom Zablotny, Bill Mack, Keith Linn and Frank Foley of the Northeast Ohio Regional Sewer District's Water Quality and Industrial Surveillance (WQIS) Department. The information contained herein was provided by numerous members of the NEORSD WQIS and Sewer Maintenance & Control Departments. The chemical and bacteriological analyses were performed by the NEORSD Analytical Services Department. Benthic macroinvertebrate identification was conducted by Bill Mack. Fish identification was conducted by Tom Zablotny. Maps were prepared by Jeffrey Duke of the NEORSD Planning Department. Computer programming was performed by Scott Horvath of the NEORSD Information Technology Department. The report was edited by Cathy Zamborsky and Frank Foley.

CUYAHOGA RIVER

The Cuyahoga River and its tributaries drain approximately 813 square miles of land in northeastern Ohio (SAIC, 1986). The headwaters of the river originate in Geauga County and drop from approximately 1,300 feet above sea level at an average rate of three to four feet per mile. Flowing south/southwest, the river moves through Lake Rockwell in Portage County and then continues west/southwest through Kent. Entering Summit County, the river flows through Cuyahoga Falls and Akron. As the river moves through the Cuyahoga gorge above Akron, it falls at a rate of about 25 feet per mile. At Akron, the river moves north/northwest and continues down through Cuyahoga County and Cleveland, descending at a rate of about five feet per mile. Compared to its upstream stretches, the river is influenced less by dam structures and diversions as it moves from Akron to Lake Erie.

As the Cuyahoga River flows through northeastern Ohio and finally empties into Lake Erie through Cleveland Harbor, it passes through and around urban, suburban, and rural land. Each of the residential, commercial, industrial, agricultural, and recreational uses exert their influences on the river, either directly or indirectly.

The hydrologic characteristics of the Cuyahoga River vary widely depending on regional precipitation, predominant soil types and their water-holding capacities, and the proportion of the drainage basin covered by impermeable surfaces. The latter is especially influential as the river moves through the highly developed Cleveland area. An increase in low-flow levels may be related to this condition. The soils in the basin range from slightly erodible to highly erodible.

Flow data for the Cuyahoga River is measured by a United States Geological Survey (USGS) station at Old Rockside Road in Independence (RM 13.2). The average flow recorded at this station was 1144 cubic feet per second (CFS) for water year 1996, 1294 CFS for water year 1997, and 870 CFS for water year 1998.

The flow in the Cuyahoga River in its navigable section, downstream of River Mile (RM) 5.6, is strongly influenced by Lake Erie. The dynamics of river and lake mixing near the confluence are primarily a function of the prevailing nearshore currents as well as the physical characteristics of the lower channel and the Lake Erie shoreline. The area where the mixing is most predominant can be considered a freshwater estuary. The effect of Lake Erie on the flow of the Cuyahoga River can be observed as far as six to seven miles upstream. Additionally, the slow moving current in the lower channel has led to the deposition of large amounts of sediment. A high rate of solids settling requires that the lower navigation channel be dredged routinely to maintain a depth of 25 to 30 feet. This sediment has been carried downstream from the river's upper and middle reaches and originates primarily from upland areas in the basin (U.S. Army Corps of Engineers, 1981). River transport of 211,000 and 530,000 tons of sediment

per year have been estimated by the USGS and the Army Corps of Engineers, respectively (SAIC, 1986).

In 1993, the Ohio EPA adopted modified aquatic life use designations for the Cuyahoga River Navigation Channel, based upon results of biological and water quality analyses and water quality modeling studies. The Ohio EPA has recognized the habitat restrictions in this river segment resulting from physical factors such as continual dredging, steel shoring of banks, and the total lack of riparian buffer and shallow water habitat.

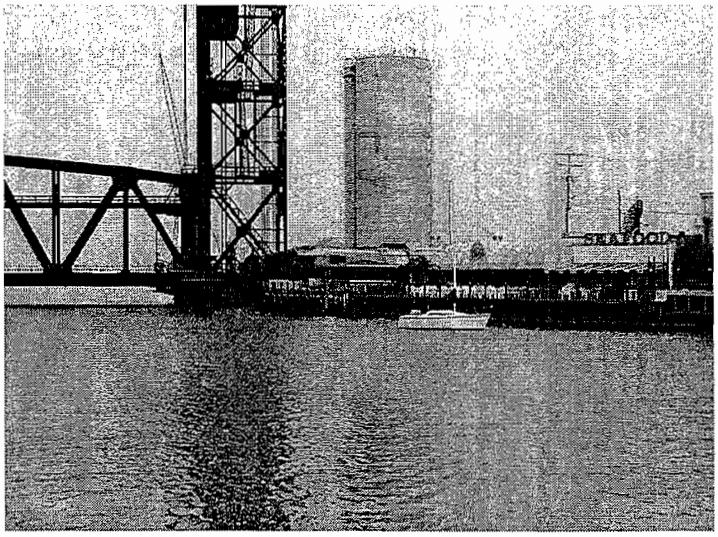
Water quality modeling studies performed by the Ohio EPA have demonstrated that depressed dissolved oxygen levels in the navigation channel are attributable to the channel's modification for navigation maintenance. The studies showed that natural levels of oxygen-demanding materials would result in periodic failure to attain Warmwater Habitat standards as long as the channel remains at its current depth. However, sufficient decrease in the depth of the channel to ensure Warmwater Habitat standards attainment would preclude navigation.

The use attainability study performed by the Ohio EPA indicates that factors such as the physical habitat and dissolved oxygen levels in the ship channel are inadequate to support warmwater aquatic life habitation. A biological survey of the navigation channel showed substantially degraded fish and benthic macroinvertebrate communities. In addition, the modification of the channel for navigation precludes the potential for the recovery of balanced, reproducing populations of warmwater fish and invertebrate organisms. However, fish use the navigational channel as a migratory route to spawning locations upstream during spring months. Therefore, this seasonal and stream flow related use has been recognized and is protected through its use designation (Ohio EPA, 1993).

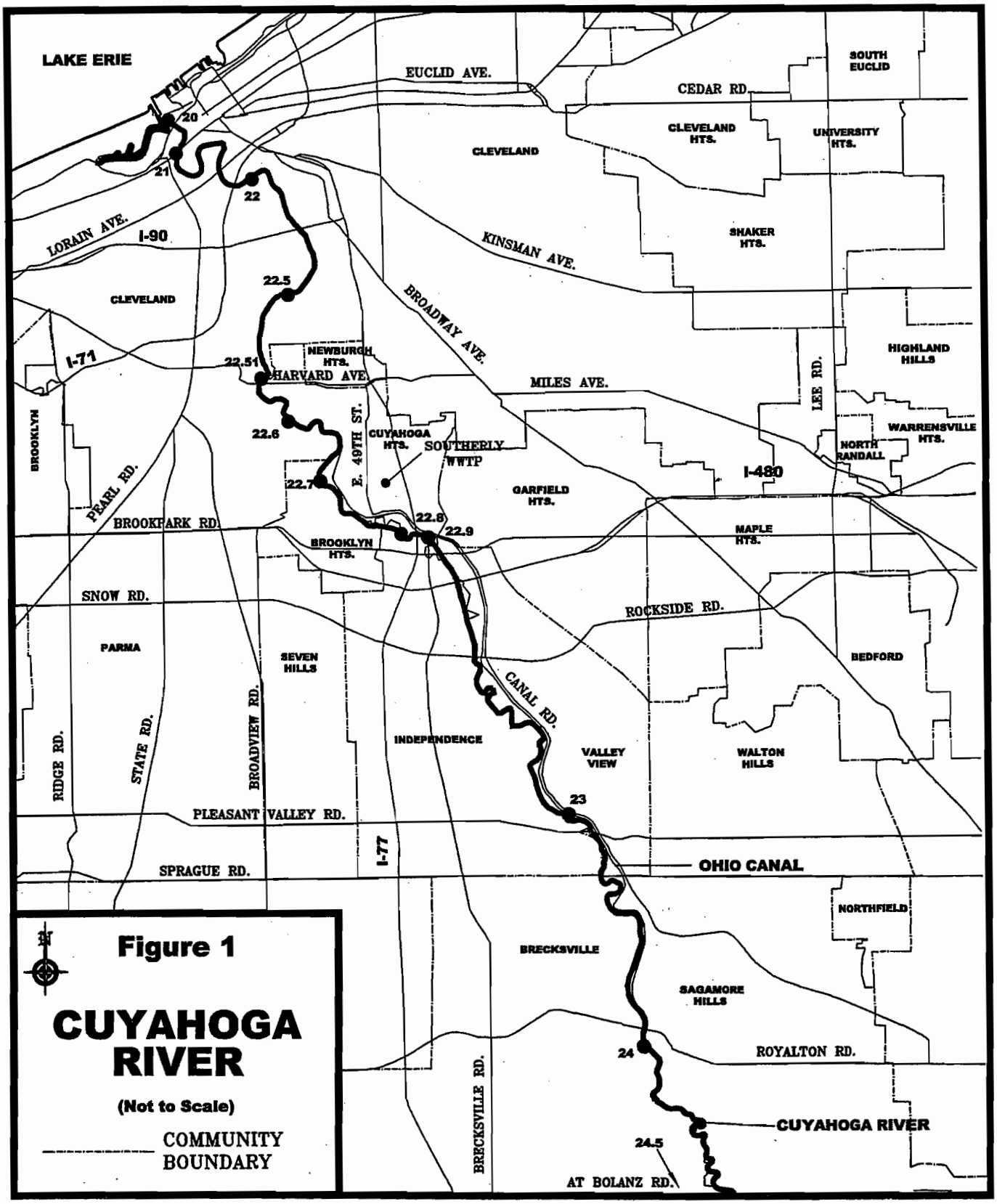
The Ohio EPA has designated the Cuyahoga River Navigation Channel as Limited Resource Water-Navigation Maintenance during the months of June through January and during the remaining months of the year whenever the river flow is less than 703 cubic feet per second at the USGS station in Independence. The minimum dissolved oxygen criterion for the Limited Resource Water-Navigation Maintenance aquatic life use is 1.5 mg/L. During the months of February through May whenever the Cuyahoga River flow equals or exceeds 703 cubic feet per second at the USGS station, the aquatic life use is Fish Passage. The Fish Passage use is defined as: those rivers or other water bodies that, "... have been found to be incapable of supporting and maintaining a balanced, integrated, adaptive community of warmwater organisms but are capable of supporting the passage of warmwater fish during migratory periods." (OEPA, 1993) The "minimum at any time" dissolved oxygen criterion for the Fish Passage Aquatic Life Use is 4.0 mg/L (Ohio EPA, 1993). The Cuyahoga River navigation channel has also been designated Industrial Water Supply and Primary Contact Recreational Use by the Ohio EPA.

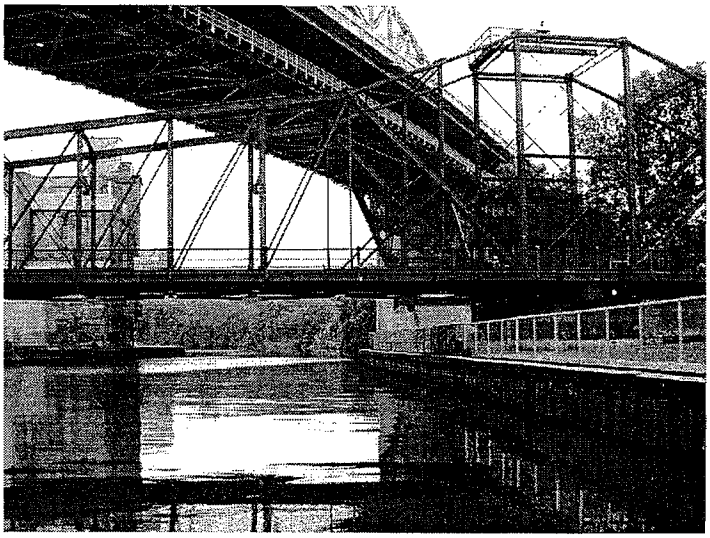
Upstream of the navigation channel, the Cuyahoga River has been designated State Resource Water, Aquatic Life Warmwater Habitat, Agricultural Water Supply, Industrial Water Supply, and Primary Contact Recreational Use.

Routine sampling for chemical and bacteriological analysis was performed in 1996, 1997 and 1998 at 12 sites on the Cuyahoga River (Figure 1) between the river mouth at RM 0.3 and Bolanz Road in Cuyahoga Valley National Recreation Area at RM 33.2. Chemical and bacteriological data from the Cuyahoga River are presented in Appendix B.

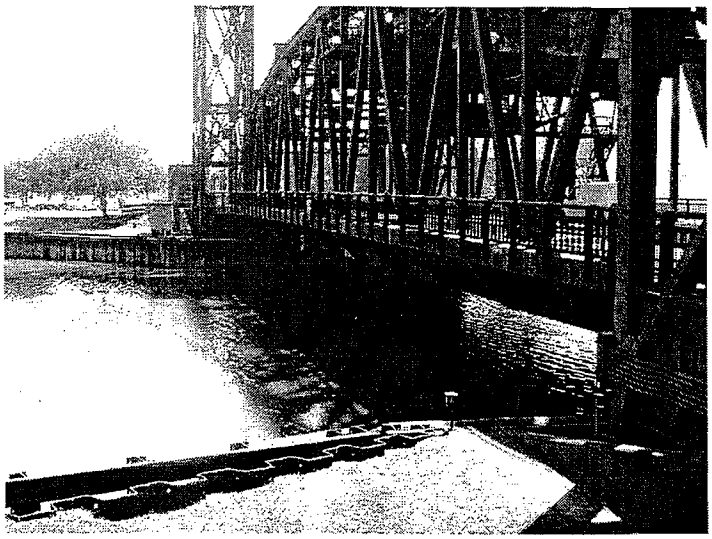


Site #20 (41° 29.966' N, 81° 42.536' W) is off the east bank of the Cuyahoga River at RM 0.3 behind Fagan's Restaurant, located at the intersection of Old River Road and Front Street. The river at this location is approximately 300 feet wide and 30 feet deep. Unidirectional flow in the river is barely evident on most occasions during dry weather conditions. A cessation in flow or backflow, which are occasionally observed, are a result of the interfacing of the river with Lake Erie's waters. At this site and at all of the other sites where the depth is at least three feet, the river generally appears turbid or light brown in color. Small amounts of natural and/or man-made debris have often been observed near the river edge at Site #20. A substrate of fine sediment and muck is typical in the lower navigation channel, and the habitat type can be considered either a very slow run or large pool. It is not a natural, riverine habitat due to the extensive shoreline development, the existence of steel-lined banks with virtually no vegetative cover, and the fact that the channel is routinely dredged to maintain its depth. Site #20 obtained a QHEI score of 29.5 in 1998 (Appendix D).


LAKE ERIE
EUCLID AVE.
CEDAR RD.
SOUTH EUCLID
CLEVELAND HTS.
UNIVERSITY HTS.
CLEVELAND
SHAKER HTS.
LORAIN AVE.
I-90
KINSMAN AVE.
BROADWAY AVE.
CLEVELAND
I-71
NEWBURGH HTS.
HARVARD AVE.
MILES AVE.
HIGHLAND HILLS
LEE RD.
BROOKLYN
PEARL RD.
CUYAHOGA HTS.
SOUTHERLY WWTP
E. 49TH ST.
WARRENSVILLE HTS.
NORTH RANDALL
I-480
GARFIELD HTS.
BROOKPARK RD.
BROOKLYN HTS.
MAPLE HTS.
SNOW RD.
ROCKSIDE RD.
PARMA
SEVEN HILLS
BEDFORD
CANAL RD.
RIDGE RD.
STATE RD.
BROADVIEW RD.
INDEPENDENCE
VALLEY VIEW
WALTON HILLS
PLEASANT VALLEY RD.
I-77
SPRAGUE RD.
OHIO CANAL
NORTHFIELD
BRECKSVILLE
SAGAMORE HILLS
ROYALTON RD.
BRECKSVILLE RD.
CUYAHOGA RIVER
AT BOLANZ RD.
20
21
22
22.5
22.51
22.6
22.7
22.8
22.9
23
24
24.5
Figure 1
CUYAHOGA RIVER
(Not to Scale)
COMMUNITY BOUNDARY



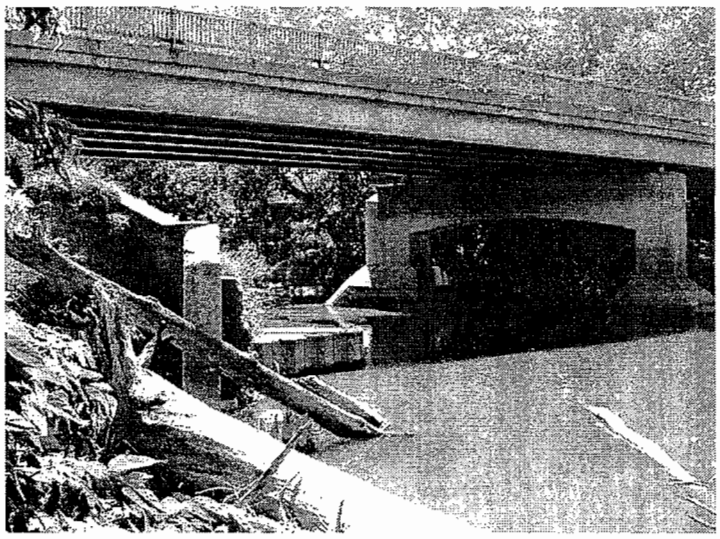
Site #21 (41° 29.656' N, 81° 42.224' W) is at the north downstream side of the Center Street bridge (RM 1.0). The river at this location is approximately 150 feet wide and 30 feet deep. Like Site #20, this segment of the river is within the navigation channel. Both banks consist of steel seawall with developed shorelines. The water color is light brown and the substrate is silt. Lake-effect backflow has been observed at this site. Samples are collected from the bridge at midstream. Site #21 obtained a QHEI score of 29.5 in 1998 (Appendix D).



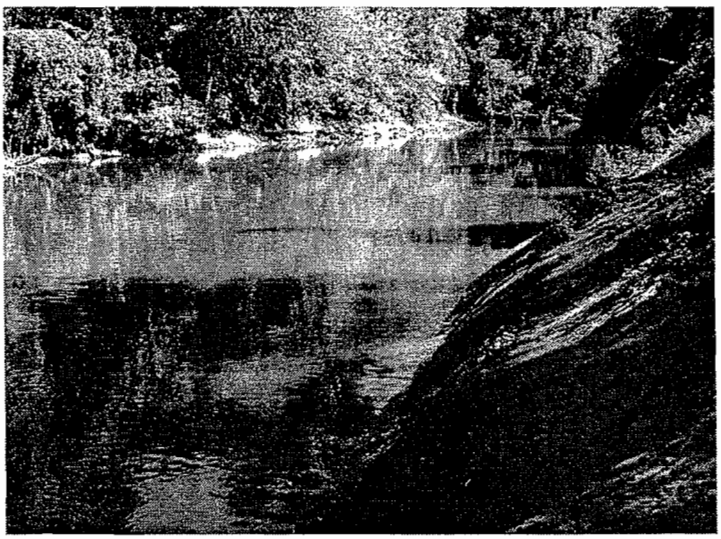
Site #22 (41° 29.332' N, 81° 41.166' W) is at the West 3rd Street bridge in the Cleveland Flats (RM 3.3). The river at this location is approximately 200 feet wide and 28 feet deep. Again, the velocity of flow in the river is very slow and barely evident on most occasions under dry weather conditions. The physical characteristics of the river are very similar to those of Sites #20 and #21, with the exception of a 0.1- to 0.2-mile stretch of exposed earthen bank along the west side of the river at this location. Substrate type and quality are also similar to those of Sites #20 and #21. Samples are collected from the bridge at midstream. In 1998, Site #22 obtained a QHEI score of 29.5 (Appendix D).

Site #22.5 (41° 27.863' N, 81° 40.634' W) is at the Newburgh and South Shore Railroad bridge on the property of the LTV Steel Company and can be accessed by following the river onto the steel mill property from either Independence Road or Campbell Road (RM 5.6). There are two parallel railroad bridges located approximately 30 feet apart at the site. The Newburgh and South Shore Railroad bridge is located on the upstream side and is the downstream boundary of the Ohio EPA Warmwater Habitat designation. The bridge on the downstream side is at the head of the navigation channel. The river at this location is approximately 150 feet wide and the depth ranges from four feet nearshore to about ten feet midstream. On the upstream side of the twin bridges, the bottom contour is more riverine. On the downstream side, the depth is greater and more uniform due to maintenance dredging. On most occasions while sampling at this site, the accumulation of natural and/or man made debris at the bridge supports, especially near the east bank, has been noted. In this run-type habitat, the substrate is primarily composed of sand and fine gravel midstream and silt and muck along the margins. An industrial setting predominates in the upland area. Separating the river and the industry is a very narrow vegetative buffer upstream of the sampling site. The vegetative buffer begins at Site #22.5 and is more extensive along the east bank than the west bank. As one approaches Site #22.51, which is 1.6 miles upstream at the lower Harvard Avenue bridge, the buffer is intermittent and is interspersed with small sections of open or "raw" land. Also, immediately upstream of Site #22.5, the lower west bank is concrete-lined. Several industrial discharges are evident both upstream and downstream of this site. Site #22.5 obtained a QHEI score of 33.5 in 1998 (Appendix D).

Site #22.51 (41° 26.835' N, 81° 41.053' W) is at the lower Harvard Avenue bridge (RM 7.1). It is located less than 0.2 miles downstream of the Cuyahoga River/Big Creek confluence. Downstream of the bridge, the river begins to slow as it moves through the "LTV stretch" from RM 7.1 to RM 4.3. Lake Erie has the potential to exert an effect on the river's velocity as far upstream as this site. Site #22.51 obtained a QHEI score of 64 in 1998 (Appendix D).



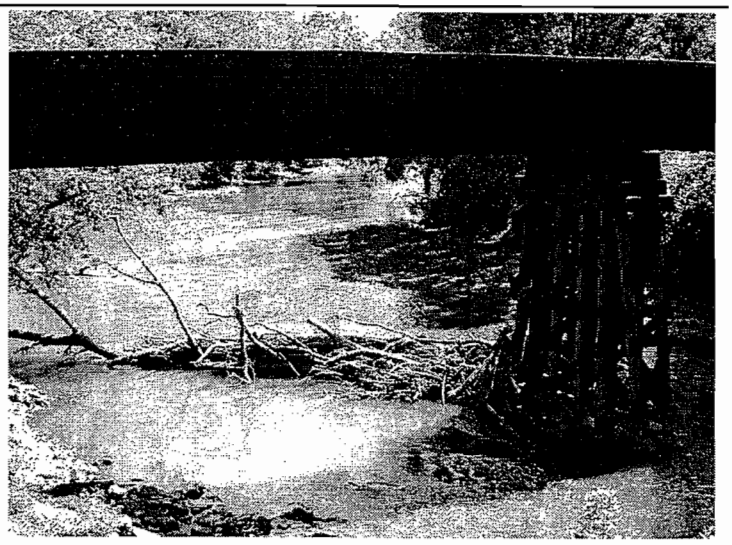
Site #22.6 (41° 26.665' N, 81° 40.695' W) is at the west bank of the river adjacent to River Recycling Industries, 4195 Bradley Road (Rm 7.9). The site can be accessed from Bradley Road (RM 7.0), at the southeast end of the company's dirt-and-gravel front lot. Site #22.6 is about one-half mile upstream of the Cuyahoga River/Big Creek confluence. In 1998, Site #22.6 obtained a QHEI score of 57 (Appendix D).



Site #22.7 (41° 25.631' N, 81° 39.948' W) is at the east bank of the river underneath the crossing of the NEORSD Southwest Interceptor (RM 9.7). This site is located one mile downstream of the effluent discharge from the NEORSD Southerly Wastewater Treatment Plant. The site can be accessed from the tow path which runs between the river and the Ohio Canal. Access can be made to the tow path at the Southerly ash lagoons off Canal Road or through the Cleveland Metroparks Ohio & Erie Canal Reservation. Located upstream between RM 10.0 and RM 10.5 are three demolition material disposal sites. Two disposal sites are situated on the west bank and one site is located on the east bank. Site #22.7 obtained a QHEI score of 56.75 in 1998 (Appendix D).

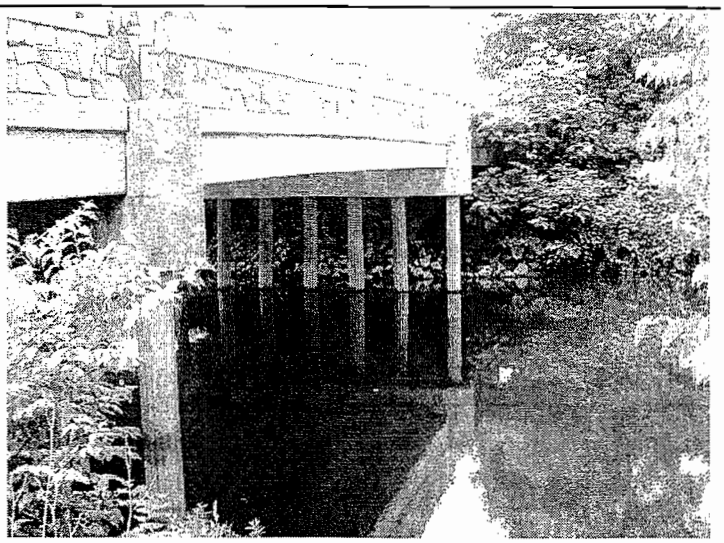
Site #22.8 (41° 25.139' N, 81° 38.895' W) is at the chlorine-access railroad bridge to the Southerly WWTP and is located near the southwest end of the plant's ash lagoons (RM 11.3). This site is about one-half mile upstream of the effluent discharge from the NEORSD Southerly WWTP and 0.1 miles downstream of the West Creek confluence. The site can be accessed from Canal Road across from the NEORSD Southerly Wastewater Treatment Plant's main entrance gate. Site #22.8 obtained a QHEI score of 68.75 in 1998 (Appendix D).

Site #22.9 (41° 25.080' N, 81° 38.473' W) is at the railroad bridge crossing southeast of the intersection of East 71st Street and Canal Road (RM 11.7). This site is located 0.2 miles downstream of the Mill Creek confluence. Site #22.9 obtained a QHEI score of 62.25 in 1998 (Appendix D).



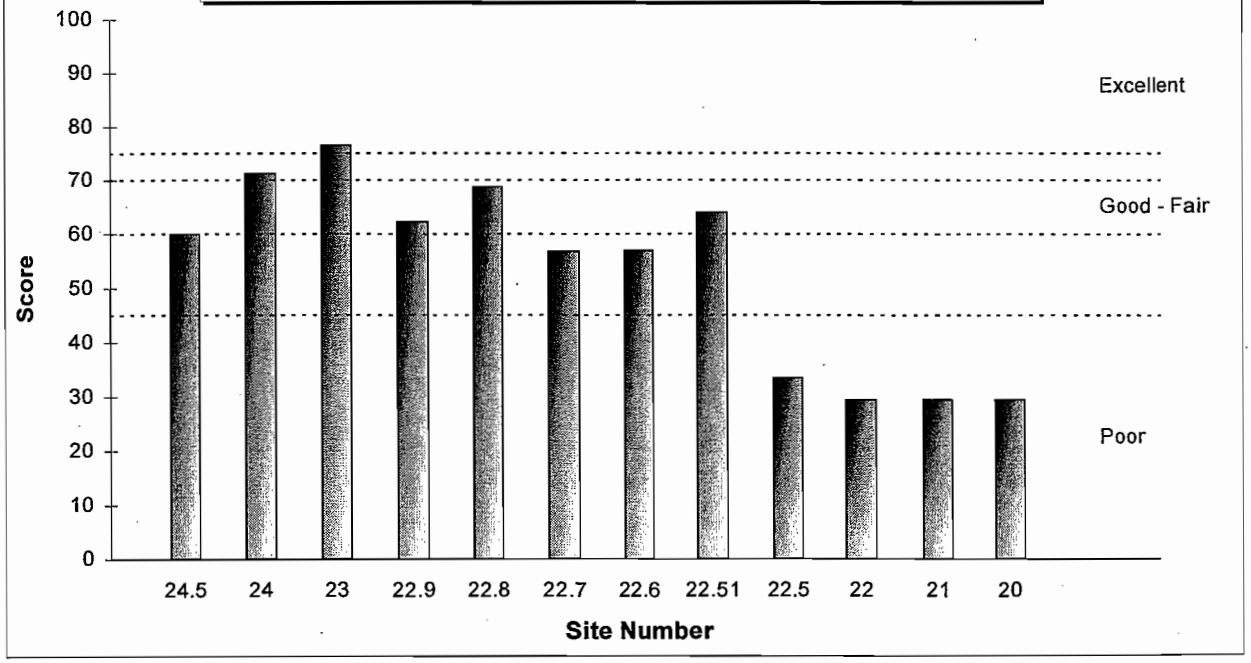
Site #23 (41° 21.924' N, 81° 39.746' W) is located at the Old Riverview Road bridge (RM 16.8). This site is in the Cuyahoga Valley National Recreation Area (CVNRA) and is located 0.2 miles downstream of the Cuyahoga River/Tinkers Creek confluence. The site can be accessed from Canal Road at the intersection with Tinkers Creek Road. Site #23 obtained a QHEI score of 76.5 in 1998 (Appendix D).

Site #24 (41° 19.259' N, 81° 35.231' W) is located downstream of the State Route 82 bridge (RM 20.8). This site is also in the CVNRA and is located downstream of the Cuyahoga River/Chippewa Creek confluence. This site can be accessed from Riverview Road south of its intersection with State Route 82. Site #24 obtained a QHEI score of 71.25 in 1998 (Appendix D).



Site #24.5 (41° 12.058' N, 81° 34.108' W) is located east of the intersection of Bolanz Road and Riverview Road in Summit County at RM 33.2. This site is approximately four miles downstream of the City of Akron Wastewater Treatment Plant effluent discharge and less than 0.2 miles upstream of the Cuyahoga River/Furnace Run confluence. Site #24.5 was selected to evaluate Cuyahoga River water quality upstream and outside of the NEORSD service area for comparison with downstream water quality. In 1998, Site #24.5 obtained a QHEI score of 60 (Appendix D).

Figure 2
Cuyahoga River Qualitative Habitat Evaluation Index Scores
1998



Benthic Macroinvertebrate Sampling on the Cuyahoga River

Results of benthic macroinvertebrate sampling conducted on the Cuyahoga River during 1996 are included in Appendix D.

Problems and Remediation

-1-

On May 22, 1996, WQIS investigators received a report from Ohio EPA of a coolant spill at Schaffer Grinding Company (SGC), located at 8740 Chamberlain Road in Twinsburg. Approximately 5,000-10,000 gallons of recycled coolant (a mixture of a product called Chem Cool 9211 and water) was lost to the environment and eventually entered Brandywine Creek. Samsel Services was contracted to carry out the remediation efforts that included diking the stream to retain the coolant and to prevent further contamination of the creek downstream. Chem-Freight, Inc. was contracted to haul the wastes to Republic Environmental, located in Walton Hills, for treatment and disposal. In addition, Samsel was also granted permission by NEORSD to pump contaminated stream water, retained by the instream dike, to a sanitary sewer. In all, an estimated 63,000 gallons of coolant contaminated water was hauled away or pumped to the sanitary sewer for treatment.

-2-

On February 13,1997, WQIS investigators conducted a follow-up investigation of Cleveland Cement Contractors, Inc. at 4823 Van Epps Road in Brooklyn Heights. Following a complaint in April of 1995, investigators found that this facility was steam cleaning heavy construction equipment over a catch basin, resulting in a discharge of oil and grease into a tributary of the Cuyahoga River. The company agreed to reroute this discharge to the sanitary sewer to eliminate the discharge to the environment. The follow-up inspection confirmed the enclosure of the steam cleaning operation and the discharge of runoff from the steam cleaning to the sanitary sewer via an oil water separator.

-3-

On April 22 and again on June 27, 1997, NEORSD personnel investigated a report of oil entering the Cuyahoga River within the Kurtz Brothers' recycling facility. On both occasions the discharge was found to be leachate from a large saw dust pile within a diked area. The leachate was dark brown to black in color and possessed a strong ammonia-like odor. The leachate from the saw dust pile had accumulated within the diked area and during periods of rain was washed into an outlet drain to the Cuyahoga River. The OEPA was apprised as to the nature and source of the discharge.

-4-

On May 1, 1997, WQIS investigators responded to a complaint of a green material entering a tributary of the Cuyahoga River near Van Epps and Spring Roads. An investigation revealed that the green color was the result of extensive algal growth in

the tributary that is normal for the time of year. No visible signs of sanitary sewage were observed.

-5-

On September 25, 1997, WQIS investigators discovered a milky white substance with a strong sulfur odor discharging to the Cuyahoga River approximately 1000 feet downstream of the Southwest Interceptor. The source of the discharge was found to leachate from the Rosby Resource Recovery (RRR) Construction & Demolition Landfill located at 50 East Schaaf Road. A similarly colored and malodorous substance was observed in a storm sewer on RRR's property and a pool of the same substance was found pooled around a catch basin. RRR personnel were aware of the problem and had constructed a dike around the catch basin to prevent any more landfill runoff from entering the storm sewer. In addition, URS Greiner had already been contracted to conduct a video inspection of the storm sewer line to locate additional points of entry of leachate into the storm sewer. RRR assured investigators that they would isolate the source and take proper remediation actions to alleviate the conditions.

On February 5, 1999, RRR personnel informed WQIS investigators that they planned to bulkhead and plug all storm sewers passing through the fill area. In addition, a storm water collection system will be constructed around the perimeter of the landfill to limit the storm water infiltration into the fill area.

-6-

On October 30, 1997, investigators inspected the Mary Street Pump Station following reports that the station was not functioning properly. An inspection of the area found that the sewers entering the pump station were surcharged, causing sewage to overflow into the Cuyahoga River. U.S. Coast Guard personnel informed the City of Cleveland of the situation and Ohio EPA supervised the elimination of the discharge to the river.

-7-

On December 3, 1997, WQIS investigators responded to an accidental discharge of ferric floc to the Cuyahoga River from the LTV Steel Company. LTV personnel stated the earlier that morning a higher than normal dosage of ferric floc was applied to the wastewater at LTV's treatment plant in an attempt to eliminate an oil sheen that was entering their wastewater plant. However, the addition of the floc did not remove the oil and both the floc and oil overflowed into the Cuyahoga River. Inland Waters of Ohio was contracted to conduct the clean up. A follow-up inspection on December 5, 1997, revealed that the floc and oil had been removed from the river and the discharge from LTV's wastewater treatment plant was free of any sheen or floc.

-8-

On February 9, 1998, WQIS investigators, in cooperation with the Ohio EPA, investigated a report of oil entering the Cuyahoga River via CSO outfall 033 located just south of ALCOA at 1600 Harvard Avenue. The oil was traced to a 36-inch storm sewer that receives flow from ALCOA's "A" Plant. However, further investigation did not reveal the actual source of the oil contamination in the storm sewer. ALCOA personnel indicated they would inspect the "A" Plant for possible sources and routes of entry for the oil contamination in the storm sewer.

-9-

On June 19, 1998, WQIS personnel responded to a report that the City of Cleveland fire station at 1801 Carter Road was discharging its sanitary sewage to the Cuyahoga River. An inspection of the area revealed that the discharge line for a lift station serving the fire station had collapsed. In order to prevent surcharging of the sewer, fire department personnel had erected a temporary bypass from the lift station to the river. The personnel at this station were informed of the inappropriateness of this discharge and were asked to reroute the discharge to a sanitary sewer until the lift station could be repaired. A follow-up inspection on June 22, 1998 revealed that the bypass for the lift station had been rerouted to another sanitary sewer pending the repair of the lift station.

-10-

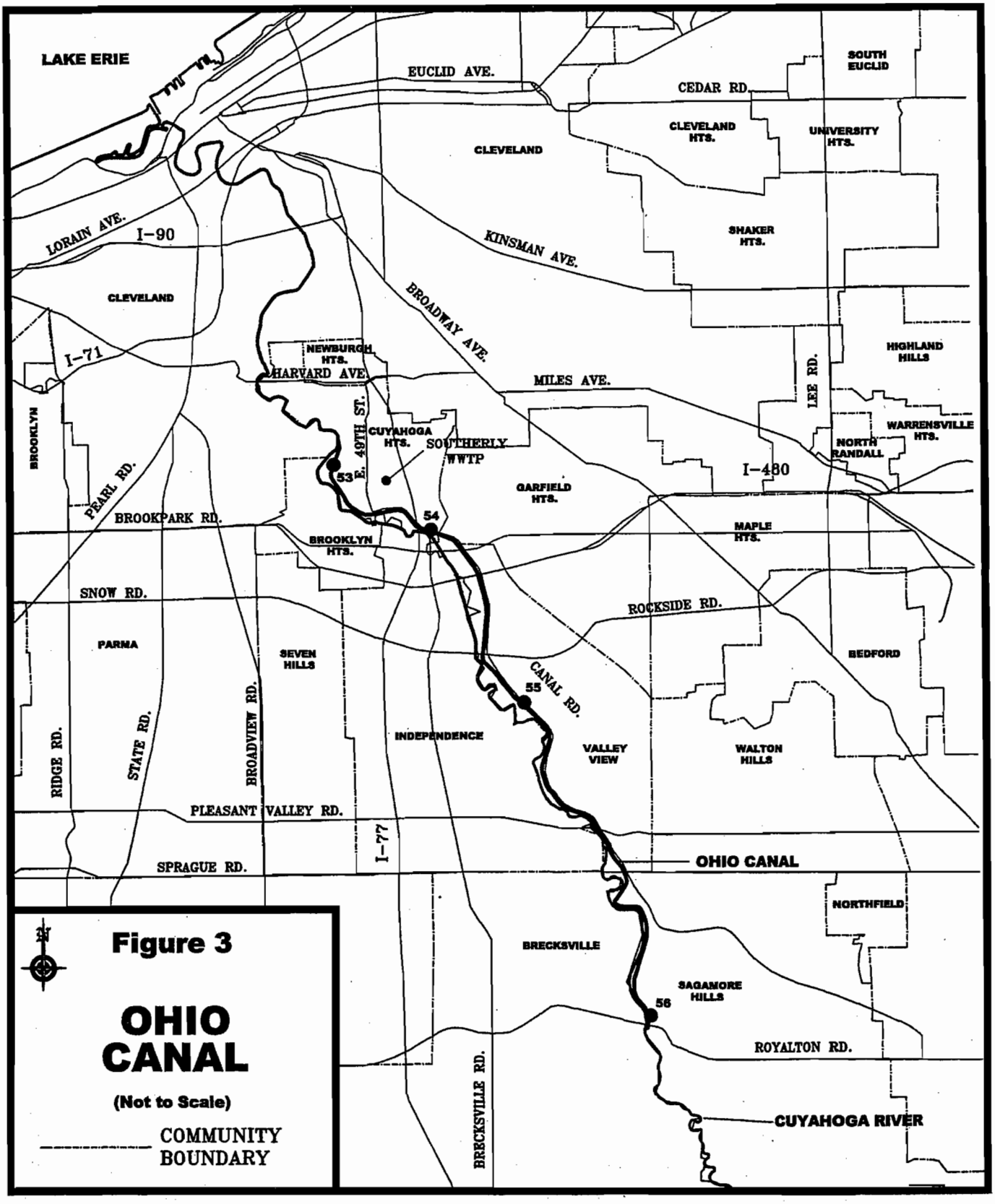
On June 25, 1998, NEORSD personnel responded to a diesel fuel spill as reported by the U.S. Coast Guard at State Fish Company located at 1600 Merwin Avenue. A leak in the company's fuel dispenser had released diesel fuel onto a gravel lot. The fuel migrated through the ground and eventually entered the river. Oil absorbent booms were deployed on the river in order to contain the oil sheen. EnviroServe was contracted to conduct the site remediation which was monitored by Ohio EPA and the U.S. Coast Guard.

OHIO CANAL

The Ohio Canal, which was opened between Cleveland and Akron in 1827, had replaced the Cuyahoga River as the major transportation artery in this region. The canal system opened Ohio and the Midwest to commerce and industrialization. Fifty-three years later, however, it was replaced as a transportation route by the railroads and subsequently abandoned. The only remaining wetted section stretches for eleven miles northward along the east bank of the Cuyahoga River from the State Route 82 bridge crossing between Brecksville and Sagamore Hills, to the confluence with the Cuyahoga River, approximately 0.7 miles west of the intersection of Grant Avenue and East 49th Street. The canal has become a recreational attraction for the area as evidenced by the opening of the Cleveland Metroparks Ohio and Erie Canal Reservation in August of 1999. A paved all-purpose trail (the Towpath Trail) follows the original Canal Towpath north from the northern boundary of the Cuyahoga Valley National Recreation Area at Rockside Road for 4.2 miles. Additional recreational activities planned for the canal within the reservation include canoeing and fishing. The Metroparks leases approximately 18 acres of land within the reservation from the Northeast Ohio Regional Sewer District.

The NEORSD incorporated sampling of the Ohio Canal into its Stream Monitoring Program as a result of arguments raised in early 1988 concerning designation of the Cuyahoga River as Warmwater Habitat from River Mile (RM) 10.8 to RM 5.6. Because the lower eleven miles of the canal are fed by the river, the two systems are expected to be quite similar in water quality characteristics. The NEORSD hypothesized that because of this similarity, any major differences in biological condition between the river and the canal must be related to differences in other factors, perhaps the quality of physical habitat and/or erosion and sedimentation. Thus, for experimental and informational purposes, chemical, bacteriological, and benthic sampling has been performed on the canal by the NEORSD.

The exact drainage area tributary to the canal's wetted section is unknown. It is fed by partial flow from the Cuyahoga River, near Site #24, through an inlet structure located just upstream of the low-head dam under the State Route 82 bridge. The canal is receiving flow from the river to provide a source of cooling water for Birmingham Steel/American Steel and Wire, located at 4300 East 49th Street in Cuyahoga Heights. The company leases the canal for this purpose from the Ohio Department of Natural Resources, and its intake line is located 0.4 miles upstream of the canal's confluence with the river. Downstream of the diversion of river water into the canal, no other large drainages which would significantly affect its flow are known to enter the canal. The flow in the canal is regulated by the inlet structure and five return structures located along its west bank. The water surface gradient is nearly zero for most of its length, and elevation drops are facilitated by lock structures and weirs.

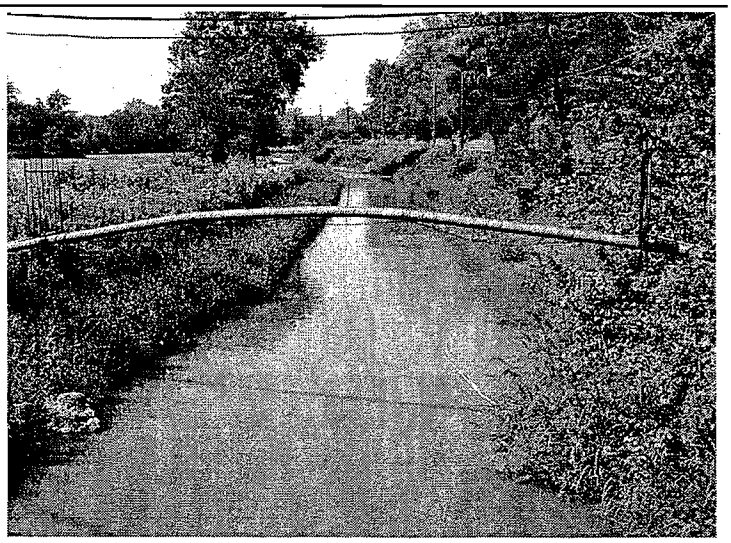

LAKE ERIE
EUCLID AVE.
CEDAR RD.
SOUTH EUCLID
CLEVELAND HTS.
UNIVERSITY HTS.
CLEVELAND
SHAKER HTS.
LORAIN AVE.
I-90
KINSMAN AVE.
CLEVELAND
BROADWAY AVE.
I-71
NEWBURGH HTS.
HARVARD AVE.
MILES AVE.
HIGHLAND HILLS
LEE RD.
BROOKLYN
E. 49TH ST.
CUYAHOGA HTS.
SOUTHERLY WWTP
WARRENSVILLE HTS.
NORTH RANDALL
53
I-480
PEARL RD.
GARFIELD HTS.
BROOKPARK RD.
54
MAPLE HTS.
BROOKLYN HTS.
SNOW RD.
ROCKSIDE RD.
PARMA
SEVEN HILLS
BEDFORD
CANAL RD.
55
RIDGE RD.
STATE RD.
BROADVIEW RD.
INDEPENDENCE
VALLEY VIEW
WALTON HILLS
PLEASANT VALLEY RD.
I-77
SPRAGUE RD.
OHIO CANAL
NORTHFIELD
BRECKSVILLE
SAGAMORE HILLS
56
ROYALTON RD.
BRECKSVILLE RD.
CUYAHOGA RIVER
Figure 3
OHIO CANAL
(Not to Scale)
COMMUNITY BOUNDARY

The Ohio EPA has no current use designation for the Ohio Canal. No QHEI's have been determined for the canal since it is not a natural watercourse. The NEORSD has selected four locations on the Ohio Canal for routine chemical, bacteriological and benthic sampling and analysis (Figure 3). Chemical and bacteriological data from the Ohio Canal are presented in Appendix B.

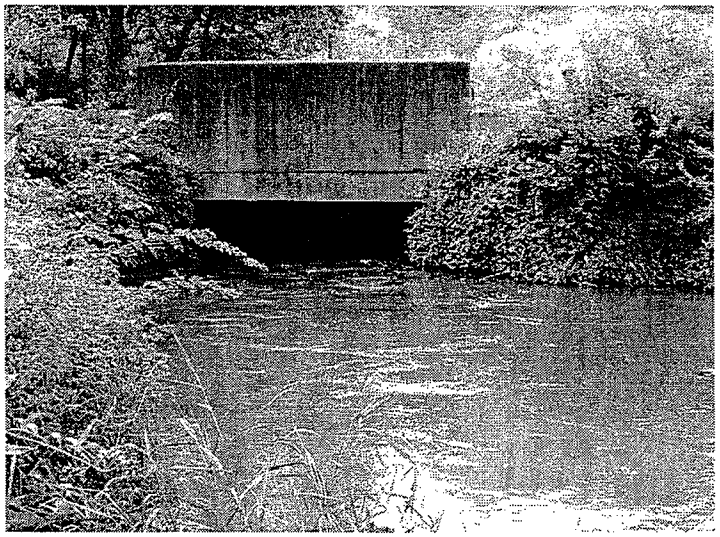
Site #53 (41° 26.374' N, 81° 40.107' W) is approximately 30 feet upstream of the confluence with the Cuyahoga River (RM 8.5). The site can be accessed from a walking trail that travels to the north between the river and the canal for 0.4 miles from the end of the old towpath.

Site #54 (41° 25.107' N, 81° 38.491' W) is located at the railroad bridge crossing near the intersection of East 71st Street and Canal Road. Parallel to this location is Site #22.9 on the Cuyahoga River.

Site #55 (41° 23.108' N, 81° 37.169' W) is located at the Stone Road Bridge and can be accessed from Canal Road. This site is located in the Cuyahoga Valley National Recreation Area.



Site #56 (41° 19.242' N, 81° 35.190' W) is located at the inlet structure through which Cuyahoga River flow is diverted into the canal. This site is located in the rural environment of the Cuyahoga Valley National Recreation Area.



Problems and Remediation

-1-

On May 24, 1996, WQIS investigators responded to a report of a fish kill in the Ohio Canal near Kurtz Bros., Inc., located at 4700 East 49th Street. Inspections revealed that approximately 0.7 miles of the canal was black in appearance, had a septic odor and dissolved oxygen readings ranging from 0.5 mg/L to 2.0 mg/L. Approximately 100 dead fish of several species were observed in this section of the canal. Continued investigation on May 28, 1996, determined that wastewater high in BOD was overflowing from a malfunctioning sump pump at Cotton Club, located at 4922 E. 49th Street, and entering the Ohio Canal. Cotton Club was later fined as a result of the fish kill by the Ohio Department of Natural Resources and also instructed by NEORSD to eliminate the overflow structure in the sump to prevent any recurrence of this discharge in the future.

-2-

On April 28, 1997, WQIS investigators responded to a diesel fuel spill on I-77 South, immediately north of the Route 21 Exit. Approximately 50 gallons of diesel fuel was lost to a catch basin following an accident between two trucks that ruptured a saddle tank on one of the trucks. The diesel fuel was contained within a storm sewer by the deployment of oil absorbent booms and pads. Daily monitoring of the storm sewer and the application of oil absorbent pads effectively remediated the diesel contamination of the storm sewer.

-3-

On July 29, 1997, WQIS investigators, in cooperation with the Cuyahoga County Board of Health (CCBH), began an investigation of a septic dry weather discharge to a tributary of the Ohio Canal near Boyas Excavating located at 11311 Rockside Road. Bacteriological analysis of the discharge from the storm sewer outfall revealed a fecal coliform concentration of 1,200,000 colonies per 100 mL. It was determined that this storm sewer served Garfield Mall located at 12540 Rockside Road. Dye tests of restaurants in Garfield Mall revealed that the Pizza Hut restaurant's sanitary facilities were cross-connected to the storm sewer. As a result of actions taken by CCBH, the cross connection was eliminated and the elimination verified by the CCBH on January 27, 1998.

-4-

On November 4, 1997, WQIS investigators discovered a turbid discharge to the Ohio Canal from behind Nook Industries located at 4950 East 49th Street. An inspection of the facility determined that the discharge was non-contact cooling water used for the cooling of electrical components. The turbid color was the result of this water washing away soil below the outfall pipe where it discharges. The facilities manager for Nook assured investigators that all the proper permits for the discharge had been obtained.

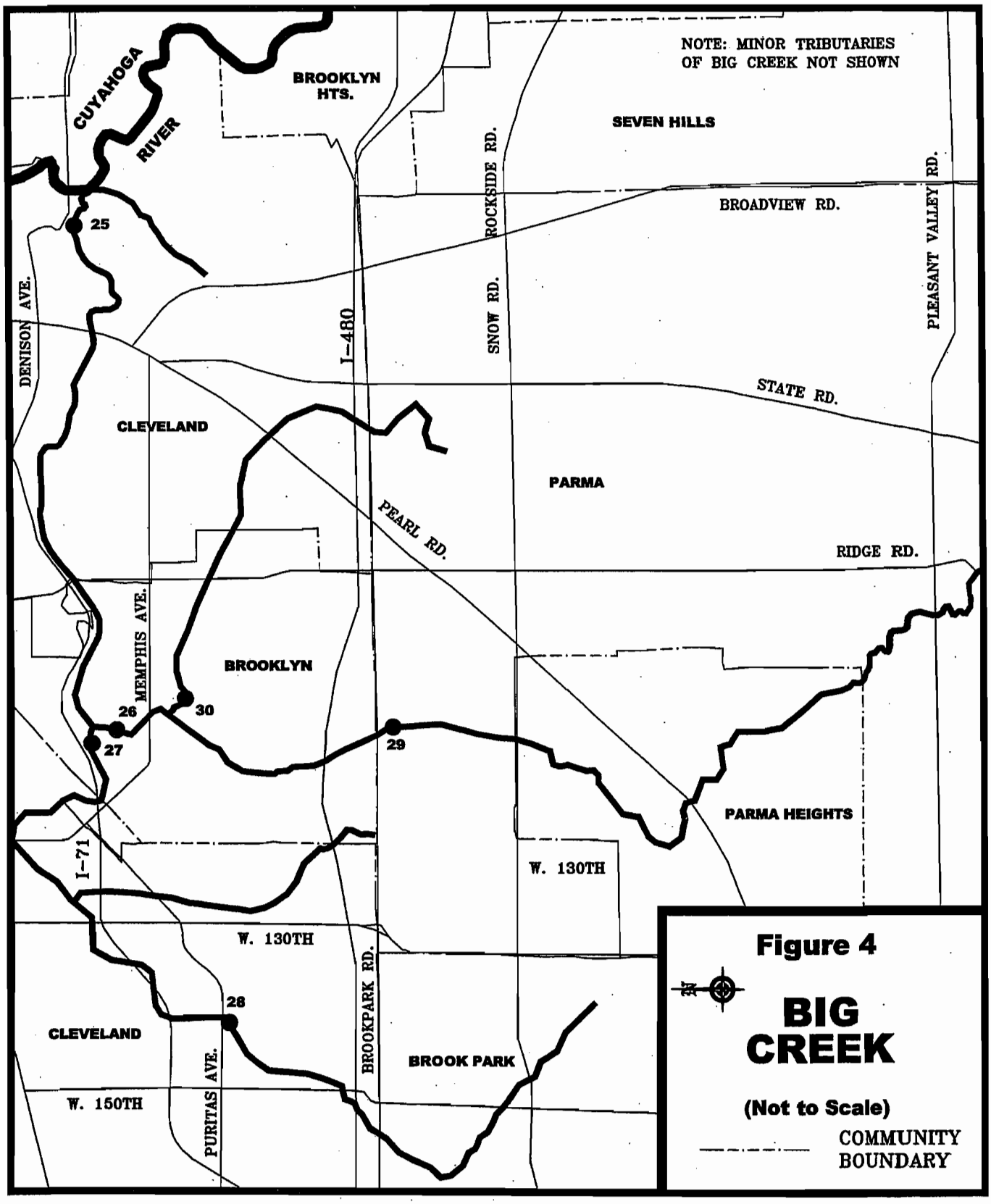
BIG CREEK

Big Creek drains southwestern Cleveland and the southwest suburbs. It has a total drainage area of 38.6 square miles and a total length of 12.0 miles. Big Creek has two main branches: the East Branch, which originates in North Royalton south of Pleasant Valley Road and flows north through Parma and Parma Heights into Brooklyn; and the West Branch, which originates in Brook Park and flows northeast through the west side of Cleveland into Brooklyn, where it combines with the East Branch. From the confluence of the two main branches, Big Creek flows east through Brooklyn and Cleveland to the Cuyahoga River at River Mile 7.4. Additionally, each branch has a major tributary stream: Stickney Creek, which originates in Parma and flows northwest through a section of Cleveland into Brooklyn, where it combines with the East Branch; and the "Chevrolet" Branch, which originates in Parma south of Brookpark Road and flows northeast into Cleveland, where it combines with the West Branch.

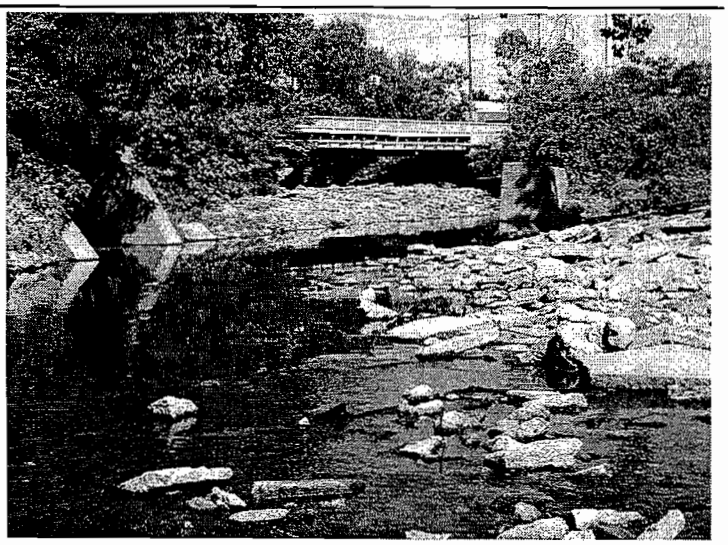
Most of Big Creek is open, with only two major portions culverted: approximately 0.4 miles underneath the Cleveland Metroparks Zoo; and approximately 2.6 miles of the West Branch between West 117th Street and Puritas Avenue.

Along Interstate 71, from downstream of the East and West Branch confluence to Brookside Park, the creek has been relocated and channelized with concrete beds. Other than these 1.6 miles of channelization and the culverted portions, the creek's substrate is predominantly natural.

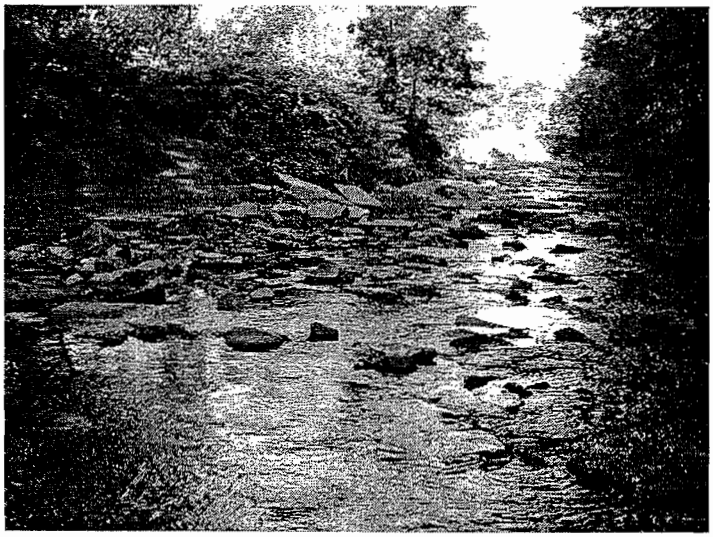
The creek's drainage area is largely residential and commercial but also includes significant portions of land used for industrial and recreational purposes. The Ohio EPA has designated Big Creek Aquatic Life Warmwater Habitat, Agricultural Water Supply, Industrial Water Supply and Primary Contact Recreational Use. The Ford Branch of Big Creek has been designated Limited Resource Water and Secondary Contact Recreational Use. Portions of Big Creek within the boundaries of the Cleveland Metroparks have also been designated State Resource Water. Big Creek has six locations that are routinely sampled by NEORSD investigators for chemical, bacteriological, and benthic analysis (Figure 4). Chemical and bacteriological data from Big Creek are presented in Appendix B.


NOTE: MINOR TRIBUTARIES OF BIG CREEK NOT SHOWN
CUYAHOGA RIVER
BROOKLYN HTS.
SEVEN HILLS
ROCKSIDE RD.
BROADVIEW RD.
PLEASANT VALLEY RD.
DENISON AVE.
I-480
SNOW RD.
STATE RD.
CLEVELAND
PARMA
PEARL RD.
RIDGE RD.
MEMPHIS AVE.
BROOKLYN
PARMA HEIGHTS
I-71
W. 130TH
W. 130TH
BROOKPARK RD.
CLEVELAND
BROOK PARK
W. 150TH
PURITAS AVE.
25
26
27
28
29
30
Figure 4
BIG CREEK
(Not to Scale)
COMMUNITY BOUNDARY

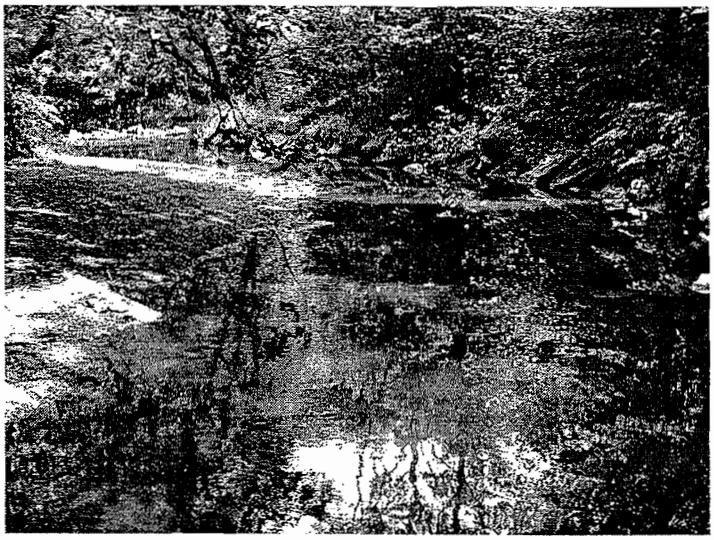
Site #25 (41° 26.747' N, 81° 41.194' W) is located on the main stem downstream of Jennings Road and approximately 900 feet upstream of the confluence with the Cuyahoga River. In 1997, Site #25 obtained a QHEI score of 62.25 (Appendix D).



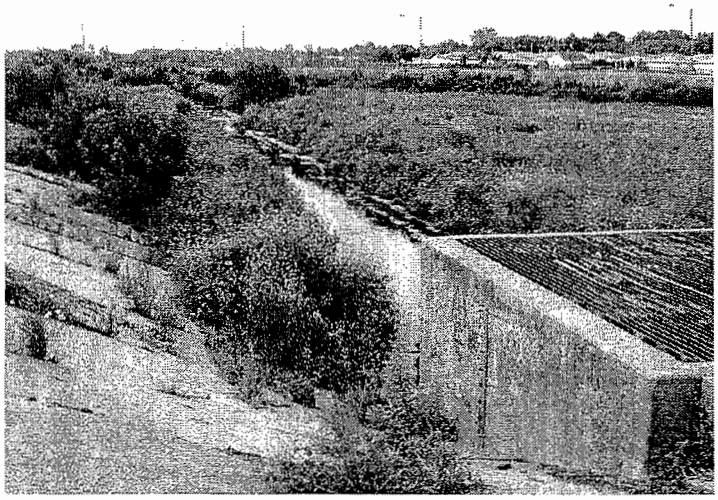
Site #26 (41° 26.747' N, 81° 45.243' W) is located on the East Branch of Big Creek approximately 100 feet upstream of its confluence with the West Branch. As is the case with Site #27, this section of the creek passes through a portion of the Cleveland Metroparks Big Creek Reservation north of Memphis Avenue and Tiedeman Road. Site#26 obtained a QHEI score of 55 in 1997 (Appendix D).



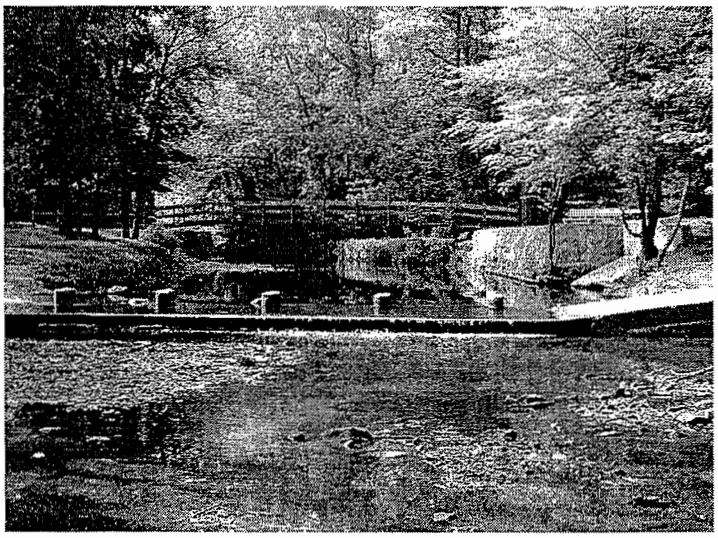
Site #27 (41° 26.812' N, 81° 45.294' W) is located on the West Branch of Big Creek approximately 100 feet upstream of the confluence with the East Branch. It is in a portion of the Cleveland Metroparks Big Creek Reservation north of Memphis Avenue and Tiedeman Road. In 1997, Site #27 obtained a QHEI score of 59.75 (Appendix D).



Site #28 (41° 25.964' N, 81° 47.527' W) is located on the West Branch of Big Creek immediately upstream of the beginning of the double-barrel culvert south of Puritas Avenue. The stream at this point has passed through a flat marshland with high grass. Near the culvert, it has concrete beds which are covered with sand and a dense growth of green algae. Site #28 obtained a QHEI score of 25 in 1997 (Appendix D).



Site #29 (41° 24.951' N, 81° 45.267' W) is located upstream on the East Branch of Big Creek at the Fernhill Picnic area in the Metroparks Big Creek Reservation, south of Brookpark Road. In 1997, Site #29 obtained a QHEI score of 64.25 (Appendix D).



Site #30 (41° 26.317' N, 81° 45.063' W) is located on Stickney Creek about 100 feet upstream of its confluence with the East Branch of Big Creek south of Memphis Avenue. In 1997, Site #30 obtained a QHEI score of 48 (Appendix D).

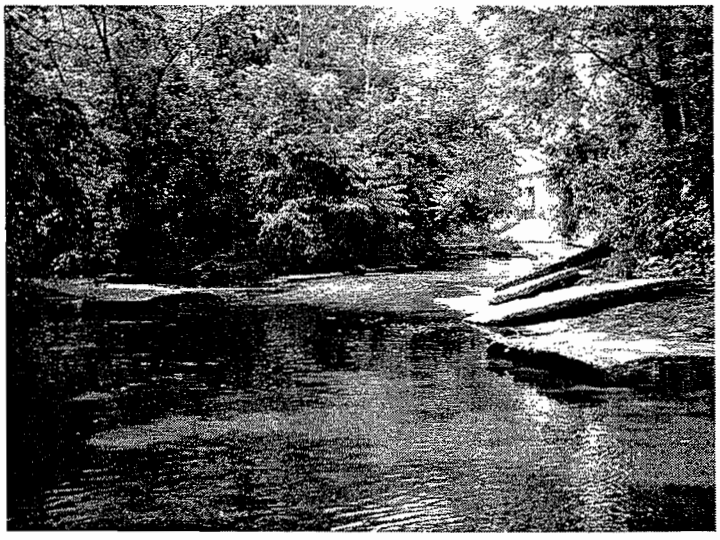
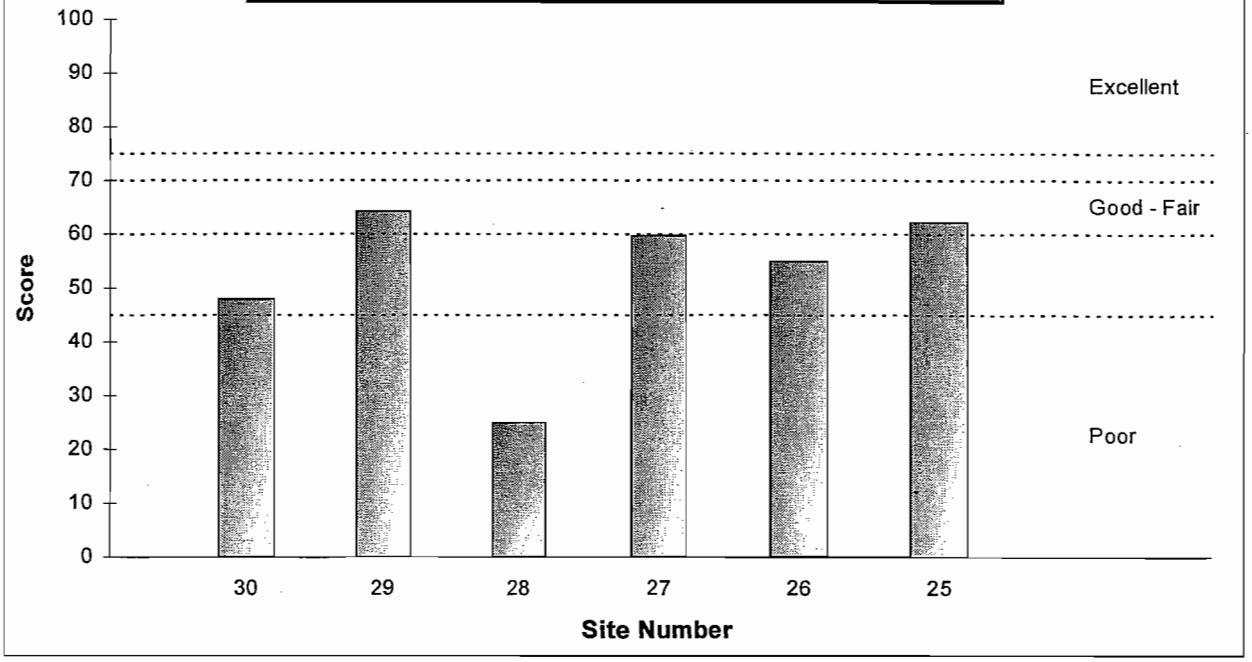


Figure 5
Big Creek Qualitative Habitat Evaluation Index Scores
1997



Benthic Macroinvertebrate Sampling on Big Creek

Results of benthic macroinvertebrate sampling conducted on Big Creek from 1996 through 1998 are included in Appendix H.

Problems and Remediation

-1-

On August 8, 1996, while inspecting the West Branch of Big Creek in the city of Brookpark, NEORSD investigators discovered an oil sheen on the creek, east of Smith Road and north of Commerce Parkway. The oil was traced to an outfall pipe located behind the Ampex Metal Products Company, 5300 Smith Road. An inspection of the property by NEORSD investigators revealed oil leaking from a scrap metal waste bin and into a nearby parking lot drain which discharges to Big Creek. Company officials were advised to clean the oil from the parking lot and move the waste bin away from the storm drain. In addition, company officials were informed of the need to contain any oil that leaks from the waste bins to prevent further such discharges to Big Creek. Finally, the company was advised to notify Ohio EPA about the incident. A follow-up inspection by NEORSD investigators on August 9, 1996 revealed that corrective action had been taken to remediate this problem.

-2-

In December 1996, NEORSD Sewer Maintenance and Control (SM & C) employees noted an increase in the incidence of dry weather overflows to Big Creek from the overflow regulator on Fulton Parkway at Brookside Road. Inspections of the regulator by NEORSD personnel revealed that intermittent increases in flow conditions had resulted in sanitary sewage overflowing the weir structure and into Big Creek through the overflow outfall north of John Nagy Boulevard in Brookside Park. As a result, NEORSD SM & C crews raised the height of the weir in an effort to prevent these overflows. Following these modifications, a follow-up inspection by investigators on January 2, 1997 revealed that the increased weir height had eliminated the dry weather overflow of sewage to Big Creek.

-3-

On February 18, 1997, while inspecting the status of a water main leak to Big Creek's East Branch through a 36-inch storm sewer outfall at Wesley Drive just south of Pearl Road, NEORSD investigators found a dry weather discharge containing sanitary sewage. Bacteriological analysis of the discharge revealed a fecal coliform concentration of 2,100,000 colonies per 100 mL. Investigators traced the sewage to a blocked sanitary sewer at 8203 Spring Garden Road. The blockage caused the sanitary sewer to become surcharged, resulting in sewage infiltrating into the storm sewer system. The City of Parma was notified and the blockage was removed. Correction of this problem was verified by investigators on March 17, 1997.

During this follow-up investigation, however, investigators found that the water main leak entering the storm sewer on Ridge Road between Wilber Avenue and Hampstead Avenue, which is tributary to the 36-inch storm sewer outfall, continued unabated. Investigators first discovered this water main leak in March 1995 and reported it to the City of Cleveland Division of Water. In March 1997, NEORSD again notified the Division of Water.

-4-

In June 1995, NEORSD investigators found a dry weather discharge to Big Creek's East Branch from a 24-inch storm sewer outfall near Big Creek Parkway, south of Oakdale Avenue in Parma. The discharge was measured at a flow rate of 1,100 gallons per day, and had a fecal coliform concentration of 110,000 colonies per 100 mL. At that time, investigators traced the flow back to the storm sewer on Elsmere Drive; however, they were unable to determine the exact source of this discharge.

On March 3, 1997, NEORSD investigators resumed their inspection and found sanitary sewage leaking into the storm sewer at 9600 Elsmere Drive. A dye test of the home at this address revealed that an apparent restriction in the lateral line between the street and the house has resulted in the leakage of sewage into the storm sewer. On May 28,

1997, NEORSD notified the City of Parma Service Department of the situation and recommended that dye testing be performed at additional homes on Elsmere Drive to verify proper connection of the sanitary discharge to the sanitary sewer system.

-5-

On July 3, 1997, NEORSD personnel investigated a dry weather discharge to Stickney Creek from a 48-inch storm sewer outfall located behind 9008 Outlook Drive. The discharge was measured at a flow rate of 3,000 gallons per day and had a fecal coliform concentration of 72,000 colonies per 100 mL. The source of the sewage was identified as an improper connection of a residential sanitary discharge to the storm sewer at 9107 Beech Avenue. NEORSD investigators noted that further dye testing of homes on Beech Avenue could possibly reveal additional improper connections of residential sanitary discharges to the storm sewer system tributary to the 48-inch storm sewer outfall. These findings were reported to the City of Brooklyn.

-6-

On July 15, 1997, NEORSD investigators discovered evidence of sanitary sewage in Stickney Creek at Roadoan Road south of Memphis Avenue. The sewage was traced back in Stickney Creek to where it exits the culvert at 4930 State Road, north of Brookpark Road. Further investigations revealed that sewage was entering the Stickney Creek culvert through a 36-inch storm sewer on West 48th Street at Torrington Avenue. Investigators found that blockages in the sanitary sewer on West 48th Street at Torrington Avenue and at 4914 Pershing Avenue had resulted in sewage leaking into the 36-inch storm sewer on West 48th Street. The City of Parma Service Department was notified of the situation on July 17, 1997. A follow-up investigation on July 18, 1997 verified that the blockage had been removed, thereby eliminating these sources of sanitary sewage contamination in Stickney Creek.

However, the follow-up inspection of the 36-inch storm sewer on West 48th Street revealed a significant amount of a clear dry weather discharge entering the creek. The sources of the flow were identified as probable water main leaks entering the storm sewers at 4520 Kenmore Avenue and at 4522 Pershing Avenue. The rate of these discharges was measured at approximately 65,000 gallons per day and 71,000 gallons per day, respectively. The City of Cleveland Division of Water was informed of these findings.

-7-

On July 17, 1997, NEORSD investigators responded to a report of sanitary sewage entering Ridgewood Lake in Parma through a storm sewer outfall at the south end of the lake. The sewage was traced back to the storm sewer on Ridge Road at West Ridgewood Road. A blockage of the sanitary sewer at this location had resulted in leakage of sewage into the storm sewer. Following this discovery, the problem was reported to the City of Parma. A follow-up inspection by NEORSD investigators on July

18, 1997 revealed that the Ridge Road sanitary sewer had been unblocked and this source of pollution to Ridgewood Lake, which discharges into a tributary of Big Creek, had been eliminated.

-8-

While conducting routine sampling of Big Creek on July 18, 1997, NEORSD investigators observed an orange color in the West Branch at Site #27. The orange color was traced to a storm sewer outfall near 11111 Memphis Avenue in Brooklyn. The pH of this discharge was measured at 2.0 standard units. Investigators traced the orange discharge to the Ferrous Metal Processing Company at 11103 Memphis Avenue, where they found acid overflowing from a metal pickling tank to a floor drain located beneath the tank. This drain ran to a drainage ditch, which was tributary to a storm sewer that ultimately discharged to the West Branch of Big Creek. Following this discovery, NEORSD personnel advised company officials to cease operations until the floor drain could be sealed. At that time, Ohio EPA was notified of the situation. A follow-up inspection on July 21, 1997 verified that the drain had been sealed, eliminating this source of contamination to Big Creek.

-9-

Also in this vicinity, on July 24, 1997, NEORSD investigators discovered a dry weather discharge of sanitary sewage to Stickney Creek through a 60-inch storm sewer outfall just downstream of Roadoan Road and north of Memphis-Villa Boulevard in Brooklyn. The fecal coliform concentration of this flow was measured at 68,000 colonies per 100 mL. The source of the sewage was identified as improper connections of three residential sanitary discharges to the storm sewer at 8618 Outlook Drive, 4499 Roadoan Road, and 4534 Roadoan Road. Investigators further noted that additional residential sanitary discharges may have been improperly connected to the storm sewer in this area but were not identified during this investigation. The City of Brooklyn Service Department was notified of these findings.

-10-

Contributing to the continuing bacterial contamination at Site #29 was a recurrence of a dry weather discharge of sanitary sewage to Big Creek's East Branch through a 30-inch storm sewer outfall upstream of this location. In April 1989, NEORSD investigators first discovered sewage entering the creek through this outfall from the east, and it was traced to a blocked sanitary sewer at 9618 Fernhill Avenue. The blockage caused the sanitary sewer to become surcharged, resulting in leakage of the sewage into the storm sewer. Since 1989, NEORSD investigators have found, on numerous occasions, blockages of the sanitary sewer at 9618 Fernhill Avenue. Notification to the City of Parma Service Department has resulted in correction of the problem by removal of the blockage.

Inspections by NEORSD investigators throughout 1996-1998 revealed numerous recurrences of the sanitary sewage influent to Big Creek as a result of the Fernhill Avenue sanitary sewer blockage. Following each notification to the City of Parma Service Department, inspections by NEORSD investigators revealed that the blockage had been removed, eliminating this source of contamination in Big Creek. Due to the recurring nature of this problem, NEORSD investigators requested that the City of Parma Service Department routinely inspect the Fernhill Drive sanitary sewer.

-11-

Another source of sanitary sewage contamination to Big Creek's East Branch, through the 30-inch storm sewer outfall upstream of Site #29, was discovered by NEORSD investigators on August 27, 1997. While inspecting the Fernhill Avenue sanitary sewer, investigators discovered a blockage in the Big Creek Parkway sanitary sewer at Fernhill Avenue, resulting in the leakage of sewage into the 30-inch storm sewer. The City of Parma Service Department was informed of this problem and removed the blockage. On October 31, 1997, a second occurrence of a blockage in the Big Creek Parkway sanitary sewer was discovered by NEORSD investigators, again resulting in sewage entering Big Creek. The City of Parma Service Department was notified of the situation and subsequent inspections by investigators indicated no further pollution to Big Creek from this source.

-12-

On August 29, 1997, NEORSD investigators responded to a report of sanitary sewage entering Big Creek through a storm sewer outfall downstream of Ridge Road and north of John Nagy Boulevard. Although no flow measurements could be obtained from the outfall, bacteriological analysis of the discharge revealed a fecal coliform concentration of 580,000 colonies per 100 mL. The source of the sewage was identified as improper connections of residential sanitary discharges to the Ridge Road storm sewer from five apartment buildings at the following addresses: 4166, 4186, 4192 and 4200 Ridge Road, and 7407 Brookside Drive. The City of Brooklyn Service Department was notified of this problem on October 24, 1997. A follow-up inspection by investigators on July 8, 1998 revealed that no corrective action had been taken to remediate this problem.

-13-

On October 21, 1997, NEORSD investigators responded to a report of a black color in Stickney Creek at Brooklyn Park and Roadoan Road. Investigators traced the black colored flow in Stickney Creek to where it exits the culvert at 4930 State Road, north of Brookpark Road. Further investigation revealed that the source of the discolored flow was Paper Tech, Inc., 3900 Brookpark Road. Dye tests showed that this company's sanitary facilities and process wastewater had been improperly connected to the storm sewer which discharges to the Stickney Creek culvert. Company officials were advised to reroute this discharge to the sanitary sewer. A follow-up inspection by investigators

on November 10, 1997 revealed that this facility's wastewater had been rerouted to the sanitary sewer system.

-14-

During the period of January 21, 1998 to January 23, 1998, with Ohio EPA's approval, NEORSD diverted flow from the trunk sewer on Ridge Road to Big Creek in order to perform needed repairs to the Big Creek Interceptor. The diversion was measured at an average volume of approximately 880,000 gallons per day.

-15-

On February 2, 1998, NEORSD investigators discovered sanitary sewage in the open section of Big Creek's West Branch located east of the intersection of West 117th Street and Highland Road in Cleveland. Bacteriological analysis of a sample obtained from the creek at this location revealed a fecal coliform concentration of 240,000 colonies per 100 mL. The sewage was traced back to the overflow regulator on Cooley Avenue, west of West 117th Street.

On February 3, 1998, NEORSD Sewer Maintenance and Control crews inspected the regulator and determined that the gate on the dry weather outlet was closed, thereby diverting sanitary sewage into the culverted section of Big Creek's West Branch. In addition, NEORSD crews discovered that the manhole used to access the gate had been buried, thereby prohibiting the crews from locating and opening the gate. Following these findings, the Ohio EPA and City of Cleveland Division of Water Pollution Control were notified. On February 4, 1998, NEORSD crews raised the gate, eliminating the overflow of sanitary sewage to Big Creek.

-16-

On April 29, 1998, NEORSD investigators responded to a report of sanitary sewage in Stickney Creek where it exits the culvert just north of 4930 State Road, north of Brookpark Road. Investigations revealed that the dry weather flow contaminated by sanitary sewage was from several sources throughout the sewer system in Parma. To determine where the sewage was entering the Stickney Creek culvert, bacteriological samples were taken at numerous locations in the storm sewers tributary to Stickney Creek. Results of the analyses revealed fecal coliform concentrations as high as 1,600,000 colonies per 100 mL and showed that the contamination of the storm sewer by sanitary sewage was from several directions throughout the sewer system. Despite these efforts, the source of the sanitary sewage contamination was not identified. The City of Parma Service Department was notified of the situation on June 5, 1998.

-17-

On June 1, 1998, NEORSD investigators responded to a report of sanitary sewage entering Big Creek's East Branch through the storm sewer outfall at Wesley Drive,

south of Pearl Road. The source of the sewage was traced to a surcharged sanitary sewer caused by a blockage at 8114 Dartworth Road. Following this discovery, the City of Parma Service Department was notified. On June 2, 1998, NEORSD investigators verified that the blockage had been removed. However, an inspection of the outfall revealed a continuous dry weather discharge with no evidence of sanitary sewage. Investigators found that the water main leak to the Ridge Road storm sewer between Wilber and Hampstead Avenues (see problem #3) continued unabated. Investigators also traced another source of the dry weather discharge to a second water main leak to the storm sewer at 7706 Dorothy Avenue. The City of Cleveland Division of Water was notified of the situation on June 11, 1998.

On July 31, 1998, NEORSD investigators responded to a complaint of sanitary sewage odors in the West Boulevard area of Brooklyn. An inspection of the sewer system on West Boulevard revealed that the sanitary sewer was surcharged, resulting in sewage overflowing into Big Creek through two storm sewer outfalls located at 4093 West Boulevard and 4055 West Boulevard. These dry weather discharges were measured at approximately 90,000 gallons per day and 5,000 gallons per day, respectively.

Investigators traced the source of the sewage to a malfunctioning pump temporarily installed to divert the sanitary flow from the Big Creek Interceptor (BCI) at Brookside Drive and West Boulevard Drive to Brookway Avenue. An NEORSD contracted construction firm performing repairs on a section of the BCI, east of Ridge Road, had diverted the flow in order to access the interceptor.

However, the malfunctioning pump had resulted in the discharge of sewage into the West Boulevard sanitary sewer and into Big Creek as a result of the surcharge condition. On August 5, 1998, a new purnp was installed and eliminated the sanitary sewage contamination to Big Creek.

MILL CREEK

Mill Creek drains southeastern Cleveland and the suburbs along the southeastern border of Cleveland. It has a total drainage area of 18.1 square miles and a total length of 9.0 miles. Mill Creek originates in the vicinity of Warrensville Township, flows southwest through Warrensville Heights and a small section of Cleveland to near Broadway Avenue in Maple Heights, which it parallels northwest through Garfield Heights into Cleveland, and then flows south along the border of Cuyahoga Heights and Garfield Heights to the Cuyahoga River at River Mile 11.9.

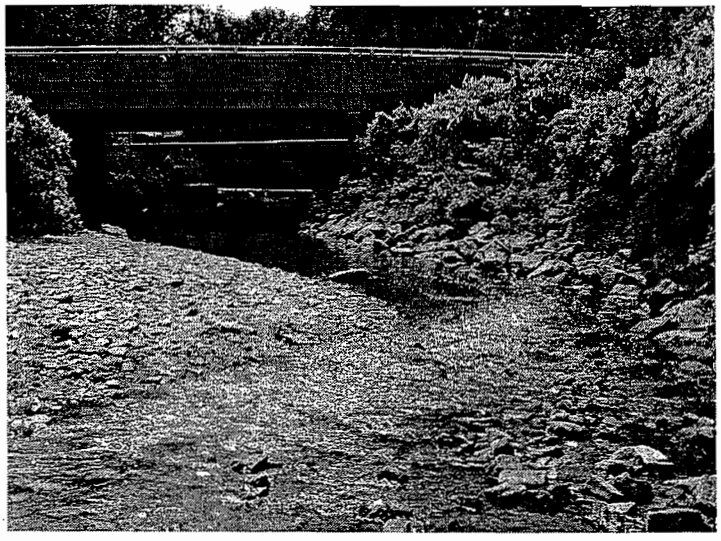
Almost the entire creek is open - the only significant culverted sections being short segments of the creek upstream of Garfield Park, under Interstate 480, and downstream of the detention basin east of Kerruish Park. Except for the concrete beds in the culverts, the creek's substrate is predominantly natural.

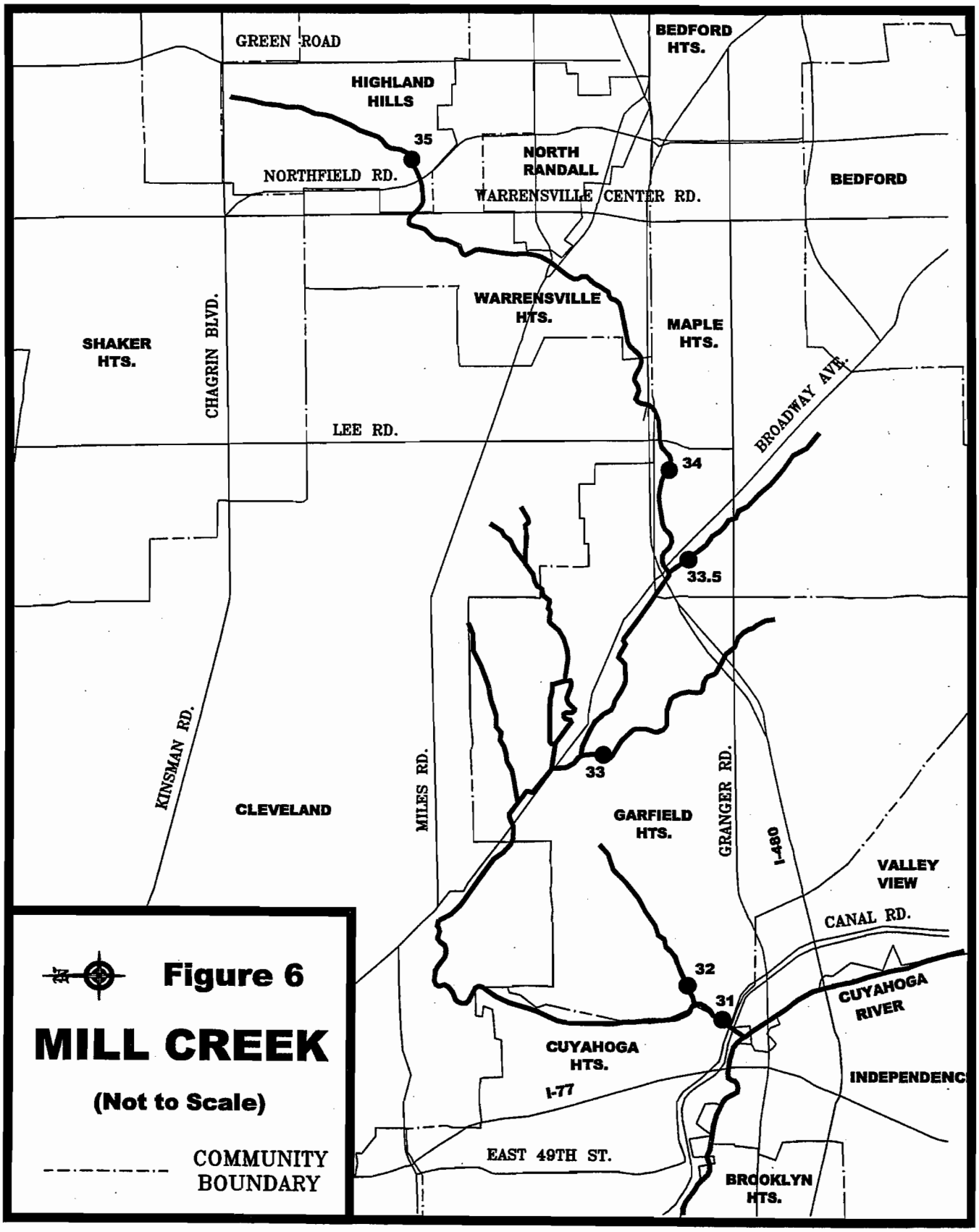
Mill Creek's drainage area is primarily residential and industrial. The Ohio EPA has designated Mill Creek Aquatic Life Warmwater Habitat, Agricultural Water Supply, Industrial Water Supply and Primary Contact Recreational Use.

The water quality of Mill Creek is of particular concern to the NEORSD as it discharges into the Cuyahoga River approximately one mile upstream of the Southerly WWTP discharge to the river. Historically, Mill Creek has been one of the most heavily polluted streams in the Greater Cleveland Area.

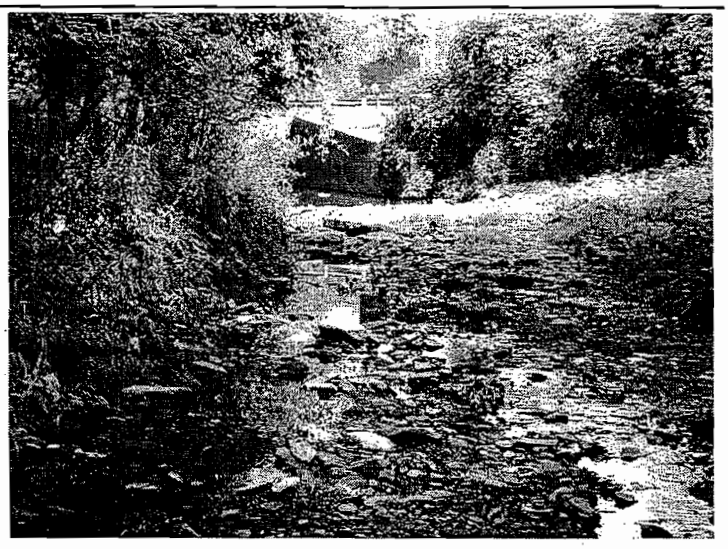
Six locations have been chosen on Mill Creek for routine chemical, bacteriological, and benthic sampling and analysis (Figure 6). Chemical and bacteriological data from Mill Creek are presented in Appendix B.

Site #31 (41° 25.054' N, 81° 38.301' W) is located on the main stem of Mill Creek, approximately 600 feet upstream of the confluence with the Cuyahoga River, under Canal Road. In 1998, Site #31 obtained a QHEI score of 68.75 (Appendix D).



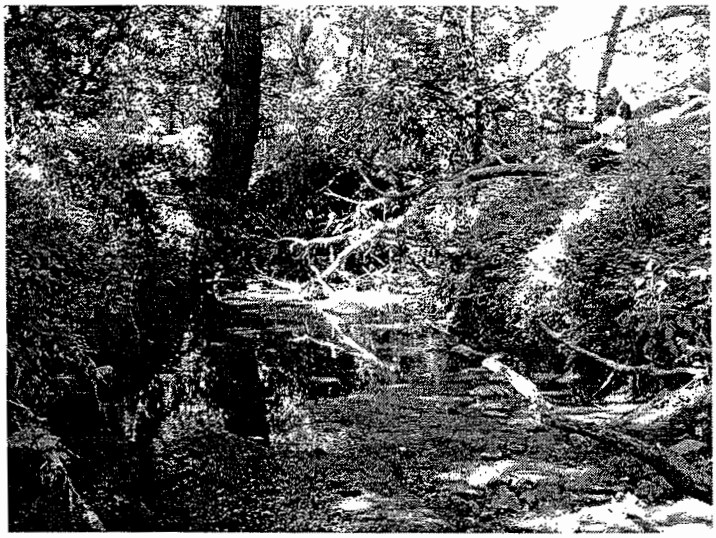

GREEN ROAD
BEDFORD HTS.
HIGHLAND HILLS
35
NORTH RANDALL
NORTHFIELD RD.
WARRENSVILLE CENTER RD.
BEDFORD
WARRENSVILLE HTS.
MAPLE HTS.
SHAKER HTS.
CHAGRIN BLVD.
BROADWAY AVE.
LEE RD.
34
33.5
KINSMAN RD.
MILES RD.
33
CLEVELAND
GARFIELD HTS.
GRANGER RD.
I-480
VALLEY VIEW
CANAL RD.
32
31
CUYAHOGA RIVER
CUYAHOGA HTS.
I-77
INDEPENDENC
EAST 49TH ST.
BROOKLYN HTS.
Figure 6
MILL CREEK
(Not to Scale)
COMMUNITY BOUNDARY

Site #32 (41° 25.282' N, 81° 38.078' W) is located on a small tributary to Mill Creek from the northeast, which is culverted beneath Warner Road. The tributary enters the creek less than one half mile upstream of Mill Creek's confluence with the Cuyahoga River. Site #32 obtained a QHEI score of 70.25 in 1998 (Appendix D).



Site #33 (41° 25.80628' N, 81° 36.282' W) is located on the Wolf Creek tributary to Mill Creek in the Cleveland Metroparks Garfield Park Reservation, approximately 100 feet upstream of its confluence with Mill Creek. In 1998, this site obtained a QHEI score of 68.5 (Appendix D).

Site #33.5(41° 25.342' N, 81° 34.911' W) is located on a tributary to Mill Creek known as the Mapletown Branch, which flows in a northeastern direction parallel to Broadway Avenue in Maple Heights. This site is approximately thirty feet upstream of this tributary's confluence with Mill Creek, south of Interstate 480 at Broadway Avenue. In 1998, this site obtained a QHEI score of 66.25 (Appendix D).



Site #34 (41° 25.396' N, 81° 33.956' W) is located on Mill Creek at Rex Avenue and Glenburn Avenue in Maple Heights. Site #35 obtained a QHEI score of 51.25 in 1998 (Appendix D).

Site #35 (41° 26.753' N, 81° 33.956' W) is located on Mill Creek 100 feet upstream of Northfield Road in the Village of Highland Hills. In 1998, Site #35 obtained a QHEI score of 68 (Appendix D).

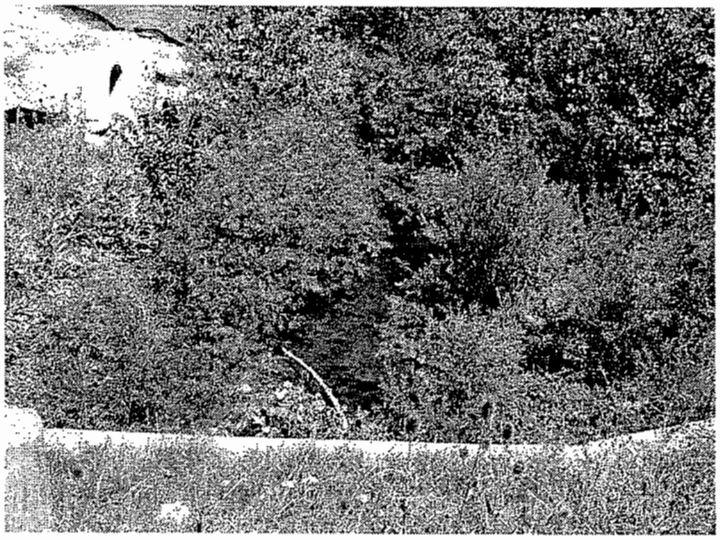
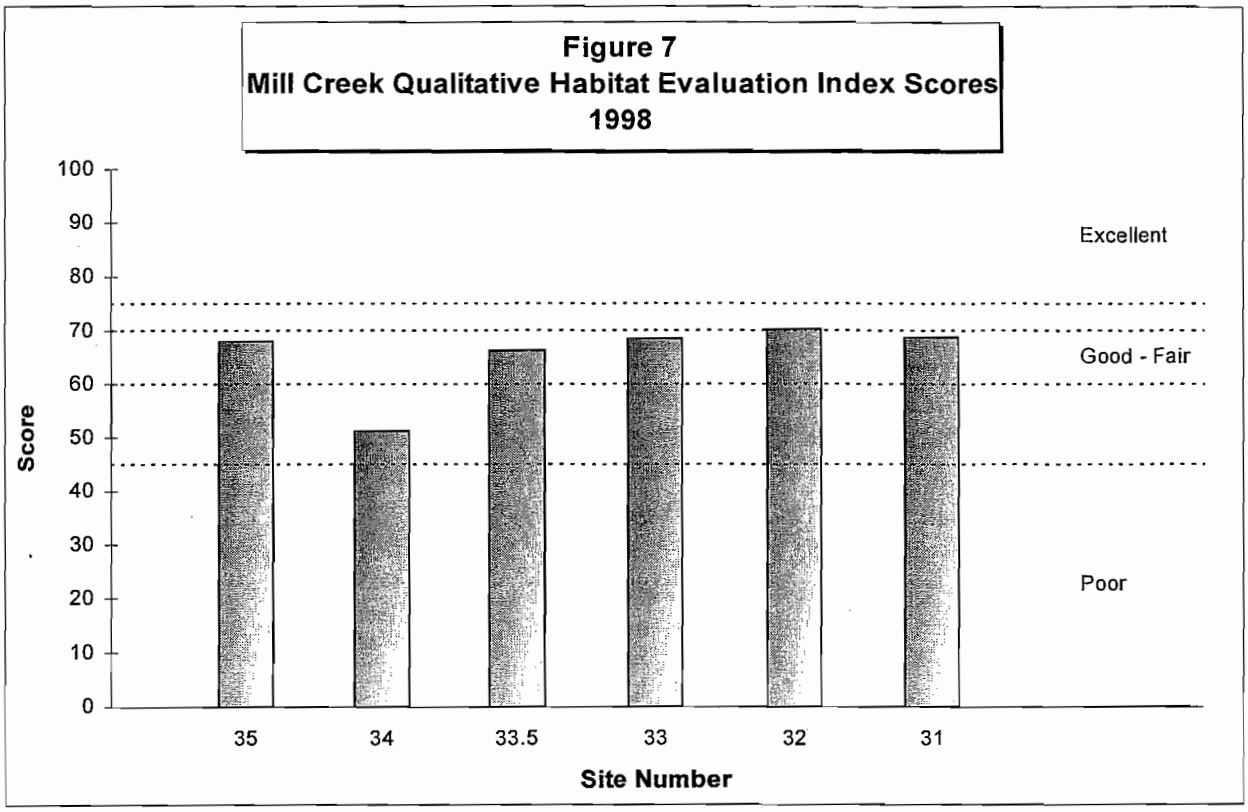


Figure 7
Mill Creek Qualitative Habitat Evaluation Index Scores
1998



Benthic Macroinvertebrate Sampling on Mill Creek

HBI Scores for Mill Creek are presented in Figure 7A. An extensive analysis of Mill Creek was conducted by the NEORSD in 1995, the results of which can be found in the Greater Cleveland Area Environmental Water Quality Assessment 1993-1995. HBI scores calculated in 1998 for the routine monitoring sites indicate an improvement in the macroinvertebrate community at most of the Mill Creek Sites with the exception of Site #31.

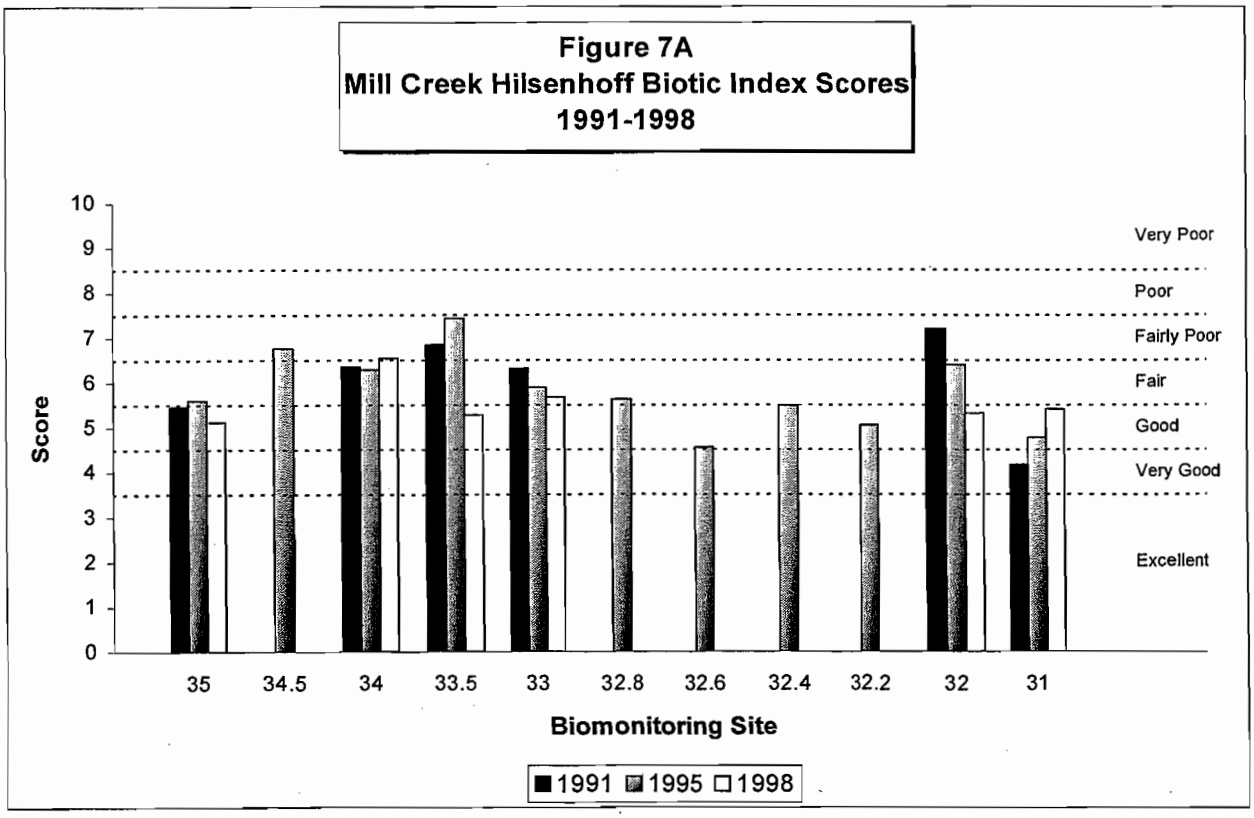
Site #35 - The 1998 HBI score at this site indicates a modest improvement in water quality at this location since 1995 (narrative rating improved from Fair to Good). The noted improvement in the HBI score is attributed to the decrease in the number of pollution tolerant organisms and a slight increase in the percentage of Ephemeropteran, Plecopteran, and Tricopteran (EPT) taxa.

Site #34 - This site received the highest HBI score on Mill Creek in 1998 (6.54 [Poor],) indicating that significant organic pollution was impacting this site. The macroinvertebrate community at this site is comprised largely (85.0%) of dipterans and non-insects, which is an indication of adverse water quality conditions. The NEORSD has repeatedly investigated several sources of organic pollution entering Mill Creek upstream of this location and will continue to do so in order to identify and eliminate the source of impairment to the invertebrate community.

Site #33.5 - This site showed improvement in water quality as indicated by its HBI score of 5.28 (Good) in 1998 compared to 7.43 (Fairly Poor) in 1995. Although the macroinvertebrate community still appears to be impacted, the structure has shifted dramatically from one once composed almost entirely of dipterans and non-insects (97.3%) in 1995 to one that is more diverse. As of 1998, only 57.5% of the community was comprised of dipterans and non-insects, while 38.1% of the community was comprised of EPT taxa. The improvements seen in the water quality at this location can be attributed to the correction of several environmental disruptions to this branch of Mill Creek (see Problems and Remediation Section).

Site #33 - HBI scores have exhibited steady improvement since 1991, but this site is still rated "Fair," indicating that fairly significant organic pollution continues to impact water quality at this location. The macroinvertebrate community at this location has shown a gradual increase in the percent EPT taxa but continues to be dominated by dipterans and non-insects (65.7%). The source of degradation at this location is most likely due to the discharge of sanitary wastes, from households in Garfield Heights, to storm sewers tributary to the creek. These cross connections were first identified in 1992 and continue to discharge unabated.

Figure 7A
Mill Creek Hilsenhoff Biotic Index Scores
1991-1998



Site #32 - As with site #33.5, this site showed improvements in water quality as well as in the health of the macroinvertebrate community from 1991 to 1998. Percent EPT composition increased from 0% in 1991 to 34% in 1998 and the percent of dipterans and non-insects dropped from 98.7% in 1991 to 50% in 1998. This improvement may

be attributable, at least in part, to the identification and remediation of a malfunctioning treatment system that was discharging caustic liquids and liquids from scrubber units to the creek (see Problems and Remediation Section).

Site #31 - This site has demonstrated a trend of increasing degradation since 1991 as measure by the HBI. This increase in the HBI score is the result of an increase in the percentage of dipterans and non-insects from 40.2% in 1991 to 58.8% in 1998 and the corresponding decrease in EPT composition from 59.8% in 1991 to 40.4% in 1998. This increase in dipteran and non-insect composition includes an increase in the number of pollution tolerant organisms displacing mayfly and caddisfly taxa as the dominant organisms at this location. The decline in the macroinvertebrate community at Site #31 requires continued monitoring and sampling to identify the cause of this degradation.

Problems and Remediation

-1-

On February 2, 1996, NEORSD investigators responded to a report of oil in Wolf Creek near Hy Court. Investigators found a light sheen on the creek downstream of the culvert opening near Hy Court, north of Interstate 480, however, traces of thick oil were noted at downstream locations. According to the Garfield Heights fire fighters on the scene, a complaint of oil in Wolf Creek had been reported on February 1, 1996. At that time, the fire department estimated the volume of oil in the creek at 55 gallons. Investigators were unable to identify the source of this oil contamination to the creek.

On March 30, 1996, NEORSD investigators responded to another report of oil in Wolf Creek. Investigators assisted personnel from the Garfield Heights Fire Department, Ohio EPA, U.S. EPA and U.S. Coast Guard in erecting absorbent booms at various locations on the creek in an effort to contain the oil. The source of the spilled oil was not identified. On March 31, 1996, U.S. EPA initiated clean-up of the oil in Wolf Creek. Approximately 150 gallons of oil was removed during the clean-up.

In an effort to identify the source of the oil contamination in Wolf Creek, on April 1, 1996, NEORSD investigators began inspecting the culverted sections of Wolf Creek upstream of Interstate 480 and the storm sewers tributary to the creek culvert.

Investigators traced the oil to the storm sewer on North Industrial Avenue in Maple Heights. NEORSD investigators then performed an extensive investigation of industries in this area. As a result, investigators identified several industries using large quantities of oil. Due to the similarity of oil samples obtained from Wolf Creek and that used in the operation at Alpha Heat Treating Company, Inc., 14701 Industrial Avenue, the samples were analyzed for comparison by a contracted laboratory. Results of the analysis revealed that the oil in the creek matched the oil obtained from Alpha Heat Treating

Company, Inc., even though the route of oil to the storm sewer could not be determined. This information was forwarded to the U.S. EPA.

-2-

On July 8, 1996, NEORSD investigators observed evidence of sanitary sewage in Mill Creek at Site #34 while conducting routine sampling. The contaminated flow was traced upstream to the Lee Road bridge where investigators found sanitary sewage entering the creek through two storm sewer outfalls. Flows rates were measured at approximately 60,000 gallons per day from a 48-inch outfall, and 14,000 gallons per day from a 36-inch outfall. Bacteriological analysis of the creek at Site #34 showed a fecal coliform concentration of 25,000 colonies per 100 mL. The source of the sewage was identified as two surcharged manholes on the sanitary sewer on the Lee Road bridge over Mill Creek. Sanitary sewage was overflowing onto Lee Road and into several catch basins, eventually entering Mill Creek. The City of Maple Heights Service Department was notified of the situation on July 8, 1996. City officials later notified NEORSD that a blockage in the sanitary sewer at this location, which had resulted in the overflow of sewage to Mill Creek, had been cleared. A follow-up inspection by NEORSD investigators on July 23, 1996 revealed that this source of contamination in Mill Creek had been eliminated.

-3-

On October 22, 1996, NEORSD investigators inspected a 48-inch storm sewer outfall to Mill Creek located south of Harvard Avenue and East 77th Street in Cleveland. A dry weather sanitary sewage influent to Mill Creek through this outfall was noted during NEORSD's Mill Creek Watershed Study. Bacteriological analysis of this flow revealed a fecal coliform concentration of 580,000 colonies per 100 mL on October 25, 1996. The flow was measured at an approximate rate of 9,000 gallons per day. The sewage was traced to the Harvard Refuse, Inc. office at 7720 Harvard Avenue. A dye test showed that the company's sanitary facilities had been improperly connected to the storm sewer. Company officials and the City of Cleveland Division of Water Pollution Control were notified of this problem. A follow-up inspection by investigators on January 8, 1997 revealed that this facility's wastewater had been rerouted to the sanitary sewer system.

-4-

On December 5, 1996, NEORSD investigators responded to a report by Cleveland Metroparks Garfield Park Reservation personnel of a green color in Wolf Creek. An inspection of Wolf Creek, from the culvert opening just north of Interstate 480 to the confluence with Mill Creek, revealed several pools containing a bright green substance. The substance appeared to have a high specific gravity due to its presence only along the bottom of deep and slow moving sections of Wolf Creek. In an effort to identify the source of the green substance, investigators inspected several companies located near

the affected areas of Wolf Creek. Despite these efforts, no source of the colored substance was found.

-5-

A problem, which was discussed in the NEORSD Greater Cleveland Area Environmental Water Quality Assessment 1993-1995 Report, was eliminated in 1997. In 1995, investigators found that the sanitary discharge from the Wash-N-Dry Laundromat, 16150 Broadway Avenue, had been improperly connected to the Broadway Avenue storm sewer. The storm sewer on Broadway Avenue is tributary to the 90-inch storm sewer outfall which discharges to the "Mapletown Branch" of Mill Creek behind the Mapletown Shopping Center. The City of Maple Heights Service Department was notified of the problem in March 1995. Inspections by investigators from March 13, 1995 to March 11, 1997 revealed that the discharge remained improperly connected to the storm sewer. Finally, a dye test performed by investigators on March 20, 1997 showed that the discharge from the Wash-N-Dry Laundromat had been rerouted to the sanitary sewer, thereby eliminating this source of pollution in Mill Creek.

In September 1994 and March 1995, NEORSD investigators attempted to trace back the source of the sanitary sewage entering the creek through the 90-inch storm sewer outfall. Investigations revealed that the dry weather flow contaminated by sewage was from several sources throughout the sewer system in Maple Heights. In March 1997 investigators performed more dye tests, inspections, and bacteriological sampling in an attempt to further identify the source(s) of sanitary sewage contamination of Mill Creek through this outfall. These efforts revealed several additional sources of sanitary sewage to the storm sewer system tributary to the 90-inch outfall.

In September 1994, investigators found dry weather flow containing sanitary sewage entering the 90-inch storm sewer from the Clement Street storm sewer. At that time, the flow was traced to the storm sewers in the vicinity of Mapleboro Road and Clement Street. In March 1997, NEORSD investigators further traced the flow to the Mapleboro Road storm sewer between 17017 Mapleboro Road and its intersection with Clement Street. However, the source of the sanitary sewage contamination in the storm sewer was not identified. The City of Maple Heights Service Department was notified of the situation on April 16, 1997.

In March 1995, NEORSD investigators also discovered a dry weather discharge to the 90-inch storm sewer from the southbound Lee Road storm sewer at Maple Heights Boulevard. The flow was traced to the storm sewer on Lee Road, north of Libby Road. Subsequent inspections by investigators in 1998 revealed that the sanitary discharges from the apartment buildings at 5141 Lee Road were improperly connected to the storm sewer. Following this discovery, the problem was reported to the City of Maple Heights Service Department.

Finally, a significant flow of clean water was discovered by NEORSD investigators in the Libby Road storm sewer at Lee Road, which is tributary to the 90-inch storm sewer. In March 1995, the source of this flow was identified as a probable water main leak entering the storm sewer between 5133 and 5185 Catherine Street. During the follow-up inspection in March 1997 however, investigators observed evidence of sanitary sewage in the Catherine Street storm sewer. Investigators found a blockage in the sanitary sewer at 5171 Catherine Street which had resulted in sewage leaking into the storm sewer. The City of Maple Heights Service Department was notified and the blockage was removed. Following this correction, investigators found that the water main leak between 5185 and 5133 Catherine Street continued unabated. Future inspections and continued monitoring will be performed to verify the elimination of these sources of pollution in this Mill Creek tributary.

-6-

On March 18, 1997, NEORSD investigators discovered sanitary sewage flowing in a concrete ditch on the north side of Emery Road in North Randall. The sewage was traced to a surcharged manhole on the sanitary sewer at 20265 Emery Road. As a result of a blockage in the sanitary sewer at this location, sewage was overflowing from the manhole and into a ditch which discharges to Mill Creek through a storm sewer outfall under Emery Road. The discharge was measured at a flow rate of approximately 6,500 gallons per day and had a fecal coliform concentration of 10,000 colonies per 100 mL. Following this discovery, the problem was reported to the City of North Randall Service Department. A subsequent inspection by NEORSD investigators revealed that the sanitary sewer had been unblocked and this source of pollution in Mill Creek had been eliminated.

-7-

In August 1994, NEORSD investigators discovered a dry weather flow entering Mill Creek through a 60-inch storm sewer outfall on the east bank, downstream of Miles Road. At that time, the discharge was measured at 130,000 gallons per day and had a fecal coliform concentration of 30,000 colonies per 100 mL. Investigations in October 1994 revealed that the dry weather flow was coming from several sources throughout the sewer system on Emery Road between Warrensville Center and Northfield Roads in North Randall. One contributing source was identified as run-off from the horse stables at Thistledown Race Track on Emery Road. Following these findings, the Village of North Randall and Ohio EPA were notified.

In March 1997, NEORSD investigators performed more inspections and bacteriological sampling in an attempt to further identify the source(s) of dry weather flow to Mill Creek through the storm sewer outfall downstream of Miles Road. These efforts revealed several additional sources of bacterial contamination. Investigators again traced dry weather flow in the Emery Road storm sewer to Thistledown Race Track. Dye tests revealed that the sanitary facilities at two of the horse barns were improperly connected

to the storm sewer. Following these findings, the Village of North Randall Service Department was notified on April 16, 1997.

In addition, on September 8, 1997, NEORSD investigators assisted the Ohio EPA in an investigation of Thistledown following complaints of debris from the horse stable entering Mill Creek through a storm sewer outfall on BP Oil Research Center property, 4440 Warrensville Center Road. As a result of the investigation, Ohio EPA advised Thistledown to institute a storm water management program to control the run-off of stable debris and manure into storm sewers, and eventually Mill Creek. At that time, Thistledown representatives stated that extensive dye testing of all its facilities was being conducted to ensure that all improper connections to the storm sewer system would be addressed.

In 1998, Thistledown informed NEORSD that a company had been contracted to perform the corrections to Thistledown's sewer system. As of December 1998, Thistledown was pursuing the appropriate actions to eliminate their illicit connections to the storm sewer.

-8-

Following an inspection of the sanitary sewer overflow chamber at Lee Road and Westview Avenue in Cleveland on April 3, 1997, investigators found that the sanitary facilities at Taco Bell, 4110 Lee Road, were improperly connected to the storm sewer system tributary to Mill Creek. The City of Cleveland Division of Water Pollution Control was notified of the situation and, on April 17, 1997, required that Taco Bell reconnect its sanitary discharge to the sanitary sewer. Following a second notification by the City of Cleveland on August 22, 1997, modifications to reroute the wastewater into the sanitary sewer were performed by Taco Bell. These modifications were verified through a dye test by investigators on September 4, 1997.

-9-

On April 28, 1997, NEORSD investigators responded to a complaint of a white substance in a tributary to Wolf Creek at 12300 Granger Road. The white colored flow was traced to the Dan Kostel Recreation Center in Garfield Heights, 5411 Turney Road. An inspection of the facility by NEORSD investigators and Ohio EPA personnel revealed that the drains for the ice rink were tributary to a storm sewer which discharges to the creek. The source of the white substance was identified as water-soluble paint used on ice. At the time of the inspection, ice was being removed from the rink. As a result, the melting ice and paint were being discharged to the drains which are tributary to the storm sewer. Following these findings, Ohio EPA instructed the Garfield Heights Recreation Department to immediately cease the discharge from the rink and to permanently seal or reroute these drains to the sanitary sewer. A follow-up inspection by NEORSD investigators verified that the drains had been sealed with concrete, eliminating this discharge to Wolf Creek.

-10-

On May 15, 1997, NEORSD investigators noticed a white substance covering the substrate of the Warner Road tributary of Mill Creek downstream of Warner Road. Although the white substance was no longer entering the creek, investigators were able to trace the substance to a storm sewer outfall from the north under Warner Road. At the time of the inspection, investigators noted a dry weather flow through this outfall. The pH of the discharge was measured at 12 standard units.

The discharge was identified as scrubber water and its source was determined to be Ohio Aluminum Industries Inc., 4840 Warner Road. An inspection and dye test revealed that the scrubber unit's holding tank was cracked. As a result, the scrubber system discharge had exfiltrated through the building's foundation and into the storm sewer system. In addition, the pH adjuster on the scrubber unit was malfunctioning, resulting in the elevated pH in the discharge.

Following these findings, company officials were advised to perform the necessary modifications to eliminate this discharge from entering the storm sewer. The Ohio EPA was informed of the situation. A follow-up inspection by NEORSD investigators revealed that this source of industrial wastewater to the storm sewer, and ultimately Mill Creek, had been eliminated.

-11-

On July 7, 1997, NEORSD investigators found sanitary sewage entering Mill Creek through a storm sewer outfall just downstream of Lee Road on the south bank of Mill Creek. The source of the sewage was identified as an improper connection of a residential sanitary discharge to the storm sewer at 5129 Catherine Street. The City of Maple Heights Service Department was notified of this situation.

-12-

On August 11, 1997, NEORSD investigators responded to a report of a green substance in Wolf Creek near East 117th Street and Edgepark Drive. The green colored flow was traced to a storm sewer outfall behind 12025 McCracken Road. Further investigation revealed that the green color was a dye being used by a plumber to test a resident's downspouts for possible storm water infiltration into the basement.

-13-

On August 27, 1997, NEORSD investigators found a 36-inch storm sewer discharging sanitary sewage to Mill Creek under the Miles Road bridge. The discharge was measured at a flow rate of 18,000 gallons per day and had a fecal coliform concentration of 860,000 colonies per 100 mL. Investigators traced the source of sewage to a blocked sanitary sewer just east of 20000 Miles Road. The blockage

caused the sanitary sewer to become surcharged, resulting in sewage infiltrating into the storm sewer system. Following this discovery, the City of Warrensville Heights Service Department was notified. However, a follow-up inspection by investigators on October 24, 1997 revealed that the sanitary sewage influent to Mill Creek continued as a result of the blocked Miles Road sanitary sewer. The City of Warrensville Heights was again notified on October 24, 1997. A subsequent inspection on November 18, 1997 verified that the blockage had been removed, thus eliminating this source of pollution in Mill Creek.

-14-

On September 12, 1997, NEORSD investigators responded to a complaint of a brown substance in Wolf Creek, east of Edgepark Drive and East 117th Street. While inspecting this section of the creek, investigators also observed that the creek's flow was higher than normal. The brown flow was traced to the storm sewer on York Boulevard in Garfield Heights. According to city officials, a water main on York Boulevard had ruptured early that day, resulting in a large volume of muddy water entering several catch basins and the storm sewer tributary to Wolf Creek. At the time of the investigation, the City of Cleveland Water Department was on location to repair the water main.

-15-

On October 1, 1997, NEORSD investigators responded to a report by the Garfield Heights Fire Department of a fire at 13305 Littleton Road. According to the fire department, an abandoned natural gas well, which was being capped, and the oil which was being removed from the well, had ignited during the recovery operation. NEORSD personnel were requested to monitor the sanitary and storm sewer system in the area for explosive conditions.

While monitoring the sewers, investigators observed oil in the runoff from the fire entering the storm sewer. Following a review of a map of the collection system, investigators determined that this storm sewer was tributary to Wolf Creek. An inspection of Wolf Creek at the culvert opening, located at the end of 114 Hy Court, north of Interstate 480, revealed a significant amount of oil in the creek. In an effort to contain the oil, investigators placed oil absorbent pillows across the creek at the culvert opening. A second set of absorbent pillows was placed in the creek at the end of East 128th Street to further collect the oil.

On October 2, 1997, NEORSD investigators returned to Wolf Creek and found that the oil had been contained by the absorbent pillows. No oil was observed in the creek downstream of East 128th Street. Clean-up of the creek was coordinated by Ohio Environmental Protection Agency and Ohio Department of Natural Resources Division of Gas and Oil.

-16-

On January 5, 1998, NEORSD investigators responded to a report by the Maple Heights Fire Department of an insecticide spill at 15404 Northwood Avenue. An estimated 40 to 50 gallons of the insecticide Premise 75 had spilled onto Northwood Avenue from an Orkin Exterminating Company vehicle. Although some of the chemical had been contained with oil dry, an undetermined quantity had entered the storm sewer through a catch basin on Northwood Avenue. This storm sewer is tributary to the Mapletown Branch of Mill Creek, north of the terminus of Lee Road, north of Rockside Road. Investigators were unable to determine if the chemical had entered the creek.

A review of the Material Safety Data Sheet (MSDS) for Premise 75 showed that the chemical is water soluble and highly toxic to aquatic invertebrates. At the time of the investigation, Inland Waters of Ohio was on location to remove the chemical from the street and catch basin. The Ohio EPA had been notified of the situation.

On January 6, 1998, NEORSD investigators conducted an instream macroinvertebrate survey of the Mapletown Branch to assess what impact the spill may have had on the aquatic life. Samples were collected from the creek, upstream and downstream of the Northwood Avenue storm sewer outfall. Analysis of the kick net samples indicated that the aquatic macroinvertebrate community downstream of the storm sewer outfall did not appear to be adversely affected by the insecticide spill.

-17-

On July 7, 1998, NEORSD investigators discovered an oil sheen on Mill Creek at Canal Road. The oil was traced to the C.H. Robinson Company, 5171 Canal Road. An inspection of this facility by NEORSD investigators and Ohio EPA personnel revealed no source of an oil discharge. However, further discussion with company officials and the owner of the building revealed that this facility was formerly occupied by a forging company. In addition, the building's owner stated that the previous occupant, Buckeye Forge Company, had utilized underground storage tanks for oil and diesel fuel. However, the owner did not know whether the tanks had been removed. Following these findings, Ohio EPA assumed responsibility for the investigation.

-18-

On July 27, 1998, NEORSD investigators discovered a milky-white substance entering the Warner Road tributary of Mill Creek through a storm sewer outfall under Warner Road. The discharge was estimated at 6,000 gallons per day. Investigators traced the flow to a catch basin on Warner Road just south of Garfield Boulevard. The source of the substance was identified as the Mill Creek Interceptor shaft at this location. Water having a high solids content was being pumped out of the interceptor tunneling shaft and onto a grassy area at the site, eventually entering a nearby catch basin. In addition, the discharge included runoff from workers watering down tailings from the

drilling operation. The construction manager was informed of the problem and agreed to perform the modifications necessary to eliminate the discharge of solids to the creek. Remediation efforts to remove the solids from the tributary of Mill Creek were confirmed by investigators on July 31, 1998.

-19-

On October 5, 1998, NEORSD investigators discovered sanitary sewage in Mill Creek at Greenhurst Road. An inspection revealed a crack in an 8-inch sanitary sewer that runs under Mill Creek near the Greenhurst Road bridge. As a result, sewage was leaking into Mill Creek. The City of Maple Heights Service Department was notified of these findings on October 21, 1998.

-20-

On December 16, 1998, NEORSD investigators found sanitary sewage entering Mill Creek from a storm sewer outfall under the Interstate 480 bridge, south of McCracken Road. Investigators traced the source of sewage to a blocked sanitary sewer near the intersection of Williams Avenue and Granger Court. The blockage caused the sanitary sewer to become surcharged, resulting in sewage infiltrating into the storm sewer system. The City of Maple Heights was notified of the situation on December 22, 1998. A follow-up inspection by investigators verified the elimination of this dry weather discharge.

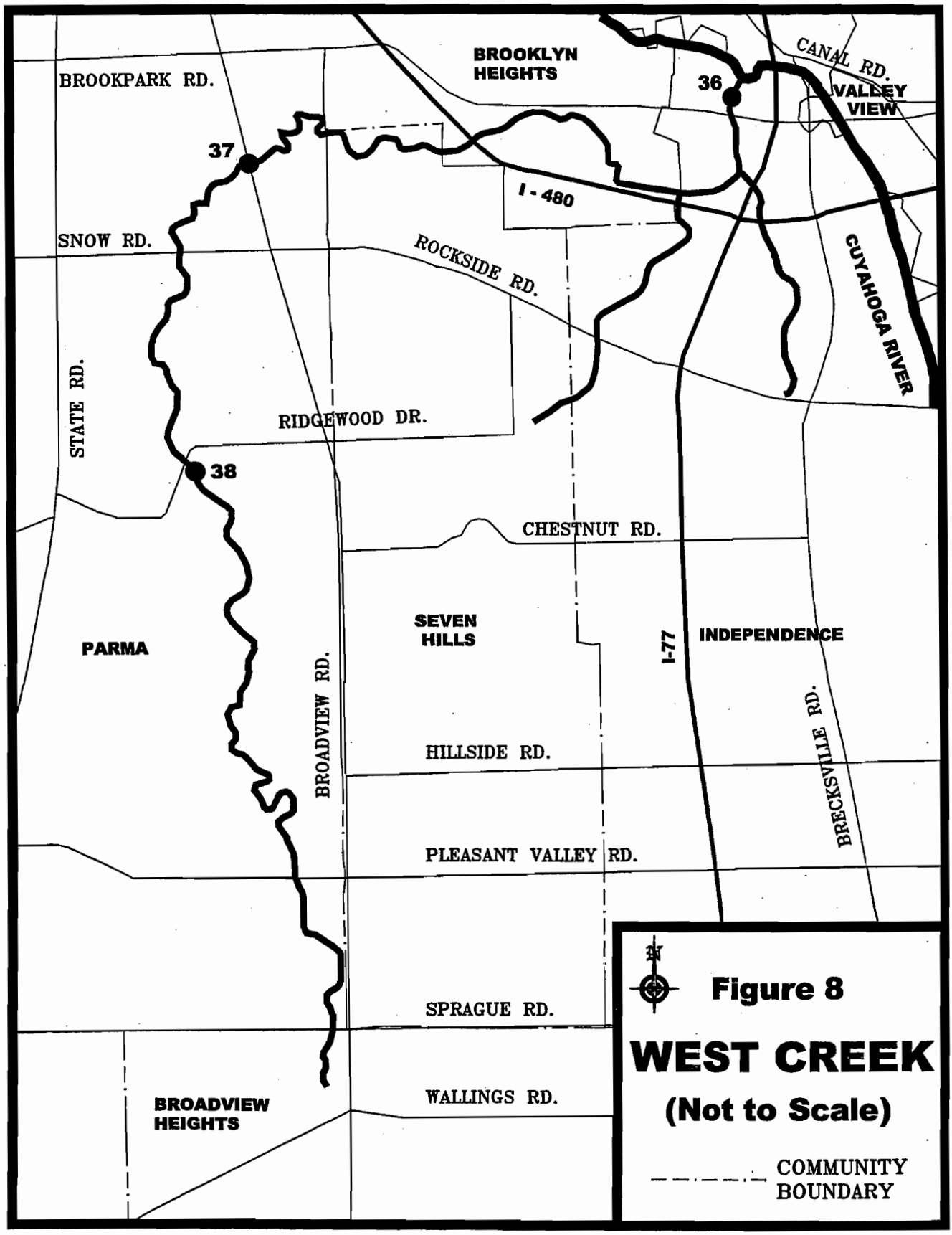
WEST CREEK

West Creek drains the eastern section of Parma and portions of Seven Hills, Brooklyn Heights, and Independence. It has an approximate drainage area of 20 square miles and a total length of approximately eight miles. West Creek has two branches: the main stem, which originates in Parma just south of the intersection of Broadview Road and Pleasant Valley Road and flows north through the eastern section of Parma, then east through Seven Hills, Brooklyn Heights, and Independence; and a smaller branch, originating in Independence north of the Chestnut Road and Oakwood Drive intersection, joining the main stem through a culvert under Interstate 480, west of the Interstate 77 interchange. From this confluence, West Creek flows north to the Cuyahoga River upstream of the Southerly WWTP chlorine-access railroad bridge (RM 11.3).

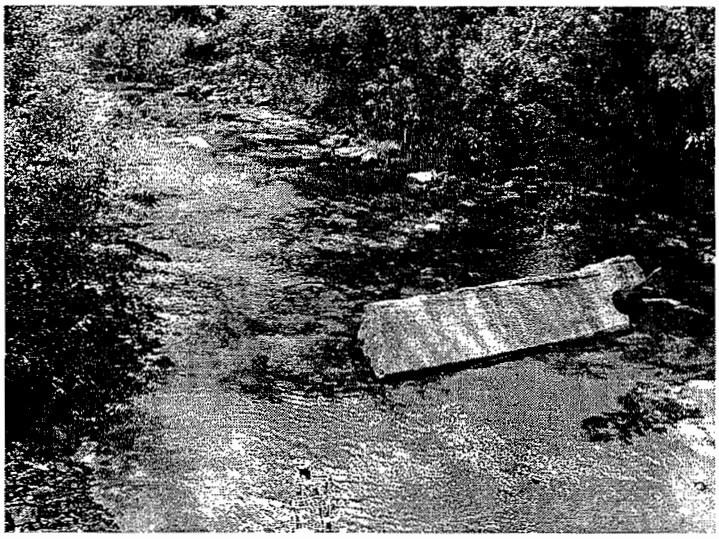
Most of West Creek is open and its substrate is predominantly natural. Along Interstate 480, the main stem has a short channelized section with concrete beds and sidewalls. Between Keynote Drive and Lancaster Drive in Brooklyn Heights, the stream has been re-routed to the northwest, with gabions installed on the banks to allow for construction of a commercial/industrial park.

West Creek's drainage area is largely residential. The Ohio EPA has designated West Creek Aquatic Life Warmwater Habitat, Agricultural Water Supply, Industrial Water Supply and Primary Contact Recreational Use. The NEORSD has selected three locations on West Creek for routine chemical, bacteriological, and benthic sampling and analysis (Figure 8). Chemical and bacteriological data from West Creek are presented in Appendix B.

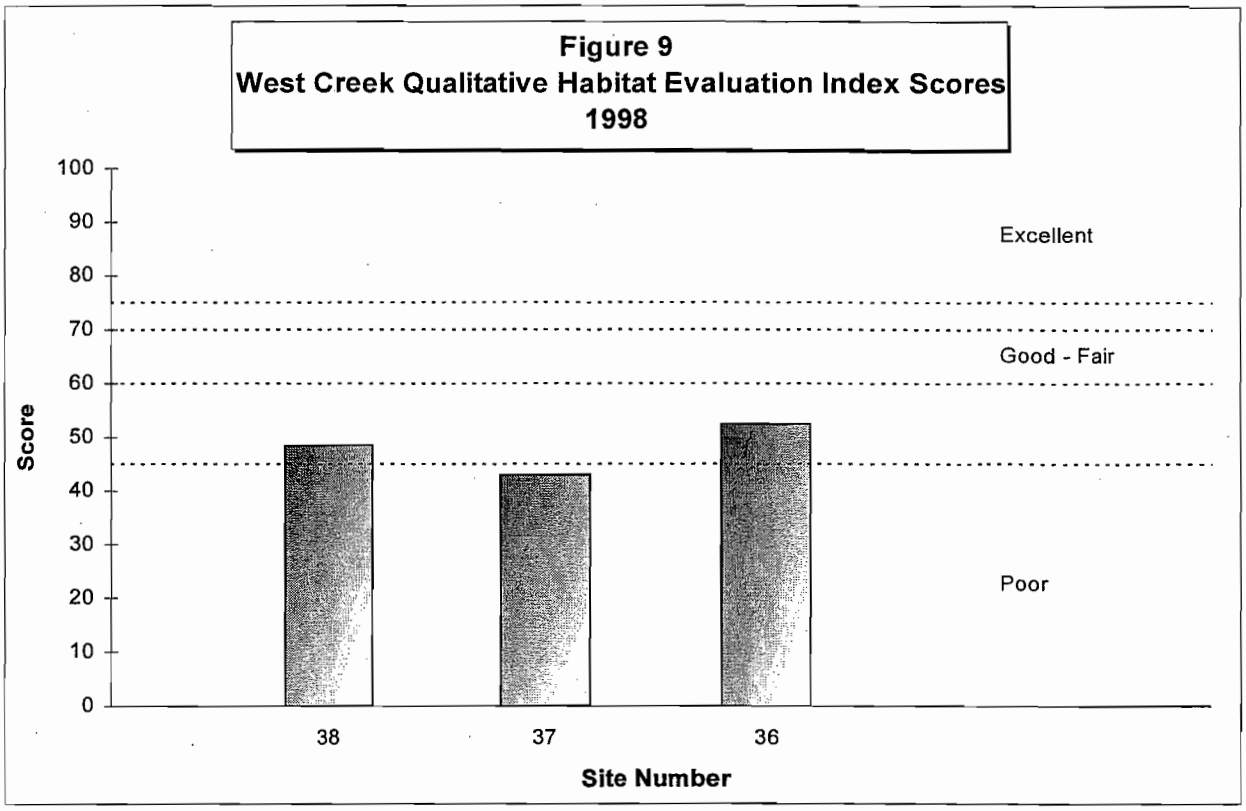
Site #36 (41° 24.868' N, 81° 38.878' W) is located on the main stem under the Granger Road bridge, between Interstate 77 and Valley Belt Road, approximately 1,000 feet upstream of the confluence with the Cuyahoga River. In 1998, Site #36 obtained a QHEI score of 52.5 (Appendix D).


BROOKPARK RD.
BROOKLYN HEIGHTS
CANAL RD.
VALLEY VIEW
36
37
I - 480
SNOW RD.
ROCKSIDE RD.
CUYAHOGA RIVER
STATE RD.
RIDGEWOOD DR.
38
CHESTNUT RD.
SEVEN HILLS
PARMA
BROADVIEW RD.
I-77
INDEPENDENCE
BRECKSVILLE RD.
HILLSIDE RD.
PLEASANT VALLEY RD.
SPRAGUE RD.
WALLINGS RD.
BROADVIEW HEIGHTS
Figure 8
WEST CREEK
(Not to Scale)
COMMUNITY BOUNDARY

Site #37 (41° 24.692' N, 81° 41.572' W) is located on the main stem of West Creek under the Broadview Road bridge, between Brookdale Avenue and Sandpiper Drive in Parma. In 1998, Site #37 obtained a QHEI score of 43 (Appendix D).



Site #38 (41° 23.448' N, 81° 41.425' W) is located on the main stem of West Creek just upstream of the West Ridgewood Drive bridge, west of Post Road, in Parma. In 1998, Site #38 obtained a QHEI score of 48.5 (Appendix D).



Benthic Macroinvertebrate Sampling on West Creek

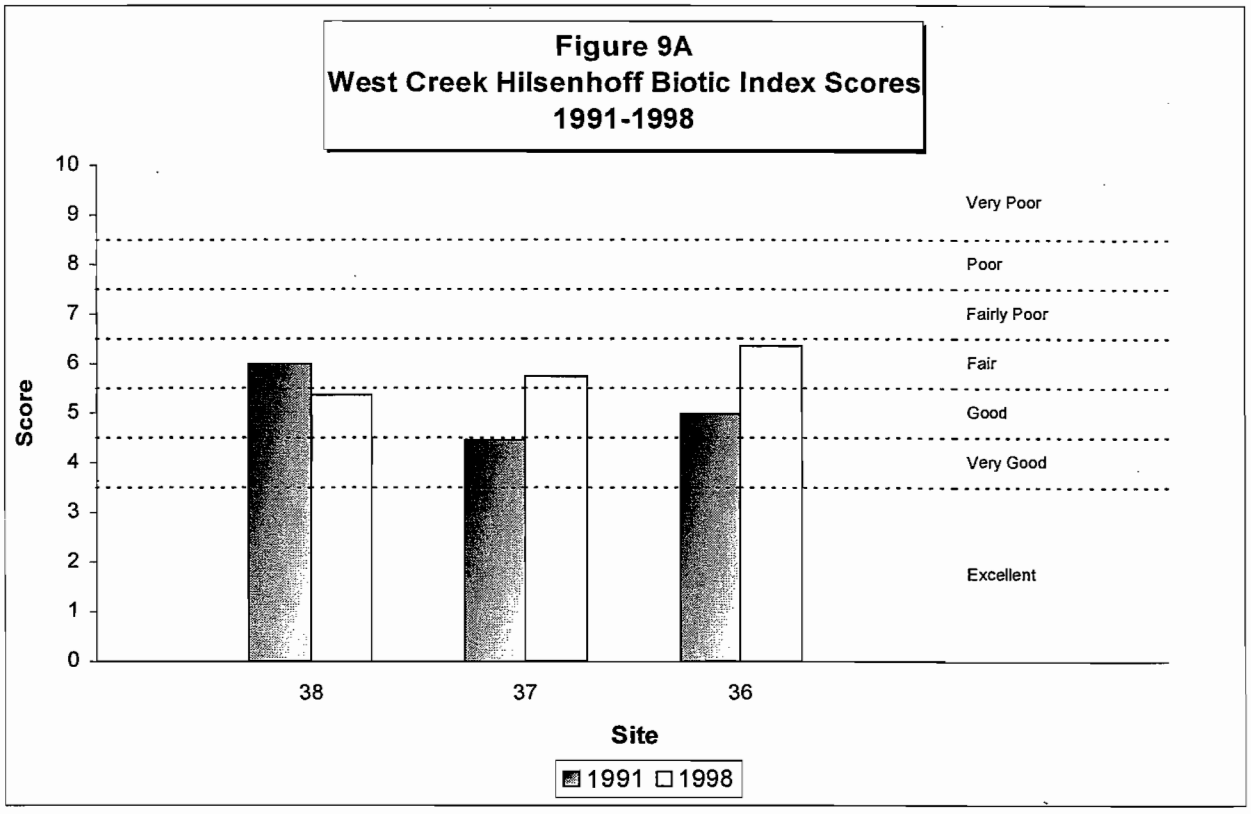
HBI Scores for West Creek are presented in Figure 9A. A comparison of 1991 scores with those collected in 1998 indicates that the overall water quality has degraded. HBI narrative ratings for Sites #37 and #36 dropped from *Very Good* and *Good* to *Fair*, indicating that significant organic pollution was impacting these sites at the time of sampling.

Site #38 - The macroinvertebrate community as well as the water quality at this location improved slightly from 1991 to 1998. Since the 1991 sample collection, there has been a change in the community structure at this location. A slight decrease in Ephemeropteran, Plecopteran, and Tricopteran (EPT) taxa has been observed, (8 in 1991 to 4 in 1998) and caddisflies now make up the majority of the EPT composition at this site. These differences may be attributable to seasonal variations between the 1991 and 1998 collection dates (three months apart) and not the result of changes in water quality.

Site #37 - The quality of the macroinvertebrate community at this site has declined since 1991. The percent EPT composition dropped from 77.2% in 1991 to 38.7% in 1998 while the percentage of dipterans and non-insects increased from 19.3% to 57.3% during the same time period. The increase in dipterans was primarily due to an increase in the number of pollution tolerant organisms. Further sampling will be

required to identify the source of the environmental disruption affecting the macroinvertebrate community at this site.

Site #36 - Since 1991, the condition of the macroinvertebrate community has also declined at this site. The community's shift in structure from one comprised predominantly of EPT taxa (69.6% in 1991 to 17.7% in 1998) to a community dominated by dipterans and non-insects (27.8% in 1991 to 75.2% in 1998) indicates that a deterioration of water quality has occurred. The species composition suggests that the degraded benthic community is the result of a combination of stressors, including toxics and organics. The source(s) of the degradation affecting the benthic communities at Sites #36 and #37 are yet unknown. Several environmental disruptions to West Creek have been corrected (see Problems and Remediation Section), however there may still be intermittent discharges of pollutants that have not been identified and that have a detrimental impact of the benthic community. Additional sampling will be required to identify the source of degradation in West Creek.



Problems and Remediation

While conducting routine sampling on West Creek, on July 30, 1996, NEORSD investigators discovered a dry weather discharge with evidence of sanitary sewage entering the creek through a northbound storm sewer outfall located just upstream of

the Broadview Road bridge. As a result of this discharge, bacteriological samples obtained at Site #37 revealed elevated fecal coliform (9,400 colonies per 100 mL) and *E. coli* (5,300 colonies per 100 mL) concentrations. Investigators traced the sewage to a blocked sanitary sewer at 5767 Broadview Road. The blockage caused the sanitary sewer to become surcharged, resulting in sewage infiltrating into the storm sewer. Following this discovery, the City of Parma Service Department was notified of the problem. Subsequent inspections by NEORSD investigators throughout 1996 and 1997 revealed that the sanitary influent to West Creek had continued unabated as a result of the blocked sanitary sewer. Finally, on July 16, 1998 an inspection by investigators revealed that the blockage had been cleared, thereby eliminating this source of contamination to West Creek.

-2-

On September 18, 1996, NEORSD investigators found sanitary sewage entering a tributary to West Creek through a 42-inch northbound storm sewer outfall, north of 720 North Avenue. Bacteriological analysis of the discharge revealed a fecal coliform concentration of 860,000 colonies per 100 mL. The rate of this discharge was measured at approximately 18,000 gallons per day. An inspection by investigators revealed that the sanitary flow was originating from several directions throughout the sewer system.

One source of the sewage was found to be a blocked sanitary sewer at 1219 North Avenue. Investigators also traced sewage to another blocked sanitary sewer at 1415 Tuxedo Avenue. As a result of these blockages, sewage was leaking into the storm sewers tributary to the creek through the 42-inch storm sewer outfall. Investigators also found that a section of the storm sewer at 1415 Tuxedo Avenue had collapsed. Following these findings, the City of Parma Service Department was notified. A follow-up inspection by investigators on September 19th revealed that the blockages in the sanitary sewers on North Avenue and Tuxedo Avenue had been cleared, eliminating this source of contamination to the West Creek tributary. Investigators also noted that no corrections had been made to the storm sewer at 1415 Tuxedo Avenue. This problem was reported to the City of Parma Service Department.

-3-

On January 31, 1997, NEORSD investigators discovered the recurrence of a dry weather sanitary sewage influent to the West Creek tributary, through the 42-inch storm sewer outfall, north of 720 North Avenue. Bacteriological analysis of this flow showed a fecal coliform concentration of 150,000 colonies per 100 mL. The flow was measured at an approximate rate of 2,800 gallons per day. The sewage was traced back to 1601 Tuxedo Avenue, where it was found to be leaking into the storm sewer. The City of Parma Service Department was notified of the problem and the blockage was cleared. A follow-up inspection by NEORSD investigators on February 24th verified the elimination of this source of pollution in West Creek.

-4-

On June 24, 1997, NEORSD investigators discovered sanitary sewage in a tributary to West Creek, east of 5245 West 10th Street. Sewage was found entering the creek through a 48-inch storm sewer outfall at this location. The sewage was traced to 1511 Brookpark Road. A blockage of the sanitary sewer at this location had resulted in sewage leaking into the storm sewer. The City of Parma Service Department was notified of the situation. On July 1st, NEORSD investigators verified that the sanitary sewer had been unblocked and this source of contamination in West Creek had been eliminated.

-5-

On July 14, 1998, NEORSD investigators responded to a complaint of sewage odors in a tributary to West Creek near 5249 West 10th Street. Investigators found sanitary sewage entering the creek through a 48-inch storm sewer outfall located east of 5245 West 10th Street. The source of the sewage was traced to a blocked sanitary sewer at 2314 Brookview Boulevard. Following notification of the City of Parma Service Department, the blockage was removed on July 15th. A subsequent inspection by NEORSD investigators revealed that this source of pollution in West Creek had been eliminated.

-6-

On July 27, 1998, NEORSD investigators responded to another complaint of sewage odors in the West Creek tributary, east of 5245 West 10th Street. Investigators discovered sewage entering the creek through a 48-inch storm sewer outfall at this location. The flow of sewage was traced to a blocked sanitary sewer between 1400 and 1619 Brookpark Road. The blockage caused sewage to leak into the storm sewer and ultimately discharge to the creek. Following this discovery, the City of Parma Service Department was notified and the blockage was removed. NEORSD investigators, on July 28th, verified that this source of sanitary sewage contamination in West Creek had been eliminated.

-7-

Since July 1988, NEORSD investigators have responded to numerous complaints of sewage in a tributary to West Creek, east of 5245 West 10th Street. NEORSD investigators found sanitary sewage entering the creek through a 42-inch eastbound storm sewer outfall at this location. The problem had been reported to the City of Parma in 1988.

Subsequent inspections and sampling by NEORSD investigators throughout the period of 1991 through 1996 revealed that the discharge to the creek was continuing unabated. Inspections also revealed that the sanitary flow was from several directions throughout the sewer system.

In an effort to further identify the source(s) of sanitary sewage contamination to the creek in August and September 1996, NEORSD investigators along with Cuyahoga County Board of Health personnel performed an extensive investigation of the storm sewer system tributary to the creek through the 42-inch storm sewer outfall. Measurements on August 27, 1996 indicated that the flow was entering the West Creek tributary at an approximate rate of 12,000 gallons per day, with a fecal coliform concentration of 110,000 colonies per 100 mL. While tracing back the dry weather flow, investigators observed that sewer construction work was being performed on the Brookview Boulevard storm sewer, which is tributary to the 42-inch outfall. Investigators noted that the work also included corrections to the lateral sanitary sewer lines of numerous homes, which had apparently been connected to the storm sewer system.

Investigators further traced sanitary sewage to the Brookpark Road storm sewer, between Broadview Road and West 26th Street. Dye tests of the businesses in this vicinity revealed that the sanitary facilities from Krehel Partitions Inc. (2513 Brookpark Road) and The Law Offices of Bruce M. Cichocki, Attorney (2545 Brookpark Road) were improperly connected to the storm sewer. Following these findings, the Cuyahoga County Board of Health contacted the owners of the buildings to require reconnection of the sanitary discharges to the sanitary sewer system. A follow-up inspection on June 16, 1997 verified that these discharges are now tributary to the sanitary sewer.

Another source of contamination in the Brookpark Road storm sewer was discovered by investigators. Run-off, contaminated with oil, was found entering the storm sewer from Parma Marine (2327 Brookpark Road) and Taylor Rental (2415 Brookpark Road). Boat washing and construction equipment cleaning from these respective companies had resulted in the discharge of oil and grease into parking lot catch basins which are tributary to the storm sewer. NEORSD investigators advised these companies that these discharges should be prevented from entering the environment via the storm sewer. Subsequent inspections by investigators at a Parma Marine on June 16, 1997 and Taylor Rental on August 12, 1998 revealed that modifications to eliminate these discharges from entering the storm sewer had been completed.

Also contributing to the dry weather sanitary influent through the 42-inch storm sewer outfall was a blocked sanitary sewer at 2113 Grovewood Avenue. The blockage caused the sanitary sewer to become surcharged resulting in sewage infiltrating into the storm sewer. The City of Parma Service Department was notified of the problem on July 17, 1997. A follow-up inspection by NEORSD investigators on July 18th revealed that the sanitary sewer had been unblocked, eliminating the influent to the creek.

Finally, NEORSD investigators noted a significant flow of apparently clean water in the Brookview Boulevard storm sewer at West 28th Street. The flow rate of this discharge entering the storm sewer was measured at approximately 5,000 gallons per day. This discharge was tributary to the 42-inch outfall. The source of this flow was identified as

a probable water main leak entering the storm sewer on Brookview Boulevard at West 28th Street.

On June 9, 1998, NEORSD investigators obtained flow measurements and bacteriological samples from the 42-inch storm sewer outfall. The discharge rate was measured at approximately 5,400 gallons per day and the fecal coliform concentration was found to be 1,200 colonies per 100 mL. The reduction in bacterial concentrations is evidence of the remediation efforts taken to eliminate sanitary sewage from entering the storm sewer system tributary to West Creek through the 42-inch outfall. The source of the continuous dry weather flow through this outfall was identified as the water main leak on Brookview Boulevard at West 28th Street.

Also contributing to the sanitary sewage contamination in this tributary to West Creek, was a dry weather sanitary influent to the creek through a 48-inch southbound storm sewer outfall located behind 5245 West 10th Street, which was discovered by NEORSD investigators. Bacteriological analysis of this discharge on July 14, 1997 revealed a fecal coliform concentration of 300,000 colonies per 100 mL. The flow rate of this discharge was measured at approximately 13,000 gallons per day.

NEORSD investigators traced the sewage to the Brookpark Road storm sewer, between Broadview Road and West 10th Street. Dye tests revealed that the sanitary discharges from Cleveland Controls, Inc. (1111 Brookpark Road), O.A. Bertin Company (1305 Brookpark Road), and Phillips Syrup Corp. (1311 Brookpark Road) were found to be improperly connected to the storm sewer. Following these findings, the Cuyahoga County Board of Health contacted these businesses to require reconnection of the sanitary discharges to the sanitary sewer system. A follow-up inspection by NEORSD investigators on June 16, 1997 verified that these discharges had been rerouted to the sanitary sewer.

In addition, dye tests showed that the process wastewater from the Brookpark-Broadview Car Wash, 1919 Brookpark Road, was improperly connected to the Brookpark Road storm sewer. As a result, the car wash was required by the Cuyahoga County Board of Health to reconnect the discharge to the sanitary sewer. On June 16, 1997, NEORSD investigators verified that the discharge was tributary to the sanitary sewer.

Following these corrections, on July 21, 1997, flow measurements and samples for bacteriological analysis were obtained from the 48-inch storm sewer outfall. The flow rate of the discharge was measured at approximately 9,000 gallons per day, and the fecal coliform concentration of the flow was measured at 7,000 colonies per 100 mL, indicating that contamination by sanitary sewage remained. In an attempt to further identify the source of remaining sanitary sewage contamination to the creek through the 48-inch outfall, investigators performed more dye tests, inspections and bacteriological sampling. These efforts revealed that the elevated bacterial concentrations may be attributable to the effluents from faulty septic tank systems from businesses on the north side of Brookpark Road, east of West 10th Street in Cleveland. The effluents

enter the 48-inch storm sewer through a 6-inch westbound storm sewer on Brookpark Road at West 10th Street. Bacteriological analysis of this discharge on July 30, 1997 showed a fecal coliform concentration of 1,100,000 colonies per 100 mL. Until improvements are made to these septic tank systems, this tributary of West Creek will continue to be contaminated by sanitary sewage.

TINKERS CREEK

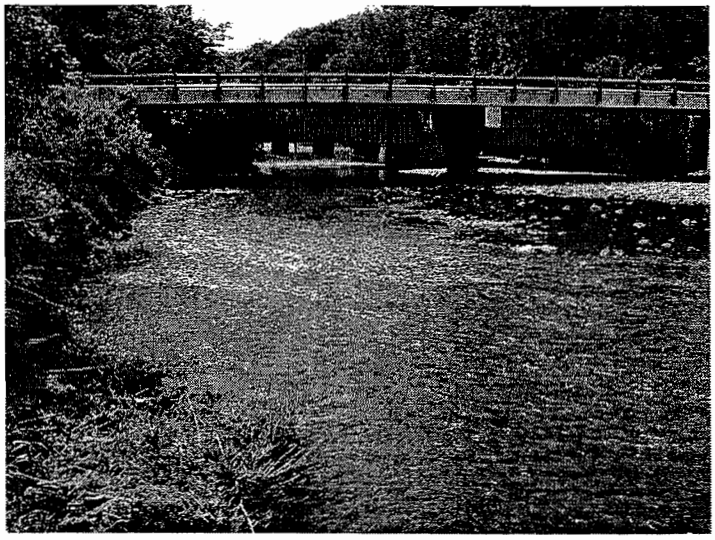
Tinkers Creek enters the Cuyahoga River at River Mile 17.0, south of Tinkers Creek Road in the Cuyahoga Valley National Recreation Area. Tinkers Creek is the largest tributary to the Cuyahoga River with a drainage area of 96 square miles.

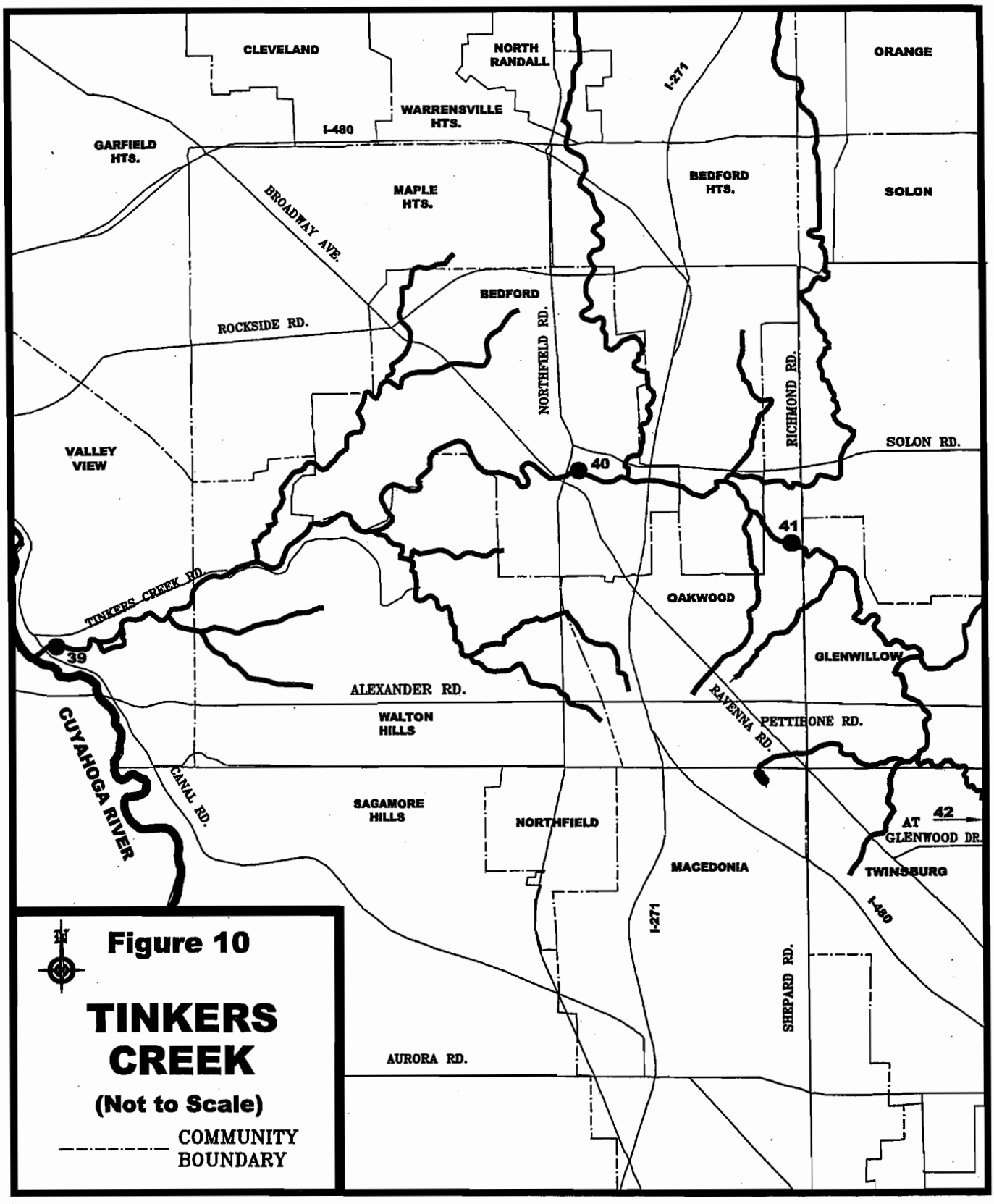
A northern run of Tinkers Creek originates in Warrensville Heights and flows south through Orange Village and into the City of Solon. In Solon, the run turns westward south of Solon Road and continues flowing west through Oakwood and into Bedford Heights. A southern run begins in Reminderville in Summit County. This run flows south into Twinsburg and then turns northwest and flows into Glenwillow. The run continues northwest through Oakwood and into Bedford Heights where it merges with the northern run. This confluence is in the Cleveland Metroparks Hawthorne Parkway, south of Solon Road.

The creek then flows northwest out of Bedford Heights and into Bedford. In the Cleveland Metroparks Bedford Reservation, a southern run, originating from tributaries in Oakwood and Walton Hills, merges with Tinkers Creek north of Gorge Parkway. From Bedford the creek turns west and flows through Walton Hills, finally entering the Cuyahoga River in Valley View.

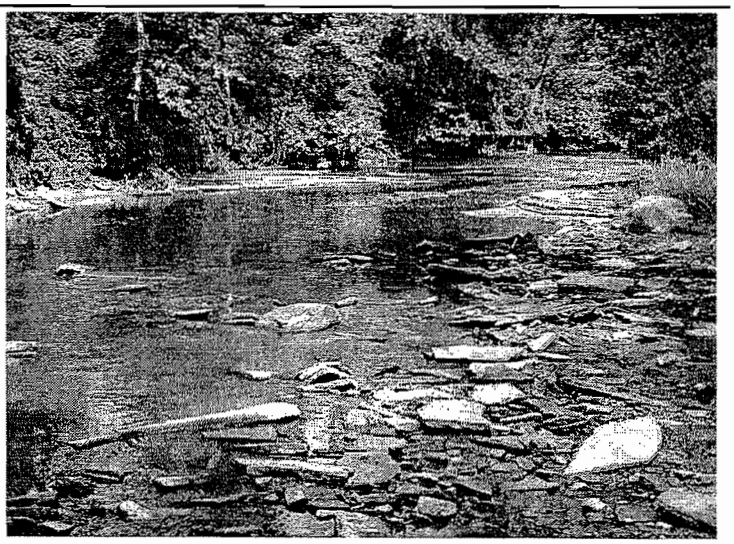
The Tinkers Creek drainage area is primarily residential and recreational, with some industry and agriculture. The Ohio EPA has designated the creek Aquatic Life Warmwater Habitat, Agricultural Water Supply, Industrial Water Supply and Primary Contact Recreational Use. Additionally, Tinkers Creek has been designated State Resource Water from its mouth to Richmond Road. Tinkers Creek has been assigned four sites for routine chemical, bacteriological and benthic sampling by the NEORSD (Figure 10). Chemical and bacteriological data from Tinkers Creek are presented in Appendix B.

Site #39 (41° 21.906' N, 81° 36.472' W) is located on Tinkers Creek approximately 500 feet upstream from the confluence of Tinkers Creek with the Cuyahoga River. This sample site is south of the intersection of Canal Road and Tinkers Creek Road. Sampling is performed upstream of the Ohio Canal viaduct over the creek. In 1998, Site #39 obtained a QHEI score of 71.25 (Appendix D).




CLEVELAND
NORTH RANDALL
ORANGE
WARRENSVILLE HTS.
I-480
I-271
GARFIELD HTS.
MAPLE HTS.
BEDFORD HTS.
SOLON
BROADWAY AVE.
BEDFORD
ROCKSIDE RD.
NORTHFIELD RD.
RICHMOND RD.
SOLON RD.
VALLEY VIEW
40
41
TINKERS CREEK RD.
OAKWOOD
39
GLENWILLOW
ALEXANDER RD.
RAVENNA RD.
WALTON HILLS
PETTIBONE RD.
GUYAHOGA RIVER
CANAL RD.
SAGAMORE HILLS
NORTHFIELD
42
AT GLENWOOD DR.
MACEDONIA
TWINSBURG
I-271
I-480
SHEPARD RD.
AURORA RD.
Figure 10
TINKERS CREEK
(Not to Scale)
COMMUNITY BOUNDARY

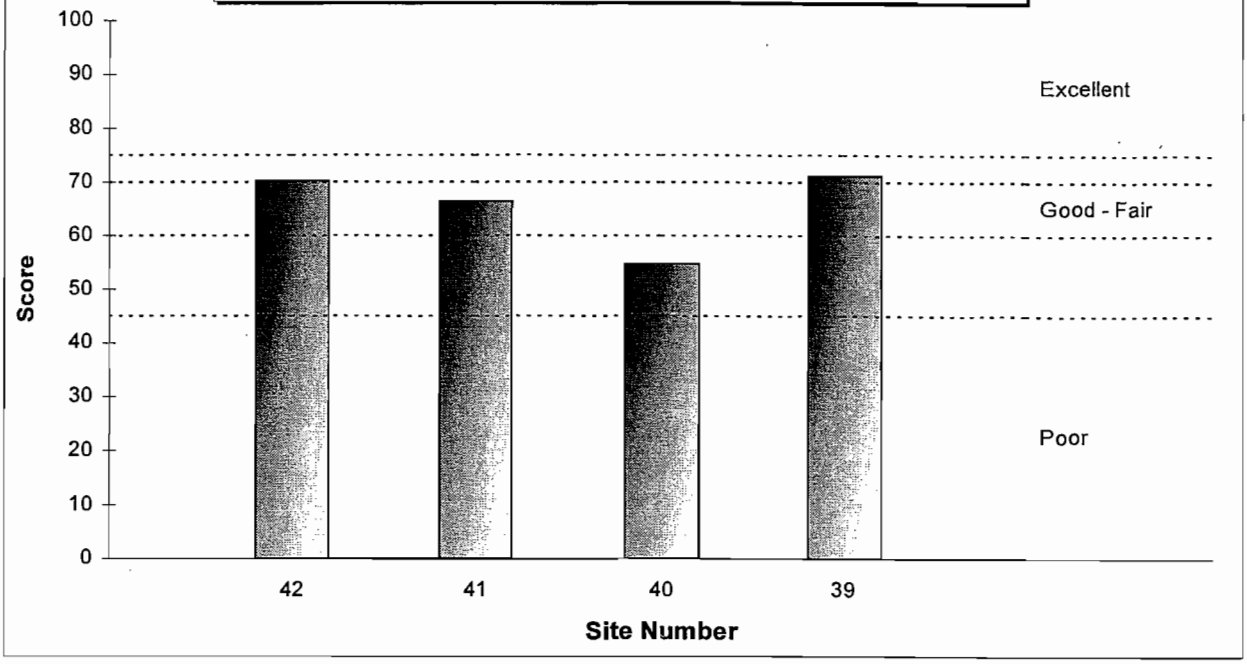
Site #40 (41° 23.088' N, 81° 31.479' W) is located within the Cleveland Metroparks Bedford Chagrin Parkway. Specifically, the site is located off Bedford Chagrin Parkway, northeast of Broadway Avenue and underneath the Northfield Road bridge. In 1998, Site #40 obtained a QHEI score of 54.75 (Appendix D



Site #41 (41° 22.566' N, 81° 29.379' W) is located just downstream of the Richmond Road bridge, north of the Bedford Chagrin Parkway in Oakwood. This site is located within the Cleveland Metroparks Bedford Chagrin Parkway. In 1998, Site #41 obtained a QHEI score of 66.5 (Appendix D).

Site #42 (41° 20.428' N, 81° 27.254' W) is located upstream of the southeast face of the Glenwood Drive bridge crossing Tinkers Creek. The bridge lies between Idlewood Drive and Gary Drive in Twinsburg. In 1998, Site #42 obtained a QHEI score of 70.25 (Appendix D).

Figure 11
Tinkers Creek Qualitative Habitat Evaluation Index Scores
1998



Benthic Macroinvertebrate Sampling on Tinkers Creek

HBI scores for Tinkers Creek are presented in Figure 11A. In general, the macroinvertebrate community at the Tinkers Creek locations has remained unchanged and reflects well upon the water quality of the creek. The slight variations in narrative ratings do not accurately reflect the health of the invertebrate communities at Sites #42 and #39.

Site #42 - The HBI score of 5.69 (*Fair*) indicates that fairly significant organic pollution exists at this location. However, the macroinvertebrate community has shown improvement with a dramatic increase in Ephemeropteran, Plecopteran, and Tricopteran (EPT) composition (36.4% in 1994 to 58.7% in 1998) and a significant drop in pollution tolerant organisms. Both of these indicators suggest a gradual improvement in the water quality at this site.

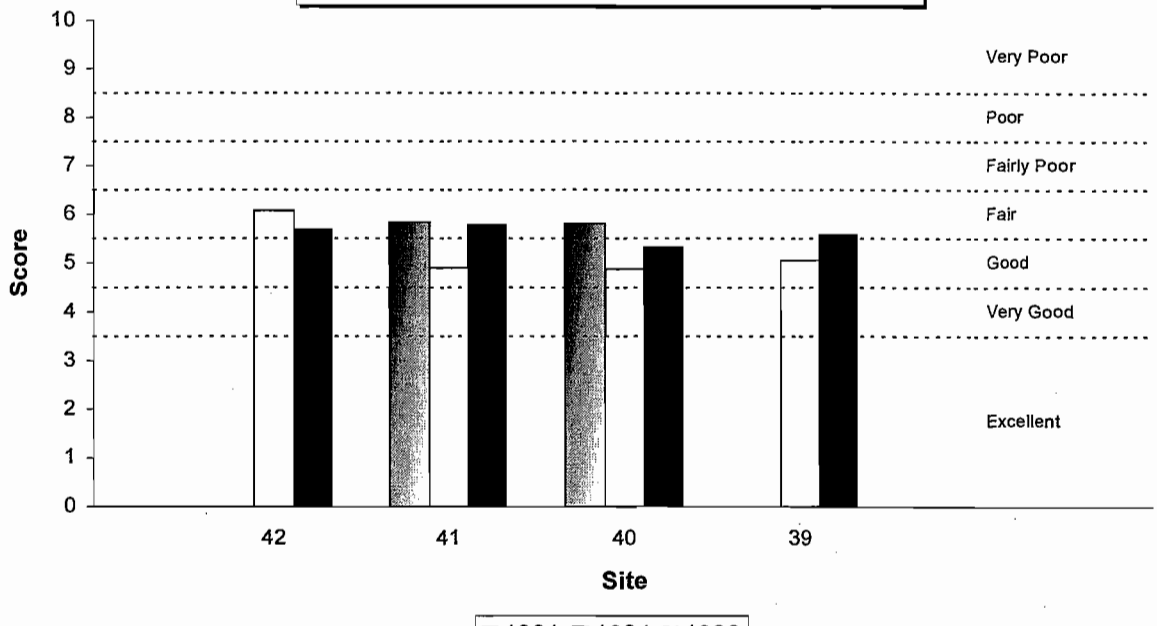
Site #41 - The HBI score of 5.79 (*Fair*) for this site indicates that it also is impacted by fairly significant organic pollution. However, the macroinvertebrate community, as at Site #42, appears to be healthy, with a 50% EPT composition and a low percentage of pollution tolerant organisms. Although the macroinvertebrate community at Sites 42 and 41 appear to be slightly degraded, these scores are more a reflection of habitat at these locations than water quality. Both of these sample locations have poorly developed and limited riffle habitats, which are essential for the proper application of the HBI. Despite

these habitat differences, the scores remain consistent with those at Sites 39 and 40 and remain useful in identifying possible disruptions to Tinkers Creek.

Site #40 - This site received an HBI narrative rating of *Good*, which is an indication of good water quality with some organic pollution. The macroinvertebrate community is fairly diverse (Shannon Diversity Index = 2.78), consists of 30 individual taxa and is well balanced with no one taxon dominating the community.

Site #39 - The HBI scores at this site increased from 5.07 (*Good*) in 1994 to 5.58 (*Fair*) in 1998. Although this increase suggests a degradation in water quality, the macroinvertebrate community remains well balanced and healthy. The slight increase in the HBI score that was observed is attributable to an increase in pollution tolerant organisms. This was, however, also accompanied by an increase in the number of EPT taxa.

Figure 11A
Tinkers Creek Hilsenhoff Biotic Index Scores
1991-1998



Problems and Remediation

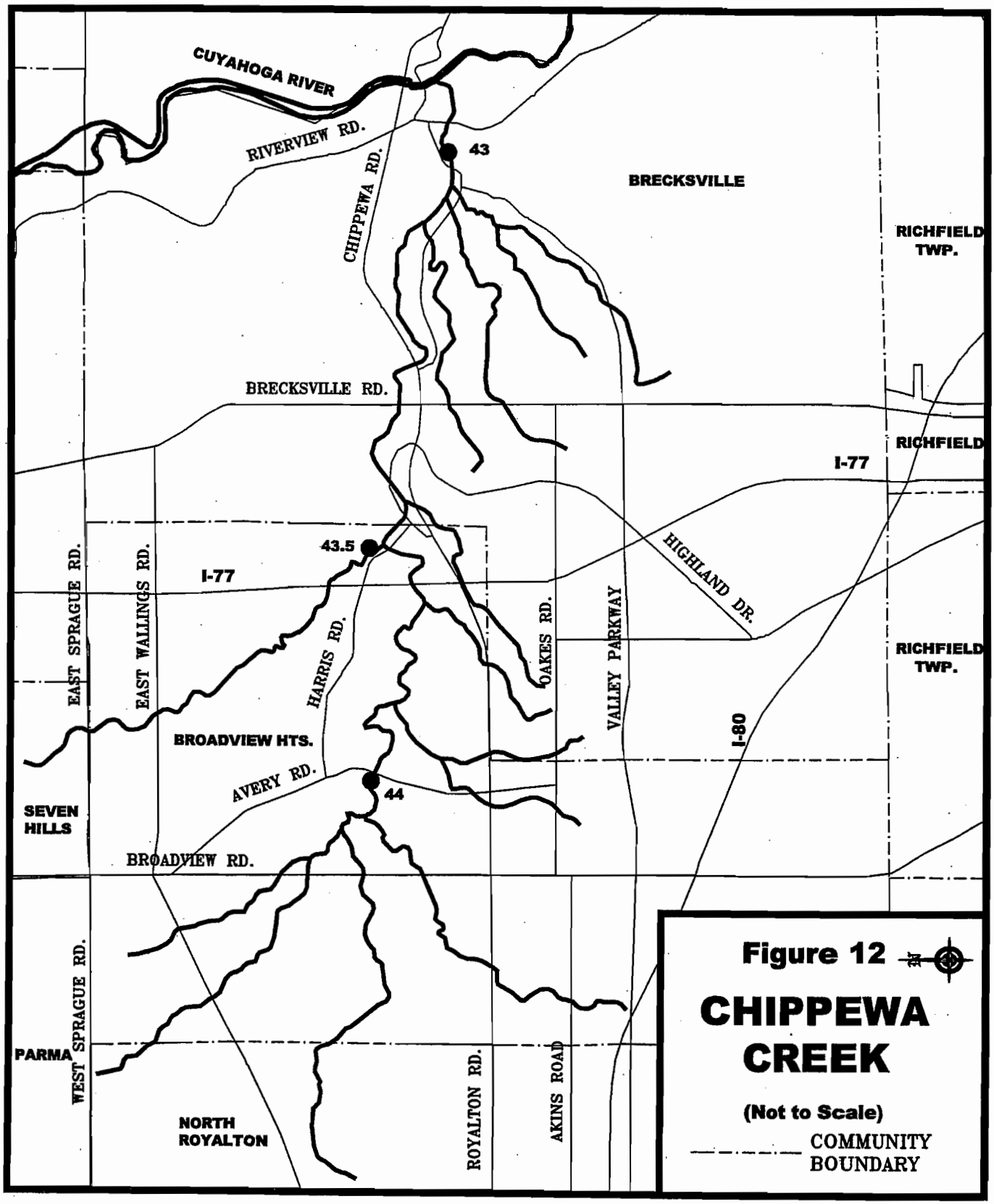
No environmental disruptions on Tinkers Creek were found by or reported to the NEORSD in 1996, 1997, or 1998.

CHIPPEWA CREEK

Chippewa Creek's drainage area includes the communities and parks in the southernmost part of Cuyahoga County west of the Cuyahoga River. From the creek's mouth upstream, these include: a portion of the Cuyahoga Valley National Recreation Area; the Cleveland Metroparks Brecksville Reservation; the City of Brecksville; the City of Broadview Heights; the southern tip of the City of Seven Hills; the eastern portion of the City of North Royalton.

Chippewa Creek's drainage area is primarily residential and recreational. The Ohio EPA has designated Chippewa Creek Aquatic Life Warmwater Habitat, Agricultural Water Supply, Industrial Water Supply and Primary Contact Recreational Use. In addition, portions of Chippewa Creek within the boundaries of the Cleveland Metroparks have been designated State Resource Water. The NEORSD has selected three locations on Chippewa Creek which are routinely sampled for chemical, bacteriological, and benthic analysis (Figure 12). Chemical and bacteriological data from Chippewa Creek are presented in Appendix B.

Site #43 (41° 19.024' N, 81° 35.844' W) is located at a concrete ford on which Chippewa Creek Drive crosses the creek east of Valley Parkway. This location is approximately 3,000 feet upstream of the confluence with the Cuyahoga River at about River Mile 22.0 and represents the total flow of Chippewa Creek. In 1998, Site #43 obtained a QHEI score of 62.5 (Appendix D).


CUYAHOGA RIVER
RIVERVIEW RD.
CHIPPEWA RD.
43
BRECKSVILLE
RICHFIELD TWP.
BRECKSVILLE RD.
RICHFIELD
I-77
43.5
HIGHLAND DR.
EAST SPRAGUE RD.
EAST WALLINGS RD.
I-77
HARRIS RD.
OAKES RD.
VALLEY PARKWAY
RICHFIELD TWP.
I-80
BROADVIEW HTS.
AVERY RD.
44
SEVEN HILLS
BROADVIEW RD.
WEST SPRAGUE RD.
PARMA
NORTH ROYALTON
ROYALTON RD.
AKINS ROAD
Figure 12
CHIPPEWA CREEK
(Not to Scale)
COMMUNITY BOUNDARY

Site #43.5 (41° 19.411' N, 81° 38.671' W) is located on the Bramblewood Branch tributary to Chippewa Creek, just upstream of its confluence with the main stem of Chippewa Creek, east of Harris Road, north of Old Royalton Road. In 1998, Site #43.5 obtained a QHEI score of 42.5 (Appendix D).

Site #44 (41° 19.485' N, 81° 40.372' W) is located on the main stem of Chippewa Creek at the Avery Road bridge between Harris Road and East Royalton Road. It is downstream of the confluence of the Seneca Branch, the Royalwood Branch, and the Briarwood Branch. In 1998, Site #44 obtained a QHEI score of 67.25 (Appendix D).

Benthic Macroinvertebrate Sampling on Chippewa Creek

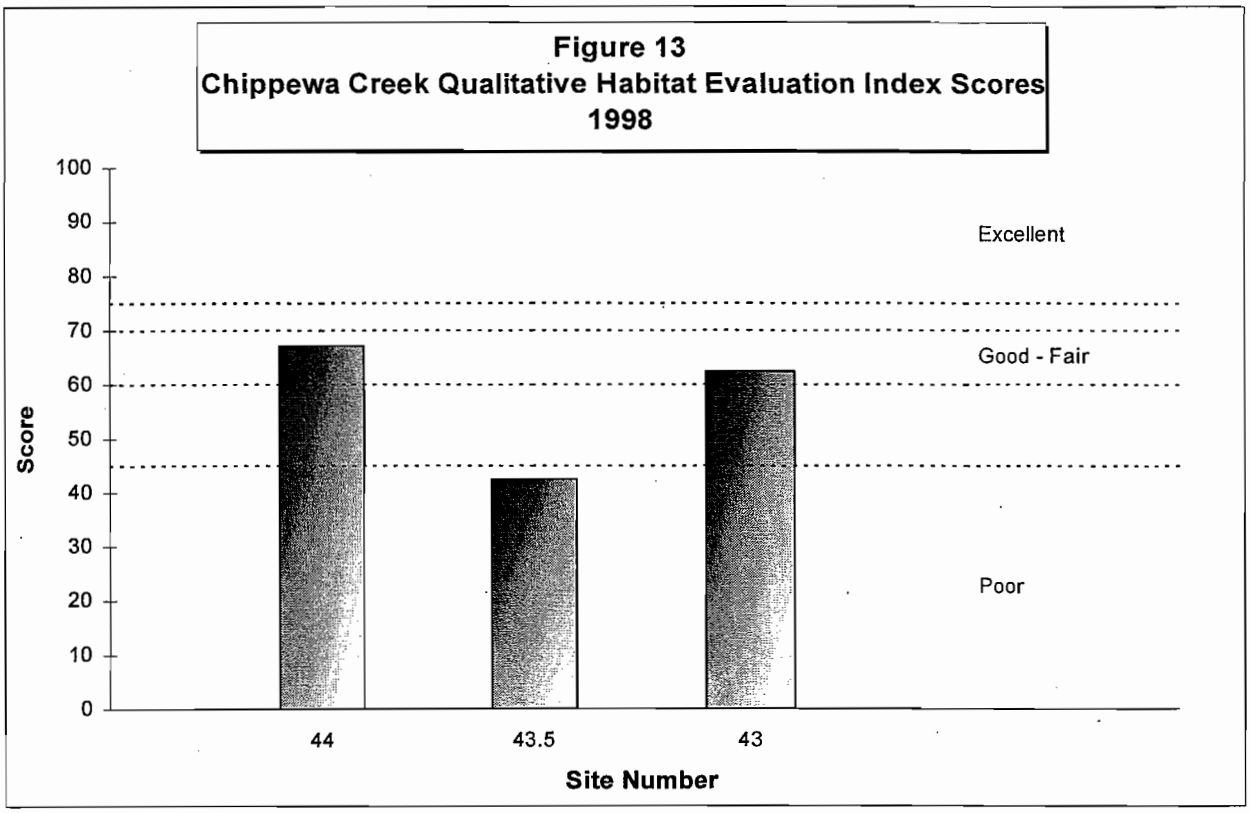
HBI Scores for Chippewa Creek are presented in Figure 13-A. In general, the water quality of Chippewa Creek, as measured by the macroinvertebrate community, is good. However there appears to be a degradation in the macroinvertebrate community at Sites 43.5 and 43.

Site #44 - This site showed a slight increase in HBI scores from 4.71 (Good) in 1991 to 4.96 (Good) in 1998. These scores, in conjunction with the percent Ephemeropteran, Plecopteran, and Tricopteran (EPT) composition, total taxa, and Shannon Diversity Index indicate the water quality at this site is good. The benthic community at this site remains healthy and relatively unchanged since 1991.

Site #43.5 - This site was sampled for the first time in 1998 and received an HBI Score of 5.83 (Fair), indicating that fairly significant organic pollution may be impacting this

site. Pollution tolerant dipterans and non-insects dominate the macroinvertebrate community at this site. However, it should be noted that this site's small drainage area

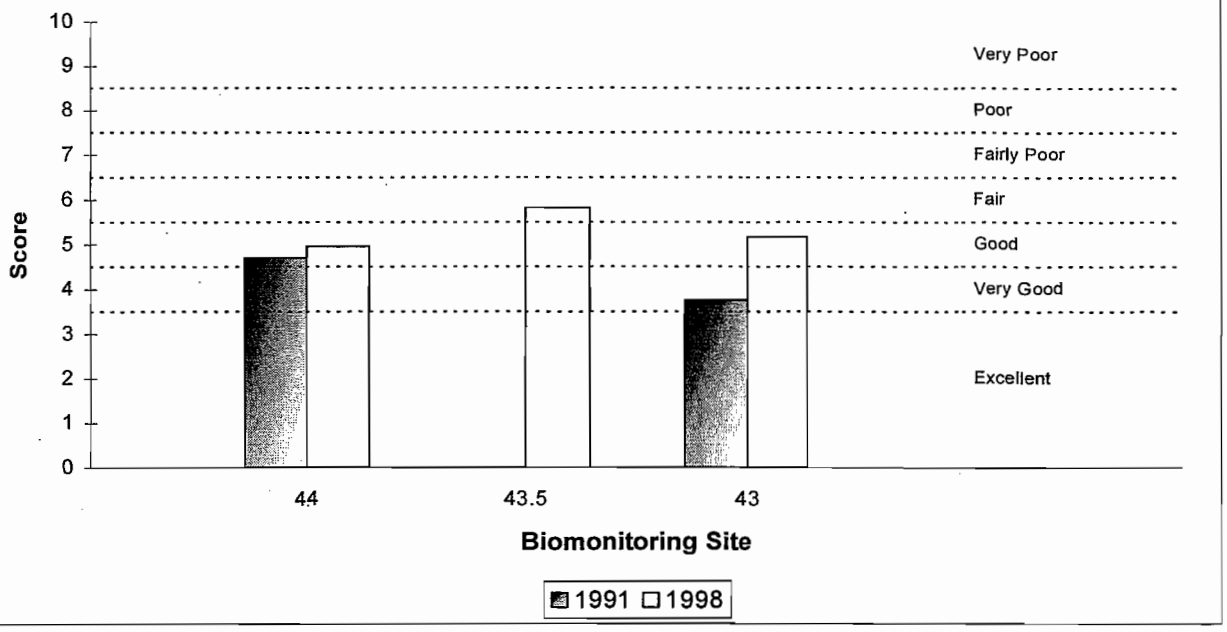
Figure 13
Chippewa Creek Qualitative Habitat Evaluation Index Scores
1998



and morphology could also affect the benthic community. The streambed at this location is predominantly shale and provides little, if any, instream cover or habitat for aquatic macroinvertebrates. As a result, the low scores may not represent poor water quality.

Site #43 - The HBI scores for this site exhibited an increase from 3.76 (Very Good) in 1991 to 5.17 (Good) in 1998. This indicates that this site is being impacted by some organic pollution. The increase in the HBI score can be attributed to a shift in the macroinvertebrate community at this site with the most notable change consisting of an increase in the number of pollution tolerant organisms (0.61% in 1991 to 9.22% in 1998) and a decrease in pollution intolerant chironomids (17.07% in 1991 to 0.46% in 1998). These results suggest that the degradation observed at Site #43 is the result of a combination or organic and toxic stresses in the macroinvertebrate community. Despite these observations, this site still supports a well-balanced and healthy macroinvertebrate community. Further sampling and investigation would be necessary to identify the source of this degradation.

Figure 13A
Chippewa Creek Hilsenhoff Biotic Index Scores
1991-1998



Problems and Remediation

-1-

On June 10, 1996, NEORSD personnel responded to an odor complaint by a resident on Royalwood Road in Broadview Heights. A storm sewer outfall near the residence was inspected and found to have a malodorous cloudy discharge entering a tributary of Chippewa Creek. The fecal coliform concentration was found to be 950 colonies per 100 mL. Additional analytical results attributed the discharge to slag leachate from the slag subbase used in the construction of Royalwood Road.

SAGAMORE CREEK

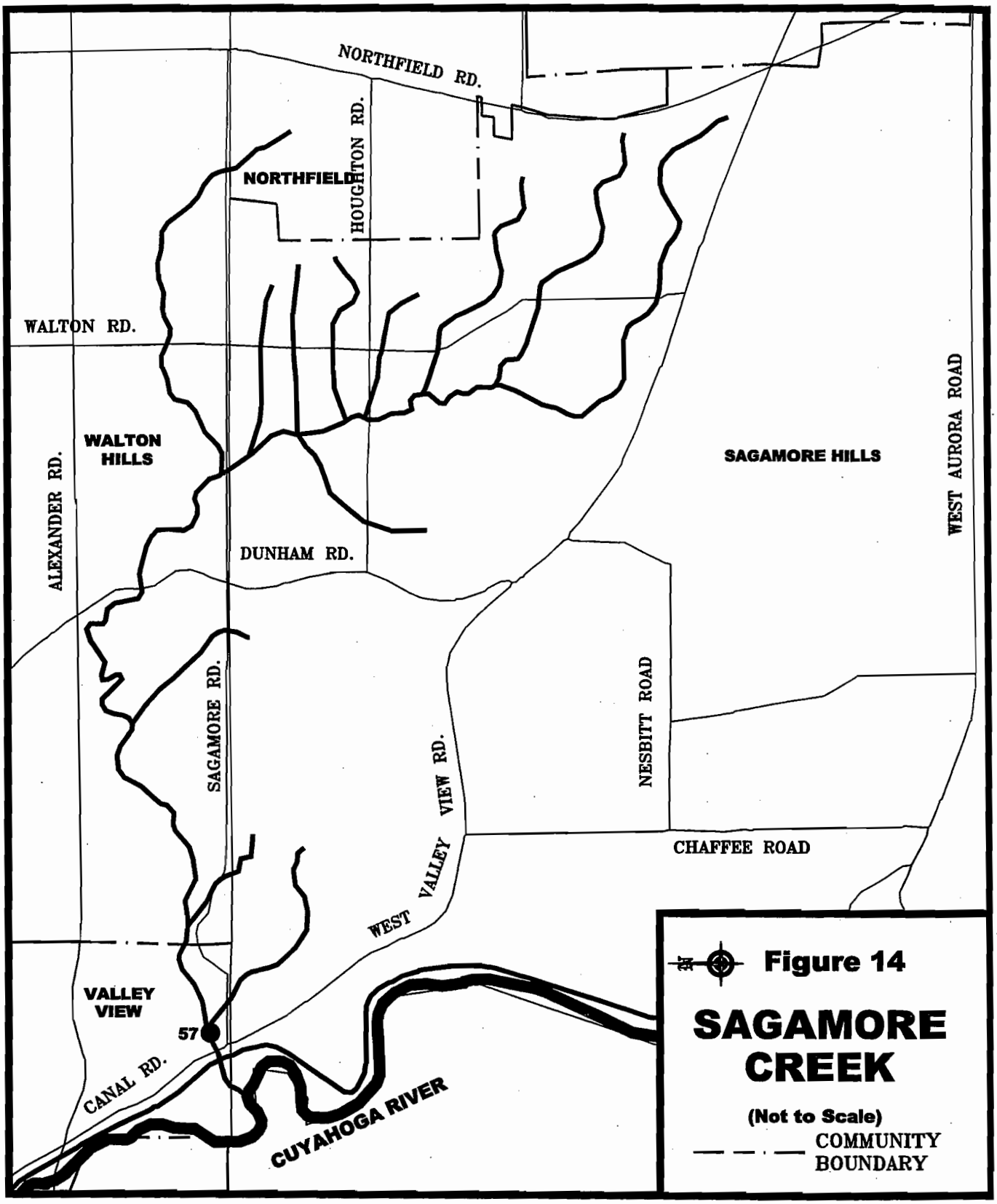
Sagamore Creek enters the Cuyahoga River in Summit County, southwest of the intersection of Sagamore Road and Canal Road in the Cuyahoga Valley National Recreation Area (CVNRA). The creek originates in Macedonia and Sagamore Hills in Summit County as two intermittent runs flowing northwest and merging north of West Valley View Road. The combined intermittent run then flows in a mostly northwest direction, entering Cuyahoga County at Sagamore Road. While flowing toward Cuyahoga County, the creek adds five intermittent runs from the east and one intermittent run from the west.

In the area of the Summit County/Cuyahoga County boundary, the creek becomes a constant flow. North of the boundary, a sixth intermittent run enters from the east. Once in Walton Hills, Cuyahoga County, the creek turns and flows in a northwest direction until it reaches the intersection of Alexander Road and Dunham Road. At this intersection the creek turns and flows generally southwest towards Canal Road. As the creek flows southwest it takes on three intermittent runs from the south. At the intersection of Sagamore Road and Canal Road the creek re-enters Summit County before it merges with the Cuyahoga River.

Sagamore Creek's drainage area is primarily low density residential with large undeveloped and recreational use areas. The Ohio EPA has no current use designation for Sagamore Creek.

Sagamore Creek has been assigned one sample location for routine chemical, bacteriological, and benthic sampling (Figure 14). Chemical and bacteriological data from Sagamore Creek are presented in Appendix B.

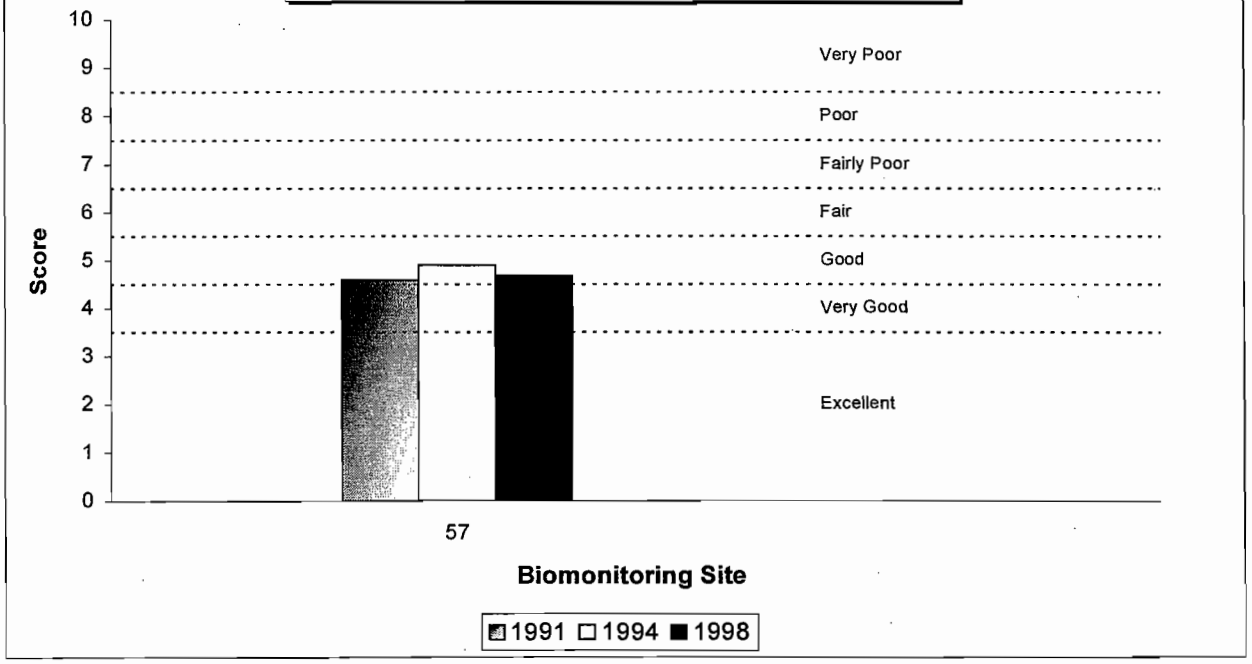
Site #57 (41° 21.074' N, 81° 35.548' W) is located upstream of Canal Road as it crosses the creek north of Sagamore Road. In 1998, Site #57 obtained a QHEI score of 67 (Appendix D).


NORTHFIELD RD.
HOUGHTON RD.
NORTHFIELD
WALTON RD.
ALEXANDER RD.
WALTON HILLS
SAGAMORE HILLS
WEST AURORA ROAD
DUNHAM RD.
SAGAMORE RD.
NESBITT ROAD
WEST VALLEY VIEW RD.
CHAFFEE ROAD
VALLEY VIEW
57
CANAL RD.
CUYAHOGA RIVER
Figure 14
SAGAMORE CREEK
(Not to Scale)
COMMUNITY BOUNDARY

Benthic Macroinvertebrate Sampling on Sagamore Creek

Site #57 - HBI scores for Sagamore Creek are presented in Figure 14A. Sagamore Creek has traditionally supported the most healthy macroinvertebrate community within the NEORSD service area. The HBI scores have remained nearly constant at Site #57 since biomonitoring on this creek began in 1991. Although HBI scores have remained consistent, shifts in the macroinvertebrate community's structure and function have occurred over the years. Most notable is the increase in Ephemeropteran, Plecopteran, and Tricopteran (EPT) taxa from 7 in 1991 to 15 in 1994 and 1998. However, there has been a decline in the number of stonefly taxa, which fell from three to one. In addition, there has been an increase in the number of dipteran taxa, primarily due to an increase in pollution tolerant midges. Despite these changes in the community, Sagamore Creek continues to support a healthy and diverse (Shannon Diversity Index score of 3.5) macroinvertebrate community, which is an indication of good water quality.

Figure 14A
Sagamore Creek Hilsenhoff Biotic Index Scores
1991-1998



Problems and Remediation

No environmental disruptions on Sagamore Creek were found by or reported to the NEORSD in 1996, 1997, or 1998.

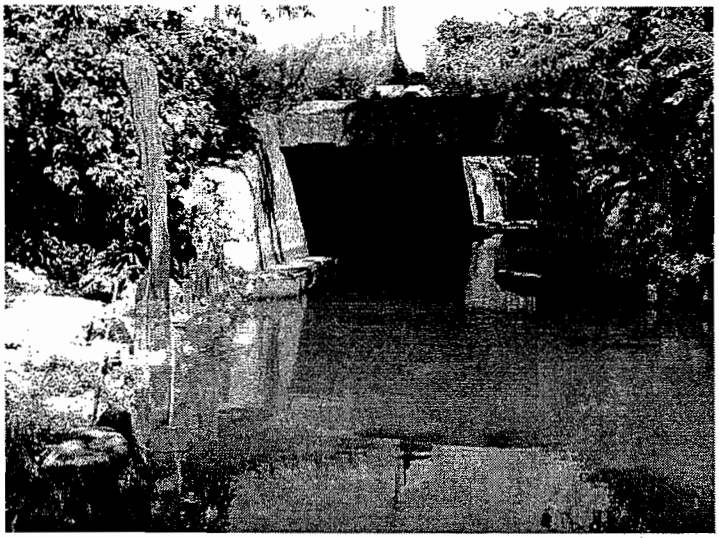
KINGSBURY RUN

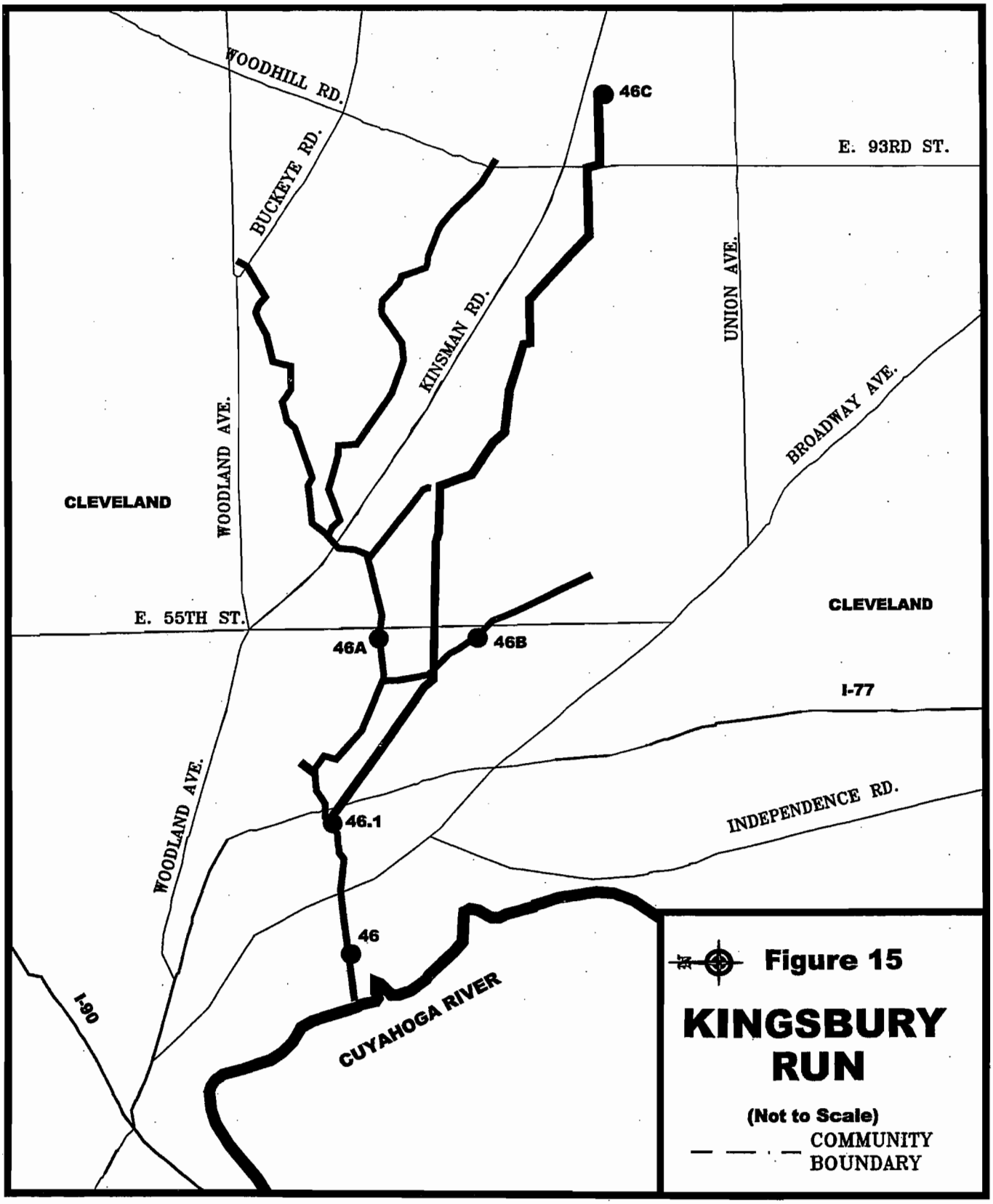
Kingsbury Run drains the central portion of Cleveland east of the Cuyahoga River and a portion of the west end of Shaker Heights. It has a total drainage area of 7.8 square miles and a total length of 4.3 miles. Kingsbury Run flows predominantly east-to-west with two branches that merge east of East 37th Street, south of Woodland Avenue. The main stem begins at East 47th Street, south of Woodland Avenue, and eventually enters the Cuyahoga River at approximately River Mile 4.0, just north of the old Jefferson Avenue bridge, 2785 Broadway Avenue.

Kingsbury Run has the following open sections: a 1,000-foot section from the confluence with the Cuyahoga River to the mouth of the culvert; a 1,100-foot section between East 78th Street and Grand Avenue, 250 feet north of Colfax Road; a 900-foot section between East 84th Street and East 87th Street, north of Kinsman Road. The remaining portion of Kingsbury Run is entirely underground and is a combination of culverted stream sections and storm sewers, serving as an overflow-receiving sewer for combined sewers during high flow conditions.

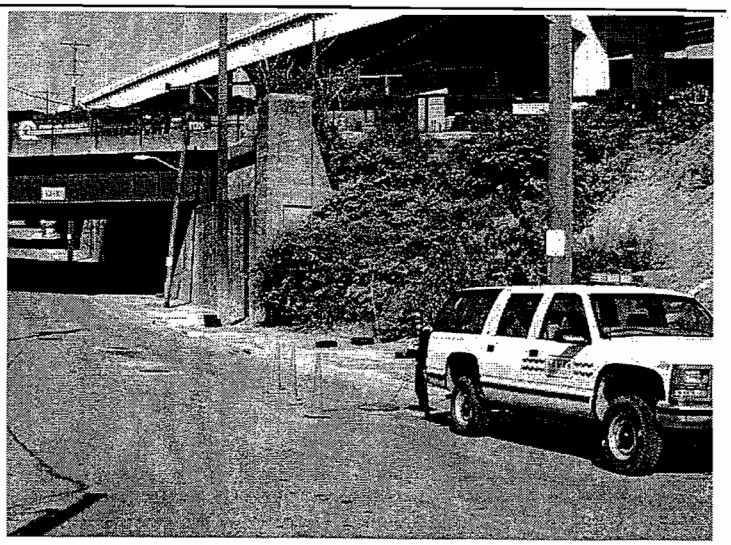
The Ohio EPA has no current use designation for Kingsbury Run. Kingsbury Run has been assigned five sample sites by NEORSD Environmental Assessment for routine chemical and bacteriological sampling (Figure 15). Because the sample sites are culverted, no QHEI's have been performed on Kingsbury Run. Chemical and bacteriological data from Kingsbury Run are presented in Appendix B.

Site #46 (41° 29.001' N, 81° 40.434' W) is located at the mouth of the culvert, approximately 1,000 feet upstream of the confluence with the Cuyahoga River and north of the old Jefferson Avenue bridge.




WOODHILL RD.
BUCKEYE RD.
46C
E. 93RD ST.
KINSMAN RD.
UNION AVE.
BROADWAY AVE.
WOODLAND AVE.
CLEVELAND
CLEVELAND
E. 55TH ST.
46A
46B
I-77
INDEPENDENCE RD.
WOODLAND AVE.
46.1
46
I-90
CUYAHOGA RIVER
Figure 15
KINGSBURY RUN
(Not to Scale)
COMMUNITY BOUNDARY

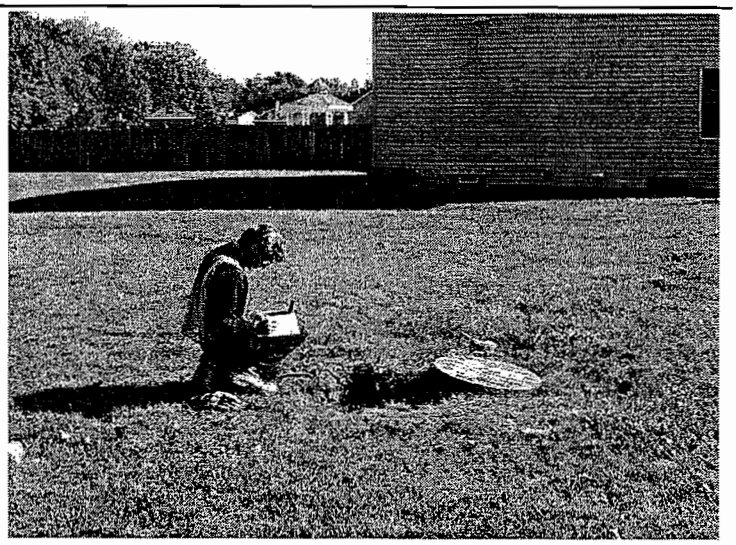
Site #46.1 (41° 29.056' N, 81° 39.857' W) is located on the main stem of Kingsbury Run at a manhole on the culvert, in the center of East 37th Street, approximately 2,000 feet south of Woodland Avenue.



Site #46-A (41° 28.892' N, 81° 39.174' W) is located on Kingsbury Run's North Branch, at a rectangular manhole on the culvert adjacent to the RTA Power Control Administrative Offices, 5400 Grand Avenue, approximately 200 feet west of East 55th Street.

Site #46-B (41° 28.576' N, 81° 39.137' W) is located on a tributary to Kingsbury Run's North Branch. The sample site is located at a manhole on the culvert in the center of Sweeney Avenue, approximately 100 feet west of East 55th Street, near 5407 Sweeney Avenue.

Site #46-C (41° 28.245' N, 81° 37.015' W) is located on Kingsbury Run's South Branch, at a manhole in a grass field east of Kingsbury Boulevard and Carton Avenue, approximately 150 feet south of Kinsman Road. This site is approximately 30 feet downstream from the confluence of the 96-inch Kinsman/Union storm relief sewer and the Kingsbury Run culvert.



Problems and Remediation

-1-

On July 29, 1998, WQIS investigators responded to an ammonia spill at the Federal Cold Storage Building at the Ohio Food Terminal at E. 37th Street and Woodland Avenue. A leak in an abandoned air conditioning unit had resulted in the loss of approximately 330 pounds of ammonia, with an unknown amount entering the sewer system as personnel from the food terminal flushed the spill area with water. Due to a malfunction at the E. 37th Street Pump Station, the ammonia that entered the sewer system had overflowed to Kingsbury Run. Employees at the food terminal who responded to the spill were instructed to cease flushing and to prevent the entry of the ammonia into the sewer system. A sample taken from Kingsbury Run revealed ammonia concentrations as high as 4.1 mg/L. Concentrations as high as 8.4 mg/L were detected in the E. 37th Street combined sewer.

MORGANA RUN

Morgana Run drains the central portion of the City of Cleveland east of the Cuyahoga River. It has a total drainage area of 2,280 acres and a total length of 4.8 miles. Morgana Run's culvert originates at East 97th Street between Sandusky Avenue and Way Avenue. It runs predominantly east-to-west to East 49th Street, where, in dry weather, its entire flow drops into the Southerly Interceptor and is tributary to the NEORSD Southerly WWTP. The remaining section of Morgana Run enters the Cuyahoga River on the LTV Steel Company's property, south of the former location of the Clark Avenue bridge, at approximately River Mile 4.9.

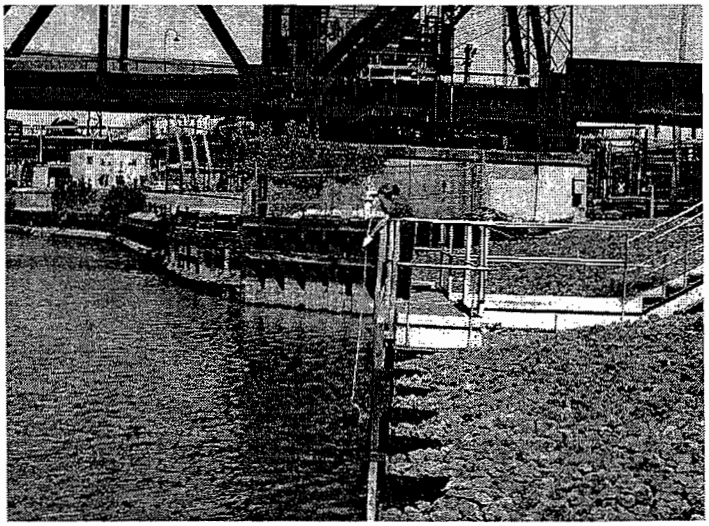
In about 1910, Morgana Run was culverted, and in some places, relocated to follow Morgana Avenue. In 1960 and 1961, the Morgana Run culvert from Interstate 77 to Independence Road was reinforced, allowing the Republic Steel Corporation to use the land above Morgana Run as a bulk storage facility for coal, coke, and ore.

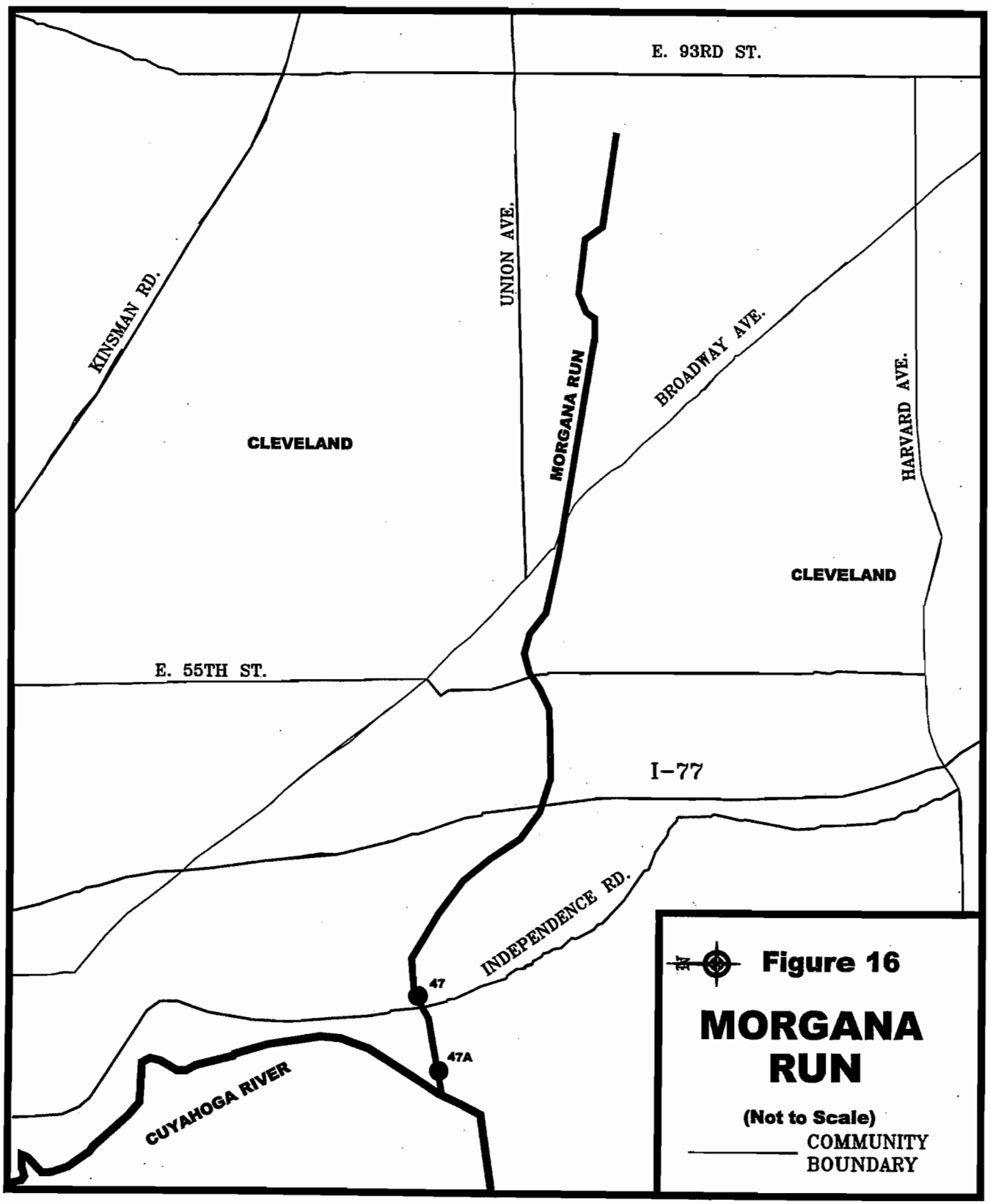
In 1969, all of the dry weather flow in Morgana Run upstream of East 49th Street was diverted by a weir, through a 42-inch pipe, into the Southerly Interceptor. The weir is overflowed only in wet weather, when many combined sewer overflows are tributary to Morgana Run upstream.

Until December 1991, when the LTV Steel Company's coke plant was removed from service, its treated effluent and cooling waters were discharged to Morgana Run between the river and Independence Road at a rate of approximately 10,000 gallons per minute.

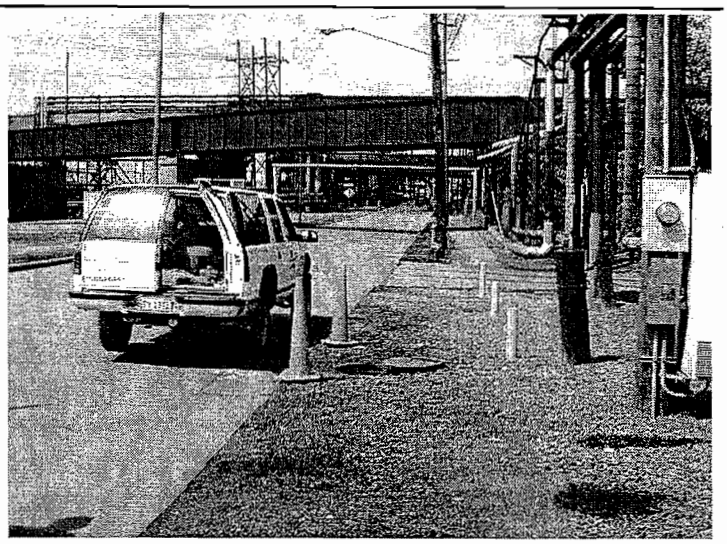
The Ohio EPA has no current use designation for Morgana Run. Morgana Run has been assigned two sampling locations for routine chemical and bacteriological analysis (Figure 16). Chemical and bacteriological data from Morgana Run are presented in Appendix B.

Site #47-A (41° 28.159' N, 81° 40.120' W) is located at the mouth of Morgana Run where it enters the Cuyahoga River, west of Independence Road on LTV Steel Company property. Since Site #47-A is at the mouth of the culvert, no QHEI has been determined at this site.




E. 93RD ST.
KINSMAN RD.
UNION AVE.
MORGANA RUN
BROADWAY AVE.
HARVARD AVE.
CLEVELAND
CLEVELAND
E. 55TH ST.
I-77
INDEPENDENCE RD.
47
47A
CUYAHOGA RIVER
Figure 16
MORGANA RUN
(Not to Scale)
COMMUNITY BOUNDARY

Site #47 (41° 28.130' N, 81° 40.102' W) is located at a manhole on Independence Road, approximately 200 yards upstream of its confluence with the Cuyahoga River. Since Site #47 is culverted, no QHEI has been determined at this site.



No environmental disruptions on Morgana Run were found by or reported to the NEORSD in 1996, 1997 or 1998.

BURKE BROOK

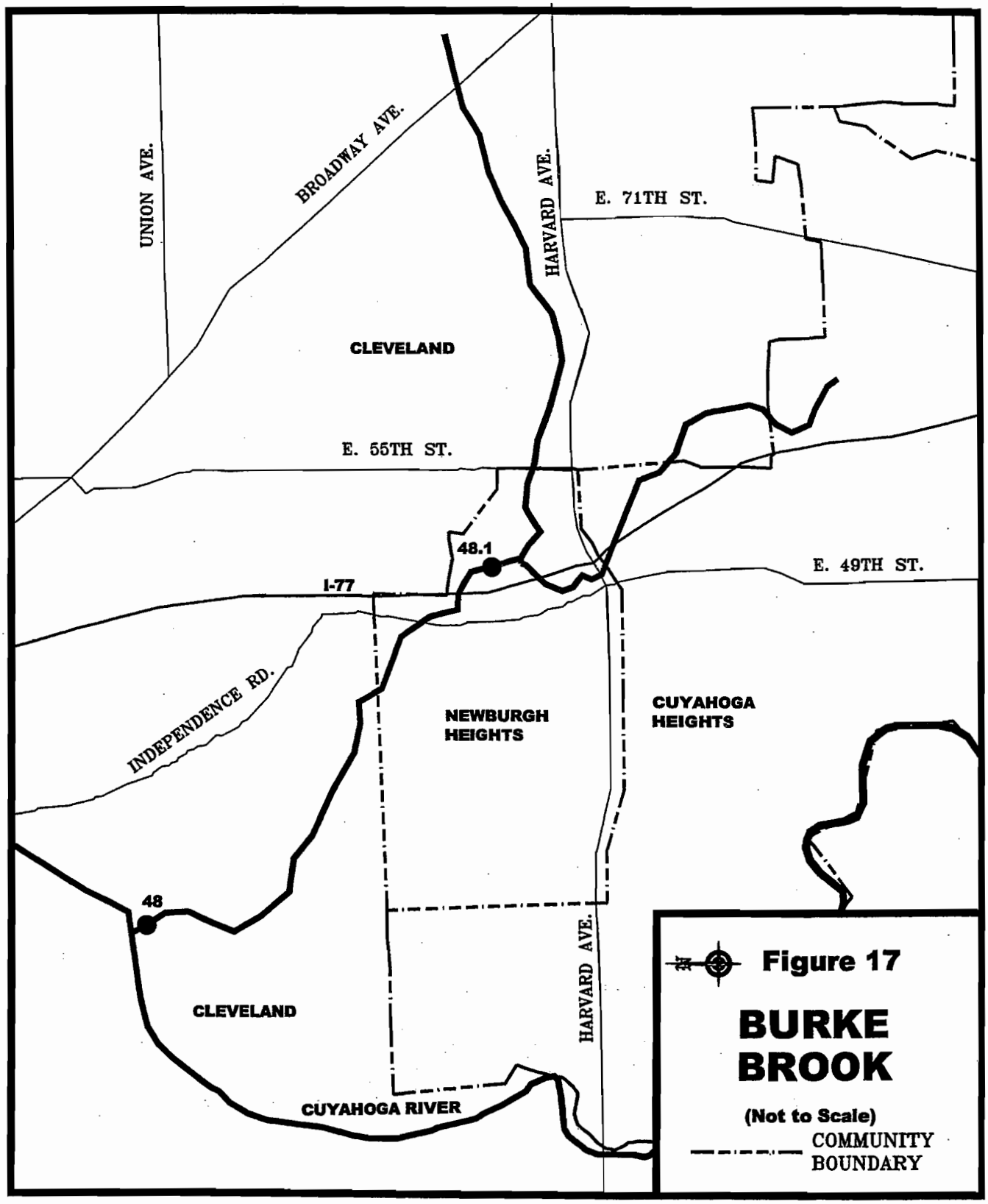
Burke Brook carries surface run-off water and combined sewer overflows from the southern part of Cleveland east of the Cuyahoga River and from sections of Cuyahoga Heights and Newburgh Heights. The total drainage area is 1,400 acres.

Tributary to Burke Brook are 13 combined sewer overflow (CSO) structures. These overflow structures receive flow from a drainage area of approximately 500 acres, which is over one third of the total drainage area of Burke Brook. Ten of these overflow structures are located on Burke Brook's main branch, east of Interstate 77. In July 1982, the NEORSD activated a diversion chamber east of Interstate 77, south of Fleet Avenue. This diversion chamber intercepts the entire dry weather flow of Burke Brook's main branch. From this chamber, the main branch's flow is diverted into the NEORSD Southerly Interceptor.

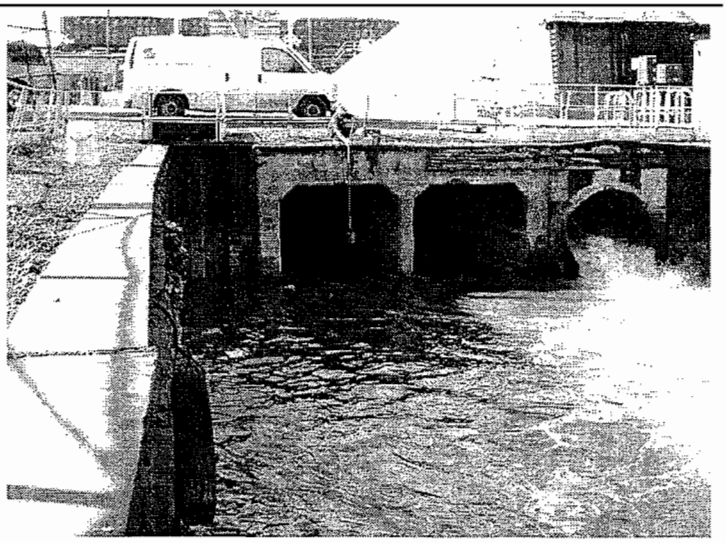
The south branch of Burke Brook originates as a 48-inch storm sewer on Grant Avenue in Cuyahoga Heights. It then flows through Newburgh Heights where it joins the former channel of the main branch downstream of the NEORSD's diversion chamber. From this point, Burke Brook flows under Interstate 77 and LTV Steel Company property northwest to its confluence with the Cuyahoga River at about River Mile 5.3.

Three combined sewer overflow structures are presently not tributary to the NEORSD's diversion chamber: one on Grant Avenue east of Interstate 77 in Cuyahoga Heights, and one on Harvard Avenue west of Interstate 77 in Newburgh Heights, both of which are maintained by the NEORSD; one in the Washington Park Horticultural Center, which the Village of Newburgh Heights is responsible for maintaining.

Except for 0.3 total miles of open section on both sides of Interstate 77 and about 100 yards of an open tributary near Bert Avenue, the entire length of Burke Brook is culverted. The Ohio EPA has no current use designation for the culverted sections of Burke Brook. The open section of the creek adjacent to Interstate 77 has been designated Limited Resource Water, Agricultural Water Supply, Industrial Water Supply and Secondary Contact Recreational Use. Burke Brook has been assigned two sampling locations for routine chemical and bacteriological analysis (Figure 17). Chemical and bacteriological data from Burke Brook are presented in Appendix B.


UNION AVE.
BROADWAY AVE.
HARVARD AVE.
E. 71TH ST.
CLEVELAND
E. 55TH ST.
48.1
E. 49TH ST.
I-77
INDEPENDENCE RD.
NEWBURGH HEIGHTS
CUYAHOGA HEIGHTS
48
CLEVELAND
HARVARD AVE.
CUYAHOGA RIVER
Figure 17
BURKE BROOK
(Not to Scale)
COMMUNITY BOUNDARY

Site #48 (41° 27.898' N, 81° 40.281' W) is located at the mouth of Burke Brook where it enters the Cuyahoga River on LTV Steel Company property. No QHEI has been obtained for Site #48.



Site #48.1 (41° 27.154' N, 81° 39.401' W) is located off Independence Road, south of Fleet Avenue, on the open section of Burke Brook's main stem, just east of Interstate 77, downstream from the former confluence of the main and south branches. In 1997, Site #48.1 obtained a QHEI score of 45.5 (Appendix D).

Problems and Remediation

-1-

In November of 1994, an extensive series of investigations was conducted at businesses in the Burke Brook watershed. As a result of these investigations, Riser Foods Company, located at 5800 Grant Avenue, was found to have several connections to the storm sewer within process areas of their building. Riser Foods Company was instructed to either seal these connections or replumb them to the sanitary sewer. A follow-up inspection conducted on March 21, 1997 confirmed that the all lines were properly connected to the sanitary sewer.

-2-

On June 19, 1997, NEORSD personnel began an inspection of a 30-inch outfall pipe for a CSO located at East 42nd Street and Alpha Avenue that was discharging to an open section of Burke Brook within the Bert Avenue Landfill. Samples of the flow revealed a fecal coliform concentration of 190,000 colonies per 100 mL. Upon tracing the sewer back, investigators discovered a large sinkhole and a manhole surcharged with septic water downstream of the overflow structure. The presence of a storm sewer lateral with a septic discharge and the proper functioning of the overflow structure indicated the possibility of residential cross connections to the outfall sewer. Dye tests confirmed the illicit connection of residents' sanitary facilities on Washington Boulevard to the outfall sewer. The Service Director of Newburgh Heights was apprised of the situation on June 23, 1997.

-3-

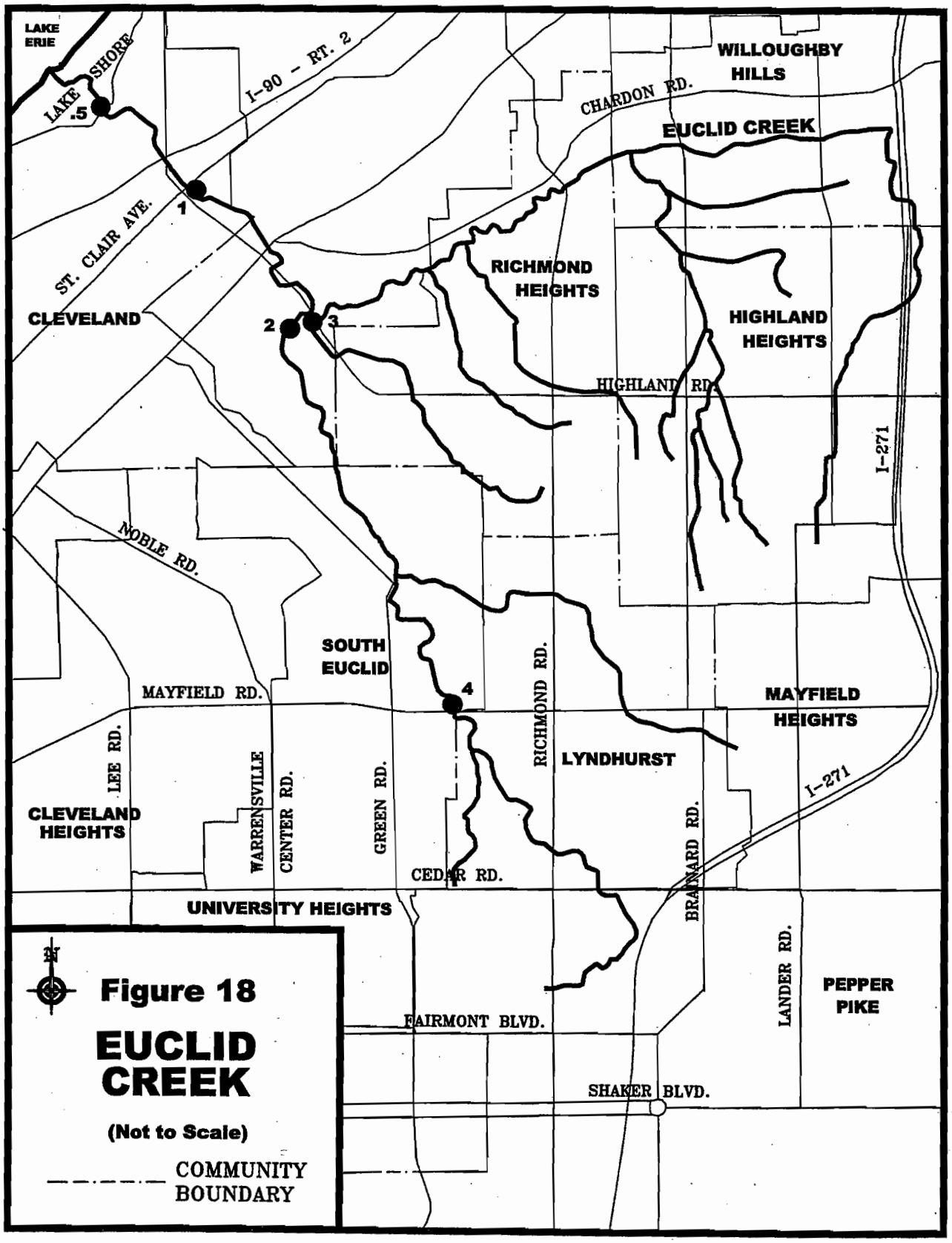
On September 19,1997, WQIS investigators discovered a break in the sanitary sewage force main that serves USA Waste Systems of Ohio located at 3227 Harvard Avenue. Analytical results indicated a fecal coliform concentration of 400,000 colonies per 100 mL in the flow entering Burke Brook. As of December 12, 1997, the break remained uncorrected.

EUCLID CREEK

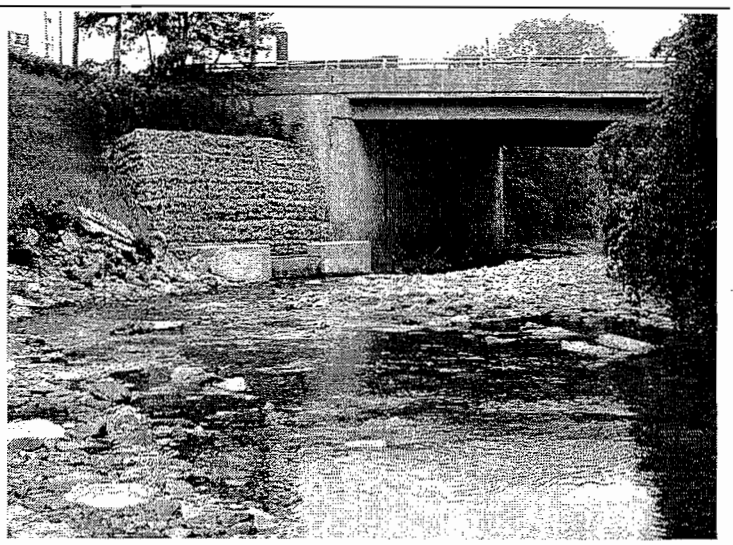
Euclid Creek's drainage area includes the communities of Cleveland, Euclid, Highland Heights, Richmond Heights, Willoughby Hills, Lyndhurst and South Euclid. The total drainage area is approximately 15,500 acres, and the creek has a length of 9.5 miles. With the exception of a culverted section under Interstate 90, the creek is predominantly open. The section between Lake Shore Boulevard and Nottingham Road has been channelized by the U.S. Army Corps of Engineers with concrete streambeds for flood control. A dam is located downstream of the St. Clair Avenue Bridge.

The Ohio EPA has designated Euclid Creek Aquatic Life Warmwater Habitat, Agricultural Water Supply, Industrial Water Supply and Primary Contact Recreational Use. In addition, portions of Euclid Creek within the boundaries of the Cleveland Metroparks have been designated State Resource Water. The NEORSD has selected five locations on Euclid Creek which are routinely sampled for chemical, bacteriological, and benthic analysis (Figure 18). Chemical and bacteriological data from Euclid Creek are presented in Appendix B.

Site #0.5 (41° 34.987' N, 81° 33.559' W) is located about 150 feet downstream of Lake Shore Boulevard. Site #0.5 was selected in 1990 to reflect the environmental impact on Euclid Creek from several upstream storm sewer outfalls, and this location is the furthest downstream sampling site prior to its discharge into Lake Erie. In 1998, Site #0.5 obtained a QHEI score of 54 (Appendix D).

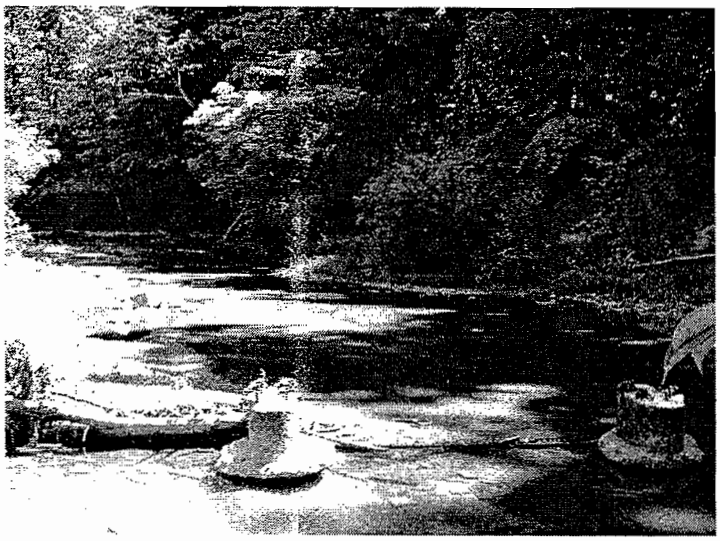

LAKE ERIE
LAKE SHORE
.5
I-90 - RT. 2
WILLOUGHBY HILLS
CHARDON RD.
EUCLID CREEK
1
ST. CLAIR AVE.
CLEVELAND
2
3
RICHMOND HEIGHTS
HIGHLAND HEIGHTS
HIGHLAND RD.
I-271
NOBLE RD.
SOUTH EUCLID
MAYFIELD RD.
4
RICHMOND RD.
MAYFIELD HEIGHTS
LYNDHURST
LEE RD.
WARRENSVILLE
CENTER RD.
GREEN RD.
CLEVELAND HEIGHTS
CEDAR RD.
BRAINARD RD.
I-271
UNIVERSITY HEIGHTS
LANDER RD.
PEPPER PIKE
FAIRMONT BLVD.
SHAKER BLVD.
Figure 18
EUCLID CREEK
(Not to Scale)
COMMUNITY BOUNDARY

Site #1 (41° 34.498' N, 81° 32.816' W) is located about 10 feet south of the St. Clair Avenue bridge. In 1998, Site #1 obtained a QHEI score of 78.5 (Appendix D).



Site #2 (41° 33.671' N, 81° 31.888' W) is located on the South Branch of Euclid Creek in the Highland Picnic Area of the Cleveland Metroparks Euclid Creek Reservation, about 100 feet upstream of its confluence with the North Branch. In 1998, Site #2 obtained a QHEI score of 57.75 (Appendix D).

Site #3 (41° 33.613' N, 81° 31.842' W) is located on the North Branch of Euclid Creek in the Highland Picnic Area of the Cleveland Metroparks Euclid Creek Reservation, about 100 feet upstream of the confluence with the South Branch. In 1998, Site #3 obtained a QHEI score of 63.25 (Appendix D).



Site #4 (41° 31.188' N, 81° 30.696' W) is located on the South Branch, adjacent to the South Euclid-Lyndhurst Public Library, 4645 Mayfield Road. In 1998, Site #4 obtained a QHEI score of 50 (Appendix D).

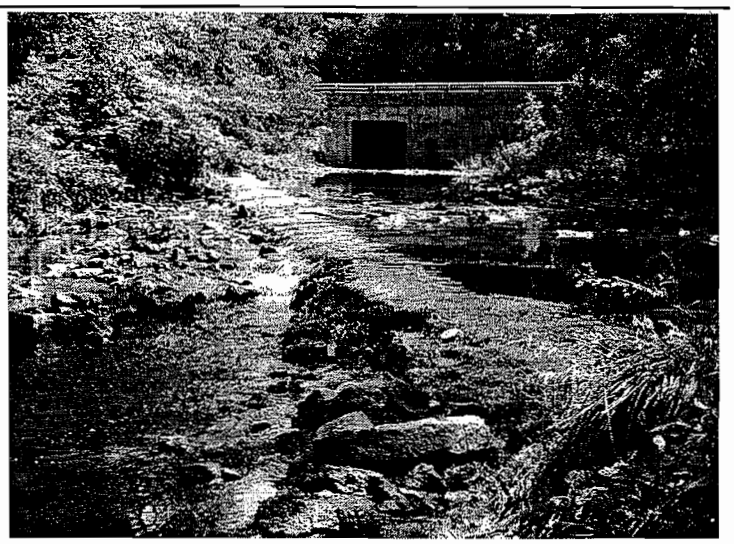
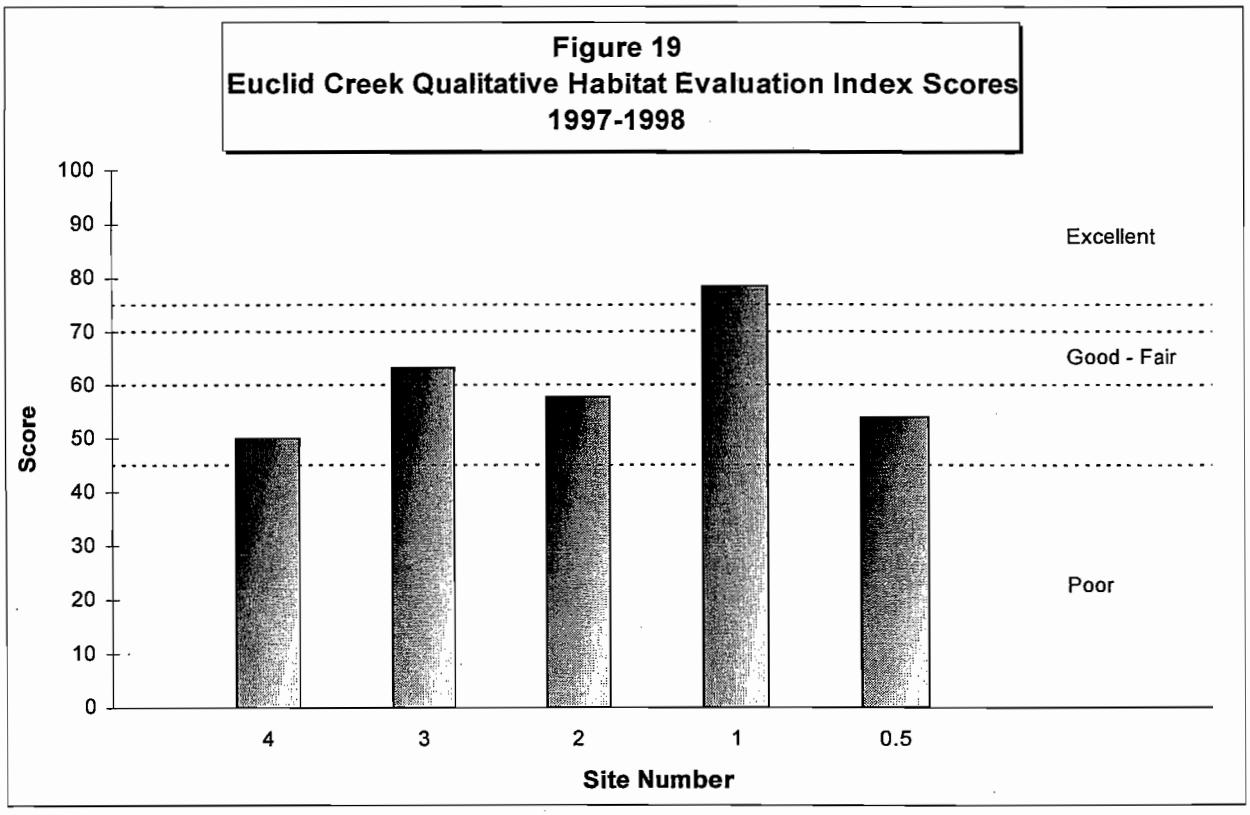


Figure 19
Euclid Creek Qualitative Habitat Evaluation Index Scores
1997-1998



Benthic Macroinvertebrate Sampling on Euclid Creek

Euclid Creek Hilsenhoff Biotic Index (HBI) scores are shown in Figure 19-A. Invertebrate Community Index (ICI) scores are shown in Figure 19-B. In general, HBI scores calculated for the routine Euclid Creek monitoring sites improved from 1991 to 1998.

Figure 19A
Euclid Creek HBI Scores
Routine Sites
1991-1998

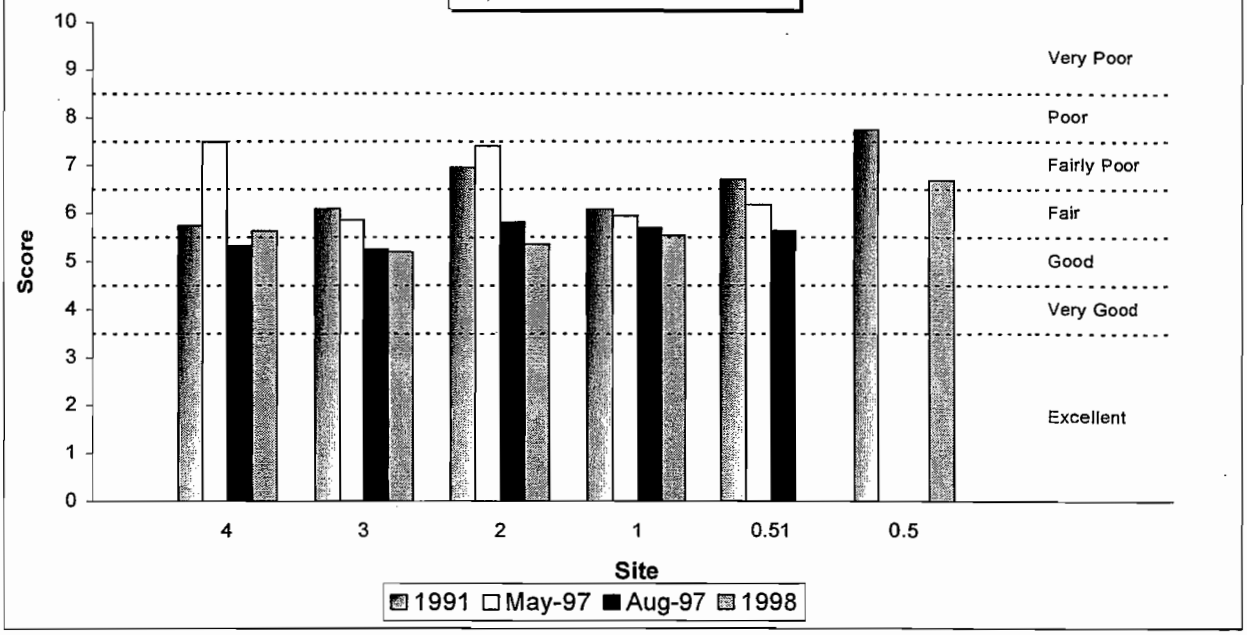
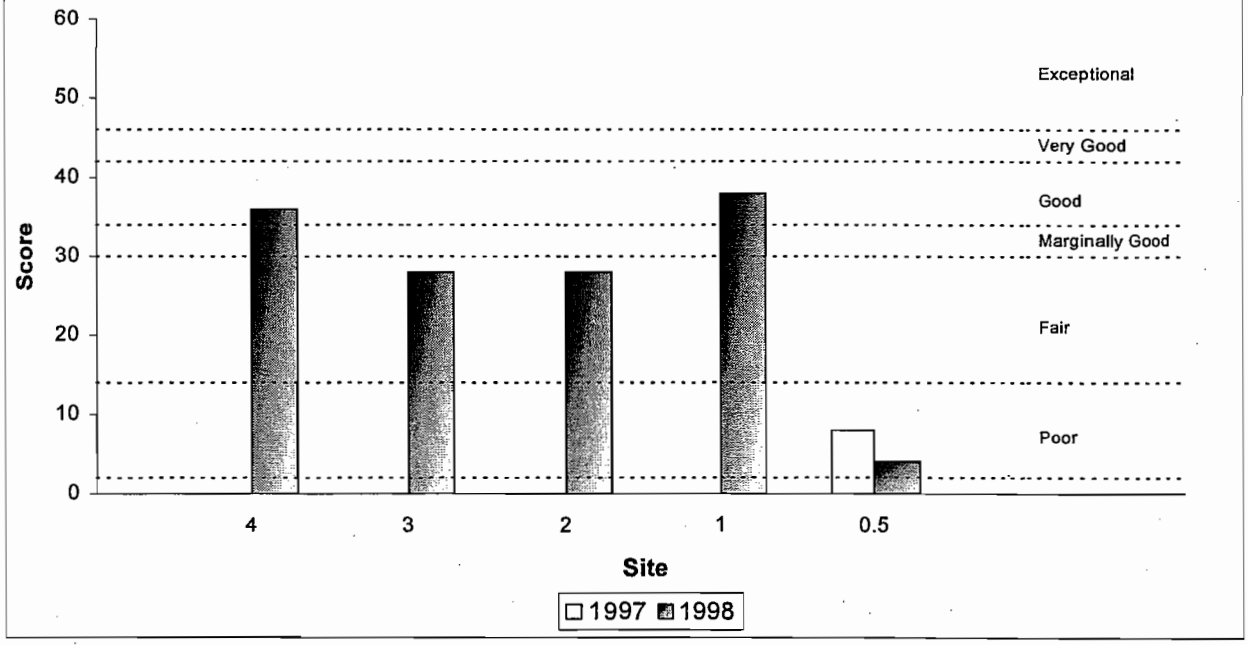


Figure 19B
Euclid Creek Invertebrate Community Index Scores, Routine Sites
1997-1998



Site #4 – The sample collected at this site in May 1997 had an HBI score in the *Fairly Poor* range, which was noticeably higher than scores obtained in 1991, August 1997, or in 1998. This sample was dominated by organisms tolerant to organic pollution. By August 1997, however, scores improved to the *Good* range. As of 1998, the HBI score at this site had returned to the Fair range, with a numerical score slightly improved over that which was obtained in 1991. This site met Ohio EPA's biological criterion for macroinvertebrates in 1998 with an ICI score of 36 (*Good*).

Site #3 – Like Site #4, Site #3 demonstrated an improvement in HBI scores from 1991 to 1998. During this time period, the narrative rating of the macroinvertebrate community, based on HBI scores, improved from *Fair* to *Good*. Although slightly improved over the 1991 sample, the sample collected in May 1997 obtained an HBI score which was slightly higher than the scores for samples collected in August 1997 or in 1998. The May 1997 sample contained a smaller proportion of Ephemeropteran, Plecopteran, and Tricopteran (EPT) organisms and a higher proportion of pollution tolerant organisms than the samples collected at this site in August 1997 or in 1998. In 1998, this site obtained an ICI score of 28 (*Fair*).

Site #2 – This site also exhibited an improvement in HBI scores from 1991 to 1998. During this time period, scores improved from the *Fairly Poor* range to the *Good* range. The score obtained at this site in May 1997 was, like the scores obtained at Sites 3 and 4, higher than scores obtained in August 1997 or in 1998. The sample collected in May 1997 had a lower proportion of EPT organisms and a higher proportion of pollution tolerant organisms than the samples collected in August 1997 or in 1998. Like Site #2, Site #3 obtained an ICI score of 28 (*Fair*) in 1998.

Site #1 – A trend similar to that observed at Sites 2, 3, and 4 was also observed at Site #1. Scores observed at this site improved from *Fair* in 1991 to *Good* in 1998. As was observed at the other sites, the May 1997 score was higher than the August 1997 or 1998 score. Like Site #3, however, the May 1997 score was slightly lower than the 1991 score. Like Site #1, Site #4 met Ohio EPA's biological criterion for macroinvertebrates in 1998, with an ICI score of 38 (*Good*).

Site #0.5 – Because of high Lake Erie water levels, 1997 samples were collected approximately 150 feet upstream of Lake Shore Boulevard at Site #0.51. Results from samples collected at these sites, however, are consistent with those obtained at other routine Euclid Creek sites. Scores improved from Poor in 1991 to Fairly Poor 1998. An improvement was also observed from May 1997 to August 1997, although the narrative rating did not change.

When samples were collected at Site #0.5 in 1991 and 1998, scores were higher than at any of the other routine Euclid Creek sites. In 1997, however, when the sampling site was moved slightly upstream, scores were more consistent with those obtained at the other sites. The proportions of pollution tolerant organisms collected at Site #0.5 and the habitat conditions at this site indicate that the causes of the elevated HBI scores may be complex in nature. Site #0.5 obtained ICI scores of 8 (Poor) and 4 (*Poor*) in 1998.

In 1997, three additional sample locations (#1.5, #2.5, #3.5) were sampled both quantitatively and semi-quantitatively. These locations are upstream of all NEORSD CSO outfalls. Site #1.5 is on the main stem approximately 0.3 miles downstream from the confluences of the north and south branches (site #3 and #2) and upstream of Euclid Avenue. Site #2.5 is located on the south branch upstream of Monticello Boulevard near the Quarry Picnic Area of Euclid Creek Reservation. Site #3.5 is located on the North Branch downstream (west) of Richmond Road. The area upstream of site #3.5 is serviced by septic tanks. Sample results for these sites are listed in Appendix D.

Problems and Remediation

-1-

On August 16, 1996, WQIS received a report from the U.S. Coast Guard of oil entering Euclid Creek in the vicinity St. Clair Avenue and Dille Road. Samsel Services was contacted to conduct the oil clean up. WQIS, Ohio EPA, and Coast Guard personnel conducted inspections at industrial facilities in the area, but were unable to identify the source of the oil. Several potential sources of oil were identified and forwarded to WQIS Pollution Prevention investigators for industrial inspections. As a result, Ski-Way Machine Products, ATS Machine, and Tool Company and Jackshaw Chevrolet Body Shop were all found to have floor drains in process areas that were tributary to the storm sewer entering Euclid Creek. The companies were instructed to permanently seal these drains or replumb the drains to a sanitary sewer. Corrections were later verified by WQIS investigators at all of the aforementioned facilities.

-2-

On August 31, 1996, The Cleveland Fire Department (CFD) reported a chemical spill into Euclid Creek at Mayfield Road. WQIS investigators arrived on the scene to discover sanitary sewage entering the creek via a 30-inch storm sewer outfall. These findings were reported to the Lyndhurst Service Department, which responded, located and cleared a blockage in a sanitary sewer on Dorsh Road at Mayfield Road on September 1, 1996. WQIS personnel confirmed the elimination of the sanitary sewage discharge on September 3, 1996.

-3-

On March 12, 1997 WQIS personnel began an inspection of an area located southwest of I-271 and Cedar Road following complaints from the Taxpayers Coalition of Beachwood of deficiencies in sanitary sewers. The complaint was based on concerns by citizens of sanitary sewers in the area surcharging during periods of rain. To address the citizens' concerns, WQIS initiated a sampling program to compare fecal coliform levels in the creek before and after a rain event. A total of 10 samples were collected in dry and wet weather in an attempt to identify areas of concern. The results of this sampling did not reveal any major problems with the sewer system in this area. Fecal coliform levels were within acceptable levels for surface waters. In addition, at

no time was any sanitary debris observed in the ponds or creeks in this area and the sanitary sewers did not appear to be hydraulically overloaded during periods of rain.

-4-

On March 28, 1997, WQIS investigators discovered a septic dry weather discharge to Euclid Creek via a 48-inch storm sewer outfall located between Liberty Road and Telehurst Road. Investigators traced the sewage in the storm sewer to an area located between Ardendale Road and Mayfield Road. Dye tests confirmed the overflow of sewage from the sanitary sewer to the storm sewer. The South Euclid Service Department was apprised of the problem and dispatched a service crew that cleared a blockage in the sanitary sewer, alleviating the overflow of sewage to the storm sewer.

On May 20, 1998 an inspection of the aforementioned outfall revealed septic conditions with bacteriological samples revealing a fecal coliform concentration of 15,000 colonies per 100 mL. Inspections of the storm sewer collection system and dye tests of businesses along Mayfield Road revealed that the source of the sanitary contamination to Euclid Creek was the result of the cross connection of the sanitary facilities of 4517 Mayfield Road and 4422 Mayfield Road to the storm sewer. The NEORSD Planning Department was informed of the problem and follow-up investigations will be conducted to confirm all corrective actions.

-5-

On March 3, 1997, District personnel responded to a report from a City of Cleveland Councilman of a possible discharge of diesel fuel to Euclid Creek from a Citgo gas station located at 1201 East 185th Street. An inspection of Citgo's facility revealed no signs of any recent spills or discharges to the creek. In addition, trench drains are situated around the diesel pumps in such a way that any spills and/or storm runoff would be collected and conveyed to an Ohio EPA approved and NPDES permitted oil-water separator. Furthermore, the discharge pipe from the oil-water separator to the creek did not reveal any staining or signs that the separator was malfunctioning. A Citgo representative was apprised of the necessity for routine and proper maintenance to prevent any oil from passing through the separator into the creek.

-6-

On March 28, 1997, WQIS investigators responded to a reported diesel fuel spill at the South Euclid Fire Department (SEFD) located at 1349 South Green Road. The spill had occurred the previous evening while SEFD personnel were refueling an emergency vehicle. An estimated 60 gallons of diesel fuel was lost. Of this 60 gallons, an undetermined amount had entered a storm sewer tributary to Euclid Creek. SEFD attempted remediation by adding emulsifier to the spill and flushing for approximately one hour. WQIS investigators recommended that SEFD personnel install booms and contact an environmental remediation service to remove all the fuel that had collected in catch basins. An inspection of the storm sewer outfall to Euclid Creek revealed no evidence of product having entered the creek.

-7-

On May 1, 1997 WQIS investigators discovered a green substance discharging into Euclid Creek from a 36-inch storm sewer outfall near Nottingham Road and St. Clair Avenue. The source of the green color was found to be Ultra Labs, Inc. located at 19600 St. Clair Avenue. The green color was from a fluorescent green penetrant the facility uses to detect defects in machine parts. The parts are then rinsed over a utility sink which was found to be discharging to the 36-inch storm sewer. Additional inspections at this multiple occupancy facility found the sanitary facilities of Ultra Labs, C&D Custom Machining, Curwin Industries, Klane Grinding and Landmark Plumbing to all be connected to the storm sewer. The NEORSD Planning Department was notified of the illicit connections.

-8-

On June 26, 1997, WQIS personnel investigated a report of a milky-white substance entering Euclid Creek from a storm sewer outfall behind 18340 Marcella Road. The source of the flow was indeterminable due to the cessation of the discharge. However, a follow-up inspection on June 27, 1998 revealed a recurrence of the discharge to Euclid Creek. The source of the flow was traced to a City of Cleveland Water Department project on Chickasaw, Kewanee and Shawnee Streets in Cleveland. During the replacement of the water mains on these streets, a temporary line was constructed and placed along the curb of each street. Crushed limestone was then used to cover the line to allow passage over the pipe for residential vehicles. The milky white substance was the result of water from the pressure relief valves on the temporary water lines washing away fine material from the crushed limestone into the storm sewer.

-9-

On October 2, 1997, NEORSD personnel responded to a complaint of a brown color in Euclid Creek between Euclid Avenue and St. Clair Avenue. Investigators found the color to be the result of a City of South Euclid bank stabilization project in the area between South Lynn Circle and Emerson Road. Heavy machinery moving in the streambed was disturbing the sediment, creating a brown turbid condition in the creek.

-10-

On October 21, 1997, WQIS investigators responded to a request from the City of Cleveland Division of Water to assist in the investigation of the source and identity of a white discharge reported to the Ohio EPA on October 15, 1997. The substance in question had been reported to be emanating from a 48-inch box storm sewer located near the Nottingham Filtration Plant at 1300 Chardon Road. Consultation of city sewer maps revealed that the aforementioned storm sewer only received flow from the Nottingham Filtration Plant. A white powdery residue was observed in the creek around the outfall and coating the banks. Inspection of the plant discounted the

possibility that the substance in the creek was sludge, due to the difference in color and consistency. The most likely source was identified as vehicle wash area where water department trucks carrying crushed limestone are washed over a storm catch basin.

-11-

On December 10, 1997, Investigators responded to a report from the U.S. Coast Guard of an oil sheen in Euclid Creek at St. Clair Avenue and Dille Road. An inspection of the area identified oil in the creek around a 48-inch outfall that serves as a discharge point for CSO #210 on St. Clair Avenue. However, an inspection of the CSO structure revealed no oil in the sewer. It was surmised that heavy rains during the day had resulted in an overflow at this location, resulting in the oil observed in the creek.

-12-

On August 14, 1998 NEORSD personnel along with personnel from the Cleveland Fire Department (CFD) and the U.S. Coast Guard responded to a report of kerosene odors emanating from Euclid Creek near Villaview Drive. A sheen that was observed in the creek's flow was found to be emanating from a triple barrel culvert on Euclid Creek at Mozina Drive and Underwood Avenue. The creek upstream of the culvert was free from of any sheen. Further inspection found that the kerosene odor and sheen was entering the culvert via a 72-inch storm sewer outfall that takes in flow from storm sewers on the property of the Citgo Station located at 1201 East 185th Street. An investigation at the Citgo Station revealed that it was the only facility in the area that sold K-1 kerosene/diesel fuel. An inspection of the station's monitoring wells showed that two of the three wells contained 21 to 42 inches of product. CFD then ordered the station to shut down operations and the Coast Guard prepared papers citing Citgo as the party responsible for the clean up. CFD and the U.S. Coast Guard supervised the remediation efforts.

-13-

On August 9, 1998 WQIS Personnel responded to a report from the Cleveland Fire Department (CFD) of oil in Euclid Creek at Wildwood Park. Booms were deployed, by the fire department, to contain the oil at the first bridge downstream from Lake Shore Boulevard. Ohio EPA contacted Chemtron to conduct the site remediation. Inspections of Euclid Creek upstream of this location did not reveal the source of the oil observed in the creek.

-14-

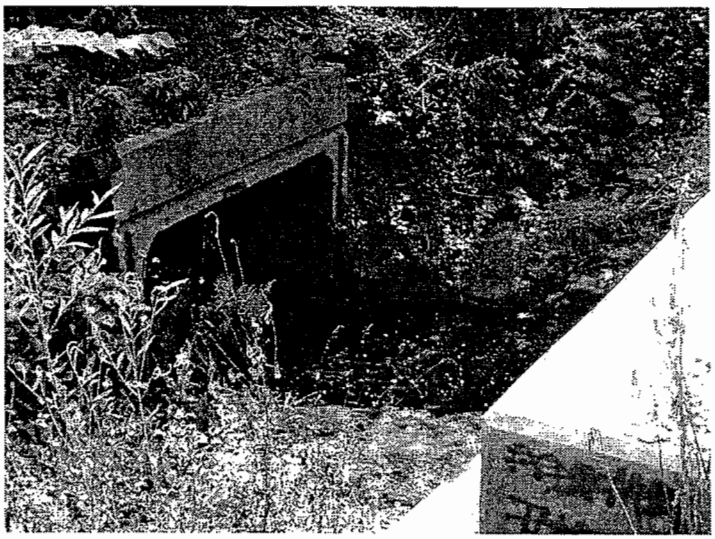
On September 11, 1998, NEORSD investigators discovered a potable water leak at a fire hydrant located at 956 East Green Road. Flow measurements estimated the volume of potable water entering the Euclid Creek at 115,000 gallons per day and the residual chlorine concentration was measured at approximately 0.5 mg/L. The City of Cleveland Division of Water was notified of the leak.

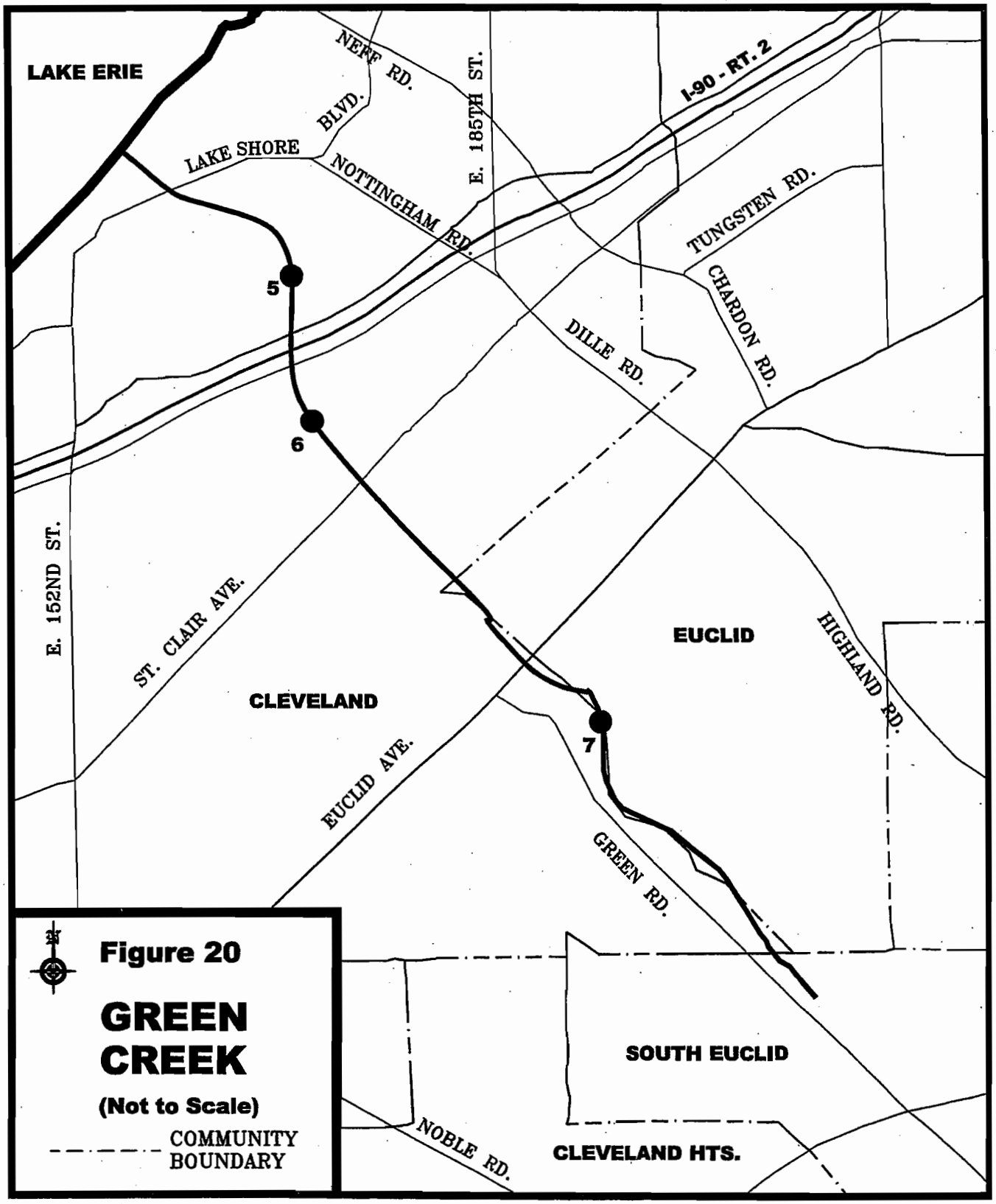
GREEN CREEK

Green Creek drains a small portion of Cleveland and South Euclid. The drainage area, mostly residential and industrial, is approximately 660 acres, and the stream is 6.1 miles in length. Green Creek is culverted for 2.3 miles, from Euclid Avenue to Lake Erie. The Ohio EPA has no current or proposed use designation for Green Creek. Green Creek has been assigned three sample sites by NEORSD Environmental Assessment for routine chemical, bacteriological and biological sampling (Figure 20). Chemical and bacteriological data from Green Creek are presented in Appendix B.

Site #5 (41° 34.420' N, 81° 33.800' W) is located at a manhole on the culvert at Arcade Avenue, west of East 167th Street. The culvert at Site #5 is 8 feet wide by 4 feet high. Since Site #5 is culverted, no QHEI has been determined.

Site #6 (41° 34.003' N, 81° 33.831' W) is located at a small opening on the culvert, northeast of East 170th Street and Saranac Road. This open section of the creek is 10 feet long by 8 feet wide. No QHEI has been determined at Site #6 since this location lacks habitat characteristics required for a QHEI. Specifically, Site #6 lacks the appropriate length (200-500 m) for determining a QHEI.



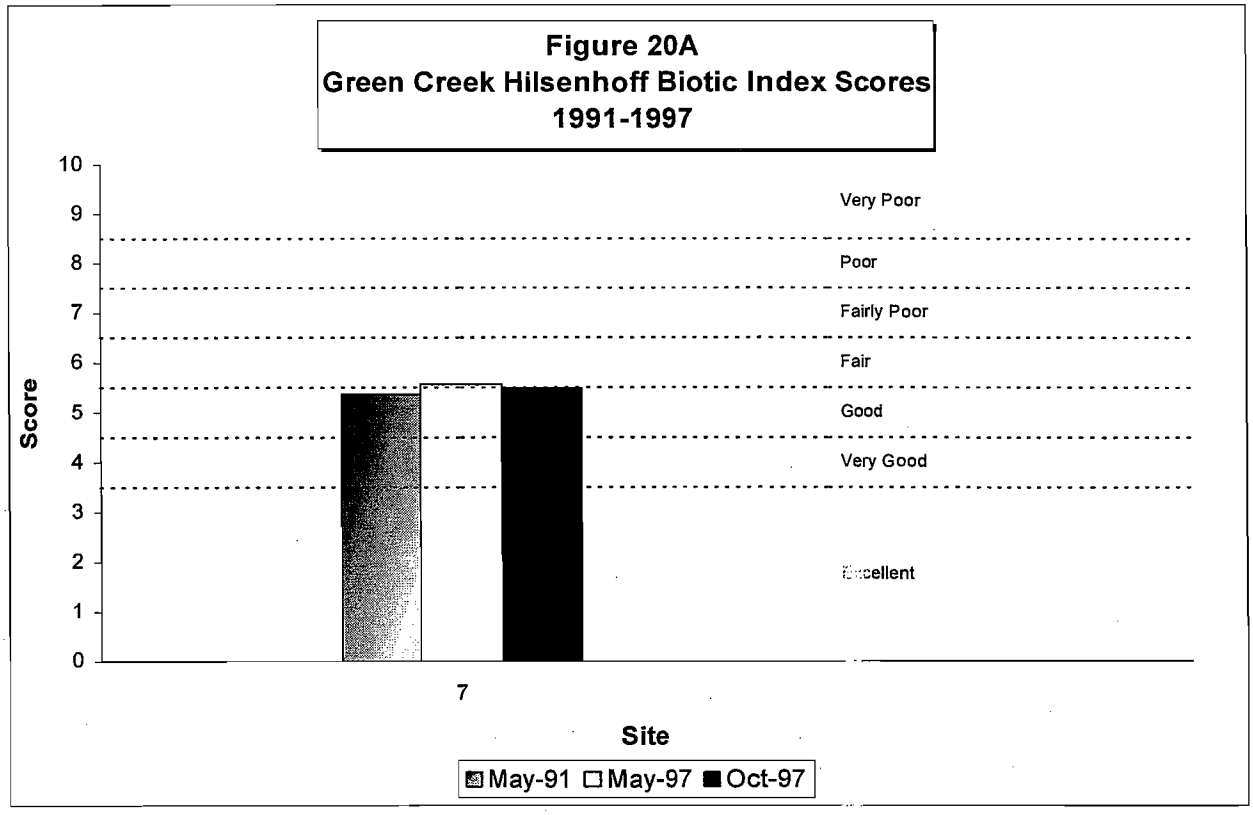

LAKE ERIE
NEFF RD.
BLVD.
LAKE SHORE
NOTTINGHAM RD.
E. 185TH ST.
I-90 - RT. 2
TUNGSTEN RD.
CHARDON RD.
DILLE RD.
5
6
7
E. 152ND ST.
ST. CLAIR AVE.
CLEVELAND
EUCLID
HIGHLAND RD.
EUCLID AVE.
GREEN RD.
SOUTH EUCLID
NOBLE RD.
CLEVELAND HTS.
Figure 20
GREEN CREEK
(Not to Scale)
COMMUNITY BOUNDARY

Site #7 (41° 33.492' N, 81° 32.861' W) is located south of Euclid Avenue on Upper Valley Drive. Samples and measurements are obtained at the downstream end of the open creek, before it enters the culvert. A metal grate, which functions as a debris screen, crosses the creek just upstream of the sample site. In 1997, Site #7 obtained a QHEI score of 45.75 (Appendix D).

Benthic Macroinvertebrate Sampling on Green Creek

Macroinvertebrate samples were collected from Green Creek Site #7 in May and October of 1997. The HBI scores for Green Creek, which have essentially remained unchanged since 1991, are presented in Figure 20A. Samples collected by NEORSD

Figure 20A
Green Creek Hilsenhoff Biotic Index Scores
1991-1997



indicate that the macroinvertebrate communities present at this site in May 1991 and May 1997 were similar in structure. Dipterans and non-insects dominated the samples

with only limited Ephemeropteran, Plecopteran, and Tricopteran (EPT) representation (6.12% in 1991 and 7.3% in 1997). The October 1997 sample, however, appeared to have a much healthier macroinvertebrate community, with an EPT composition of 34.9% and a decreased percentage of pollution tolerant organisms. Despite these differences in community structure, which appear to be seasonal in nature, the HBI scores have remained relatively constant and indicate the presence of organic pollution at this site at the time samples were collected.

Problems and Remediation

-1-

As discussed in the NEORSD Greater Cleveland Area Environmental Water Quality Assessment 1993-1995 Report, NEORSD investigators, in September 1995, discovered that the sanitary facilities at Popeye's Chicken and Biscuits (18126 Euclid Avenue), Pizza Hut (18324 Euclid Avenue) and two retail stores at the Greenlite Shopping Center were improperly connected to storm sewers tributary to Green Creek. In addition, investigators found that a 24-inch westbound sanitary sewer was connected to the Green Creek culvert at 18324 Euclid Avenue. Following these findings, the City of Cleveland Division of Water Pollution Control was notified. In October 1996, the City of Cleveland required the reconnection of these sanitary discharges to the sanitary sewer system.

A follow-up inspection by investigators on October 7, 1997 revealed that the sanitary discharge from Pizza Hut had been properly connected to the sanitary sewer. Also, a dye test verified that the 24-inch sanitary sewer on Euclid Avenue had been rerouted to a sanitary sewer west of the Green Creek culvert. However, this inspection revealed that no corrective action had been taken to eliminate the sanitary discharges to the creek from the two retail stores at the Greenlite Shopping Center.

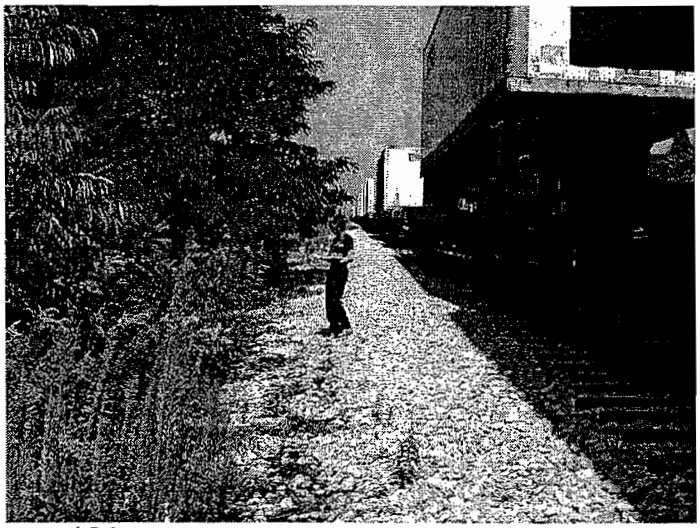
NINE-MILE CREEK

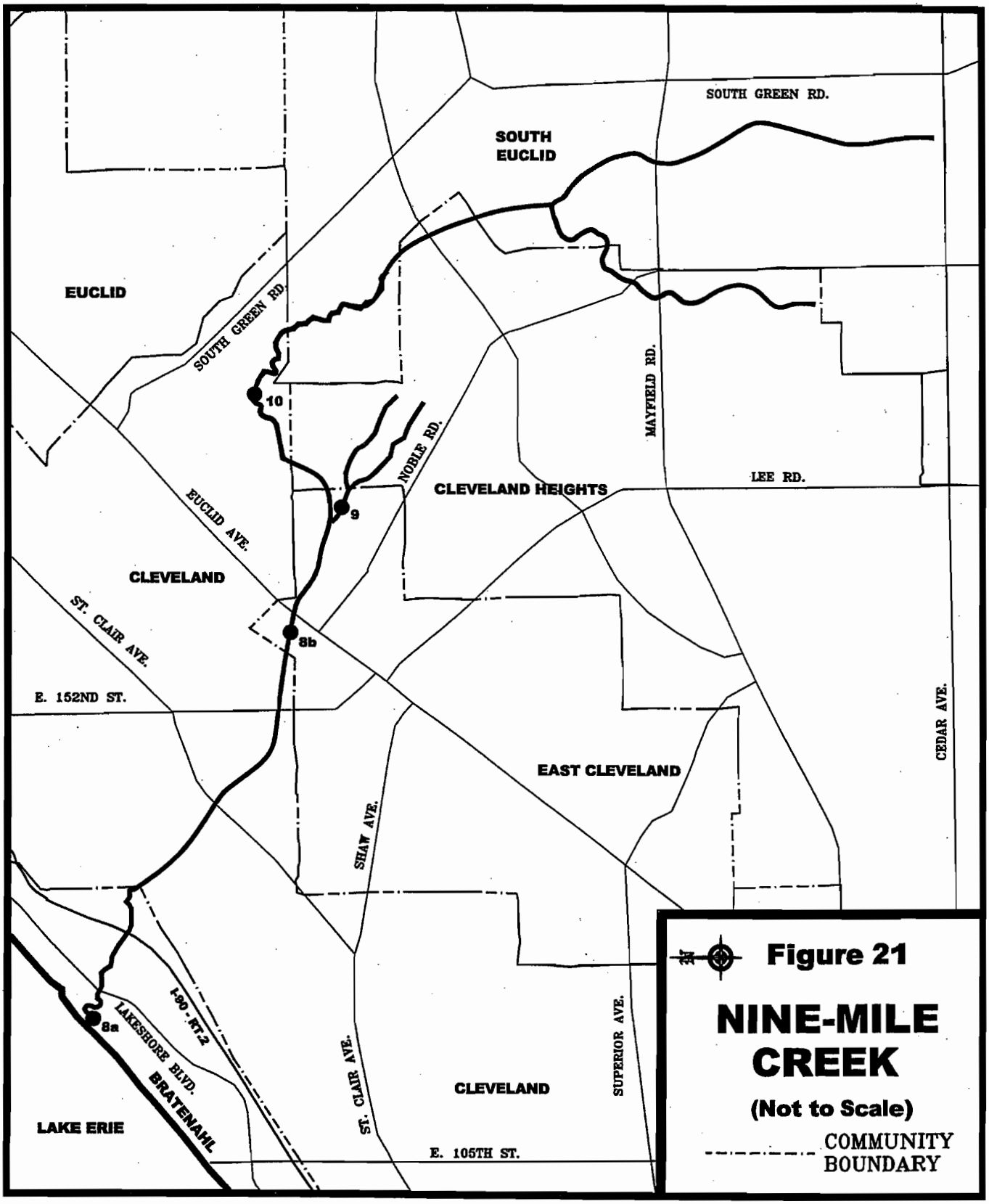
Nine-Mile Creek's drainage area includes the communities of South Euclid, University Heights, Cleveland Heights, East Cleveland, Cleveland, and Bratenahl. The total drainage area is approximately 5,000 acres. Nine-Mile Creek is culverted from near its mouth at Lake Shore Boulevard to east of Belvoir Road at the border between the cities of Cleveland and Cleveland Heights. Upstream of this location, the creek is open, and the "Nela Park" Branch, which enters the culverted main stem of Nine-Mile Creek south of Belvoir Boulevard, east of Hillside Avenue in East Cleveland, is also open.

The Ohio EPA has designated Nine-Mile Creek Aquatic Life Warmwater Habitat, Agricultural Water Supply, Industrial Water Supply and Primary Contact Recreational Use. The NEORSD has selected four locations on Nine-Mile Creek which are routinely sampled for chemical, bacteriological, and benthic analysis (Figure 21). Chemical and bacteriological data from Nine-Mile Creek are presented in Appendix B.

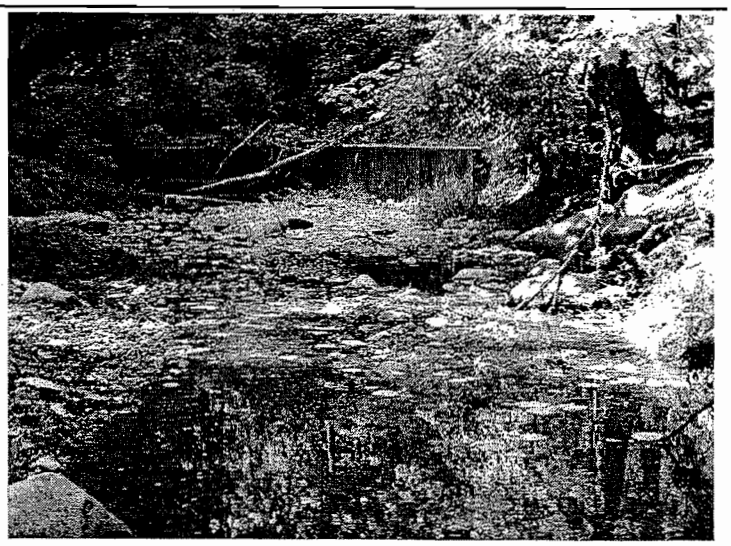
Site #8a (41° 33.489' N, 81° 36.014' W) is located approximately 500 yards upstream of Nine-Mile Creek's confluence with Lake Erie. Samples are obtained about 50 feet north of the Lake Shore Boulevard bridge. In 1997, Site #8a obtained a QHEI score of 56.75 (Appendix D).

Site #8b (41° 32.827' N, 81° 34.134' W) is located on the culverted section of the main stem of Nine-Mile Creek. This site is located at a manhole west of Ivanhoe Road and approximately 20 feet north of the railroad tracks which run perpendicular to Ivanhoe Road. Since Site #8b is culverted, no QHEI has been obtained.

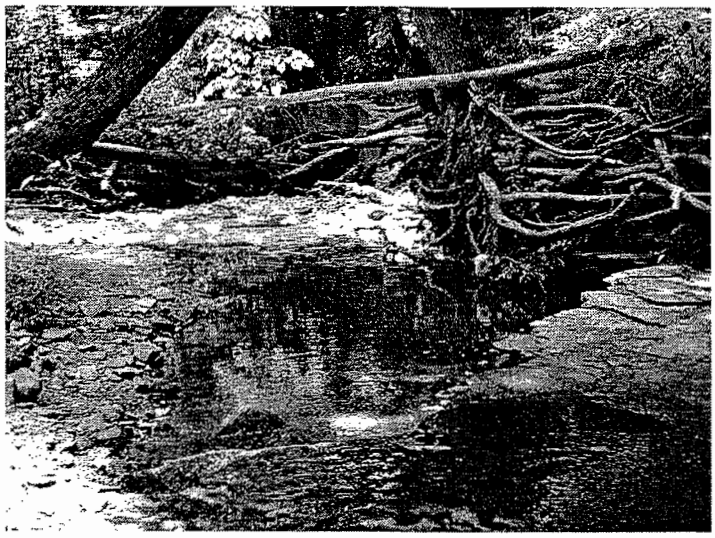



SOUTH GREEN RD.
SOUTH EUCLID
EUCLID
SOUTH GREEN RD.
MAYFIELD RD.
10
NOBLE RD.
CLEVELAND HEIGHTS
LEE RD.
9
EUCLID AVE.
CLEVELAND
ST. CLAIR AVE.
8b
E. 152ND ST.
CEDAR AVE.
EAST CLEVELAND
SHAW AVE.
8a
I-90 - RT-2
LAKESHORE BLVD.
BRATENAHL
ST. CLAIR AVE.
CLEVELAND
SUPERIOR AVE.
LAKE ERIE
E. 105TH ST.
Figure 21
NINE-MILE CREEK
(Not to Scale)
COMMUNITY BOUNDARY

Site #9 (41° 32.554' N, 81° 33.332' W) on the Nine-Mile Creek "Nela Park" Branch is located one-quarter mile southeast of Euclid Avenue on the southwest side of Belvoir Boulevard. Samples are obtained just upstream of this branch's entry into the Nine-Mile Creek culvert. In 1997, Site #9 obtained a QHEI score of 43.75 (Appendix D).



Site #10 (41° 32.769' N, 81° 33.196' W) is located on the main stem of Nine-Mile Creek, 10 feet upstream of its entry into the Nine-Mile Creek culvert. It is on the south side of Belvoir Boulevard about one-half mile east of Euclid Avenue. In 1997, Site #10 obtained a QHEI score of 57.5 (Appendix D).



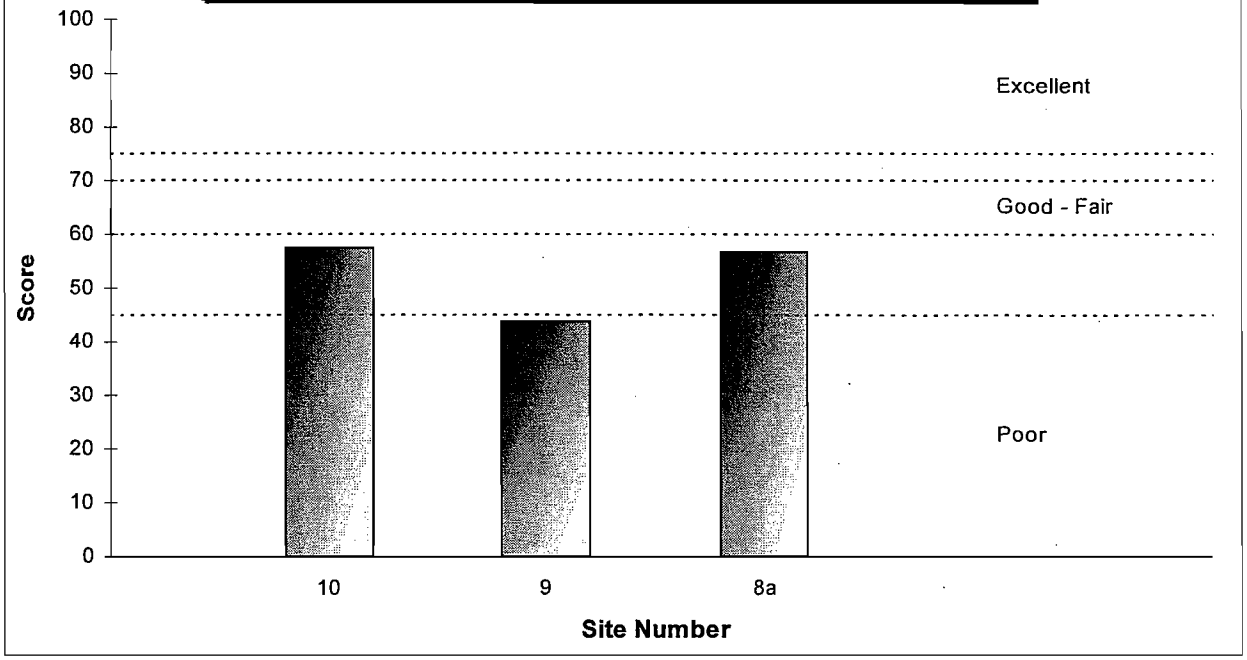
Macroinvertebrate Sampling on Nine-Mile Creek

In 1997, NEORSD investigators collected semi-quantitative macroinvertebrate samples at Nine-Mile Creek Sites 8a, 9, and 10. Hilsenhoff Biotic Index (HBI) scores ranged from the *Fair* range to the *Very Poor* range. These scores indicate that organic pollution was present at the time of sampling. Nine-Mile Creek HBI scores are shown graphically in Figure 22-A.

Site #8a - HBI scores at this site were measured in the *Fairly Poor* range (7.0) in 1997, which indicates the presence of significant organic pollution. Examination of individual tolerance metrics indicates that the elevated HBI scores at this site may be attributable to organic pollution. Habitat at this location may, however, also have an effect on the macroinvertebrate community. Lake levels affect flow velocity at this site, which in turn may affect the biota which inhabit the substrate. Slower, deeper waters tend to have

greater abundances of tolerant organisms such as aquatic worms and midge larvae. Only aquatic worms and one midge taxon were present at Site #8a in 1997. HBI scores from 1997 were slightly higher than those from 1991. One reason for the increase in

Figure 22
Nine-Mile Creek Qualitative Habitat Evaluation Index Scores
1997

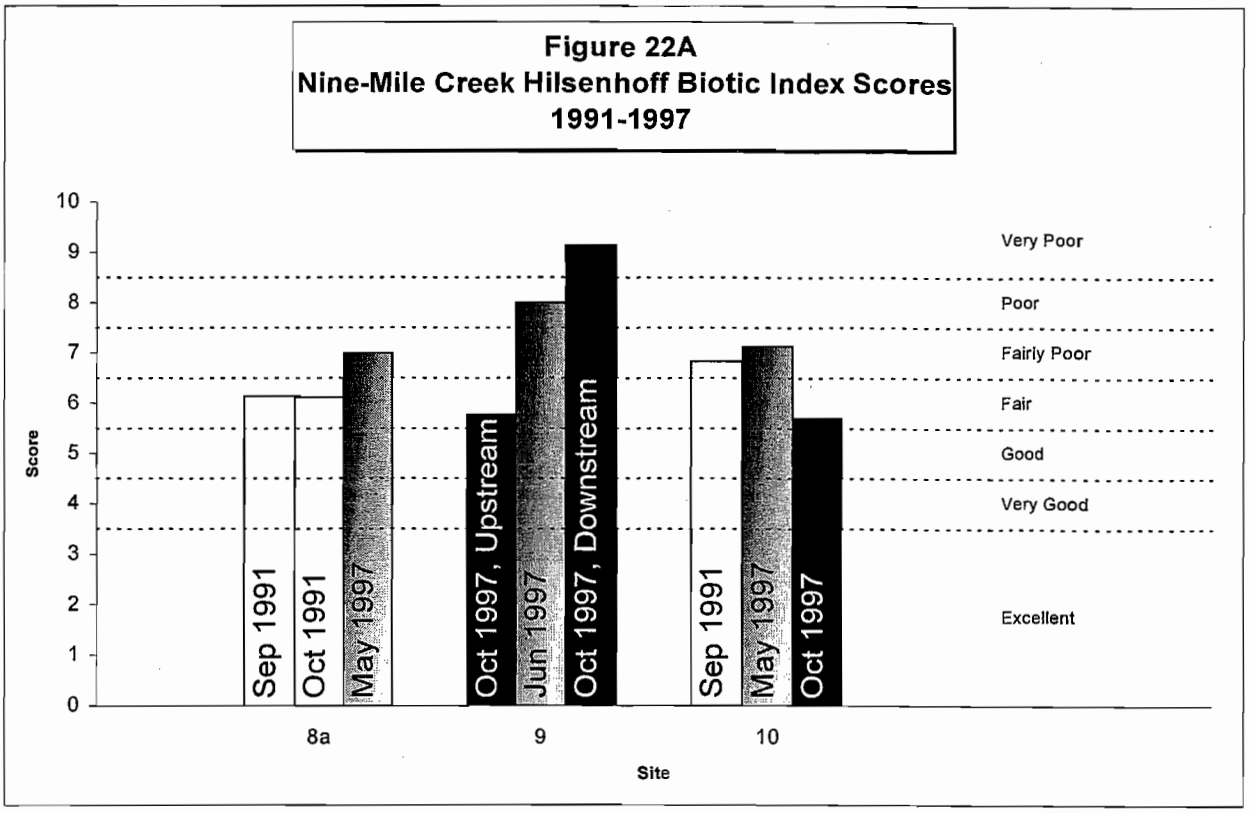


HBI score may have been the higher lake levels present during 1997. Possible sources of contamination tributary to this site include dry weather discharges from three outfalls discovered during the Easterly CSO Phase II Facilities Plan Dry Weather Outfall Survey conducted in 1998.

Site #9 - Samples were collected from Site #9 on June 13 and October 2, 1997. On September 24, 1997, investigators observed sewage entering Nine-Mile Creek near Site #9 as a result of a blocked sanitary sewer (see Problems and Remediations section item #4). Two samples were collected on October 2, 1997, one upstream and one downstream of the location where sewage had been observed entering the creek on September 24. The *Very Poor* (9.14) HBI score obtained at the downstream location on October 2 indicates that the discharge of sewage observed on September 24 had an adverse effect on the macroinvertebrate community at this location. The sample obtained upstream of the discharge on October 2 received an HBI score in the *Fair* range (5.78). The *Poor* score (8.0) obtained at Site #9 on June 13 indicates that a periodic overflow may have been occurring at this location.

Site #10 - Macroinvertebrates were collected at Site #10 on May 22 and October 6, 1997. HBI scores were measured in the *Fairly Poor* (7.14) and *Fair* (5.72) ranges, indicating the presence of significant and fairly significant organic pollution, respectively.

Figure 22A
Nine-Mile Creek Hilsenhoff Biotic Index Scores
1991-1997



Although the May 1997 sample obtained the same narrative rating as the sample collected in September 1991, the October 1997 score showed a slight improvement.

Problems and Remediation

-1-

On July 29, 1996, NEORSD investigators discovered sanitary sewage entering Nine-Mile Creek through an overflow structure at Coit Road and Kirby Avenue. A blockage in the combined sewer on Coit Road had resulted in the dry weather overflow of sanitary sewage to Nine-Mile Creek. NEORSD Sewer Maintenance and Control personnel were notified and removed the blockage on July 29, eliminating this source of contamination in Nine-Mile Creek.

-2-

On August 5, 1996, NEORSD investigators performed routine sampling of Nine-Mile Creek. Results of the chemical analysis revealed elevated concentrations of total chromium (0.36 mg/L) and hexavalent chromium (0.31 mg/L) at Site #8a. The next upstream sample site, #8b near Ivanhoe Road, had lower concentrations of total chromium (0.003 mg/L) and hexavalent chromium (<0.01 mg/L). In an effort to trace the source of the chromium contamination, investigators obtained samples at numerous locations on the creek between Sites #8a and #8b.

The source of the chromium was identified as the Electrolizing Corporation of Ohio, 1325 East 152nd Street. Inspections of the facility by NEORSD investigators, company officials, and a hired consultant revealed numerous potential sources of chromium contamination to a storm sewer which discharges to the Nine-Mile Creek culvert. Following these findings, Electrolizing Corporation performed extensive remediation in an effort to eliminate the discharge of chromium to the creek. The remediative work had been completed by December 1998. Future sampling at Site #8a should reflect an improvement in water quality resulting from this remediation.

-3-

On June 4, 1997, NEORSD investigators found sanitary sewage entering the "Nela Park" Branch of Nine-Mile Creek, upstream of Site #9, from a storm sewer outfall behind Randolph and Medford Roads. The dry weather flow of sanitary sewage was measured at approximately 72,000 gallons per day. Bacteriological analysis of this discharge revealed a fecal coliform concentration of 420,000 organisms per 100 mL. The sewage was traced back to 2392 Noble Road. A blockage of the sanitary sewer at this location had resulted in leakage of sewage into the storm sewer.

A follow-up inspection by investigators on June 9, 1997, verified that the blockage had been removed, eliminating this source of pollution in Nine-Mile Creek.

-4-

On September 24, 1997, NEORSD investigators responded to a report of sanitary sewage in Nine-Mile Creek near Belvoir Boulevard. The discharge of sewage was attributed to a blockage in the sanitary sewer which runs along the east bank of the "Nela Park" Branch, just upstream of its entry into the Nine-Mile Creek culvert. Investigators found sewage overflowing from a manhole located approximately 100 feet upstream of Site #9. Following this discovery, the City of Cleveland Heights Service Department was notified of the problem. A subsequent inspection by NEORSD investigators on October 2,1997 verified the elimination of this source of contamination in Nine-Mile Creek.

-5-

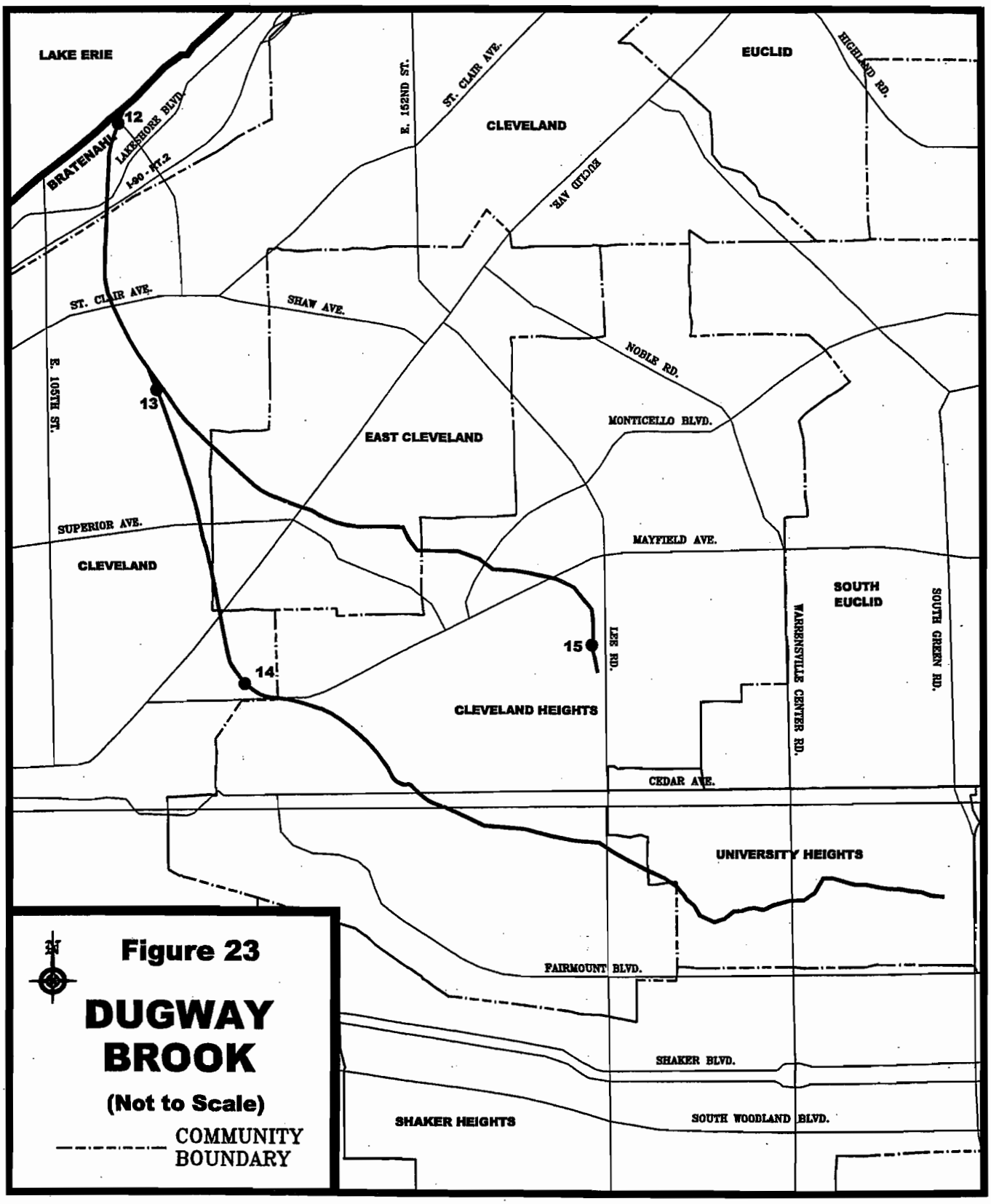
On June 8, 1998, NEORSD investigators found sanitary sewage discharging into Nine-Mile Creek through a storm sewer outfall north of Princeton Boulevard and Cambridge Road. The rate of this dry weather discharge was measured at approximately 160,000 gallons per day. Investigations revealed that sanitary sewage was leaking into the storm sewer system through the inspection plates at 1062 Allston Drive and on Monticello Boulevard at Beverly Road. The City of Cleveland Heights Service Department was notified of the situation.

DUGWAY BROOK

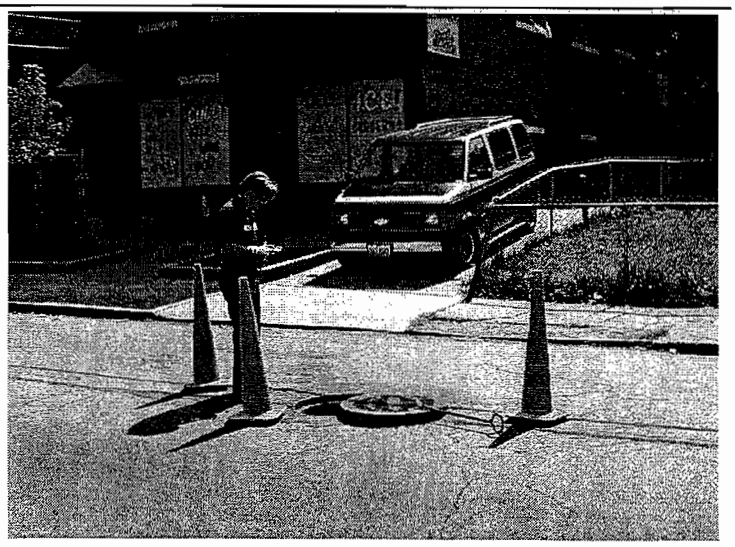
Dugway Brook's drainage area includes the communities of Cleveland, East Cleveland, Cleveland Heights, University Heights, and Bratenahl. The brook has two main branches, East and West, and has a total length of 7.9 miles and total drainage area of 9.4 square miles. Most of Dugway Brook is culverted, with the following exceptions which are open: near the mouth, north of Lake Shore Boulevard; on a tributary to the West Branch, between Derbyshire Road and Washington Boulevard in Cleveland Heights; on the West Branch, through Lakeview Cemetery, between Mayfield Road and Euclid Avenue; on a tributary to the East Branch downstream of the small lake located northwest of the intersection of Lee and Forest Hills Boulevards in Forest Hills Park in East Cleveland; on the East Branch through Cumberland Park, between Euclid Heights Boulevard and Hampshire Road, in Cleveland Heights.

The Ohio EPA has no current or proposed use designation for Dugway Brook. The NEORSD has selected four locations on Dugway Brook which are routinely sampled for chemical, bacteriological, and benthic analysis (Figure 23). Chemical and bacteriological data from Dugway Brook are presented in Appendix B.

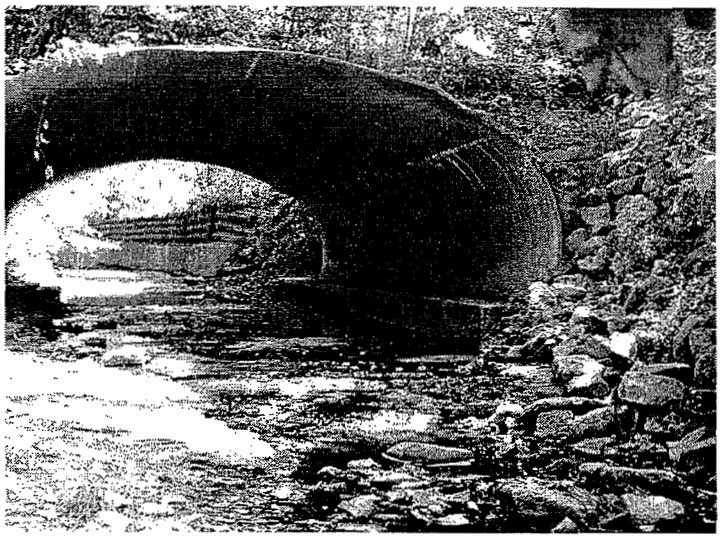
Site #12 (41° 32.984' N, 81° 36.529' W) is located near the mouth of Dugway Brook, just north of Lake Shore Boulevard. In 1997, Site #12 obtained a QHEI score of 54 (Appendix D).


LAKE ERIE
BRATENAHL
LAKESHORE BLVD.
I-90 - RT.2
E. 152ND ST.
ST. CLAIR AVE.
CLEVELAND
EUCLID
HIGHLAND RD.
ROCKID AVE.
ST. CLAIR AVE.
SHAW AVE.
E. 105TH ST.
NOBLE RD.
MONTICELLO BLVD.
EAST CLEVELAND
SUPERIOR AVE.
CLEVELAND
MAYFIELD AVE.
SOUTH EUCLID
LEE RD.
WARRENSVILLE CENTER RD.
SOUTH GREEN RD.
CLEVELAND HEIGHTS
CEDAR AVE.
UNIVERSITY HEIGHTS
FAIRMOUNT BLVD.
SHAKER BLVD.
SHAKER HEIGHTS
SOUTH WOODLAND BLVD.
12
13
14
15
Figure 23
DUGWAY BROOK
(Not to Scale)
COMMUNITY BOUNDARY

Site #13 (41° 31.689' N, 81° 36.480' W) is located on Dugway Brook's West Branch at Primrose Avenue. The stream is culverted at this point and must be entered through the storm sewer outlet from the overflow regulator at Primrose Avenue and East 111th Street. Since Site #13 is culverted, no QHEI has been determined.

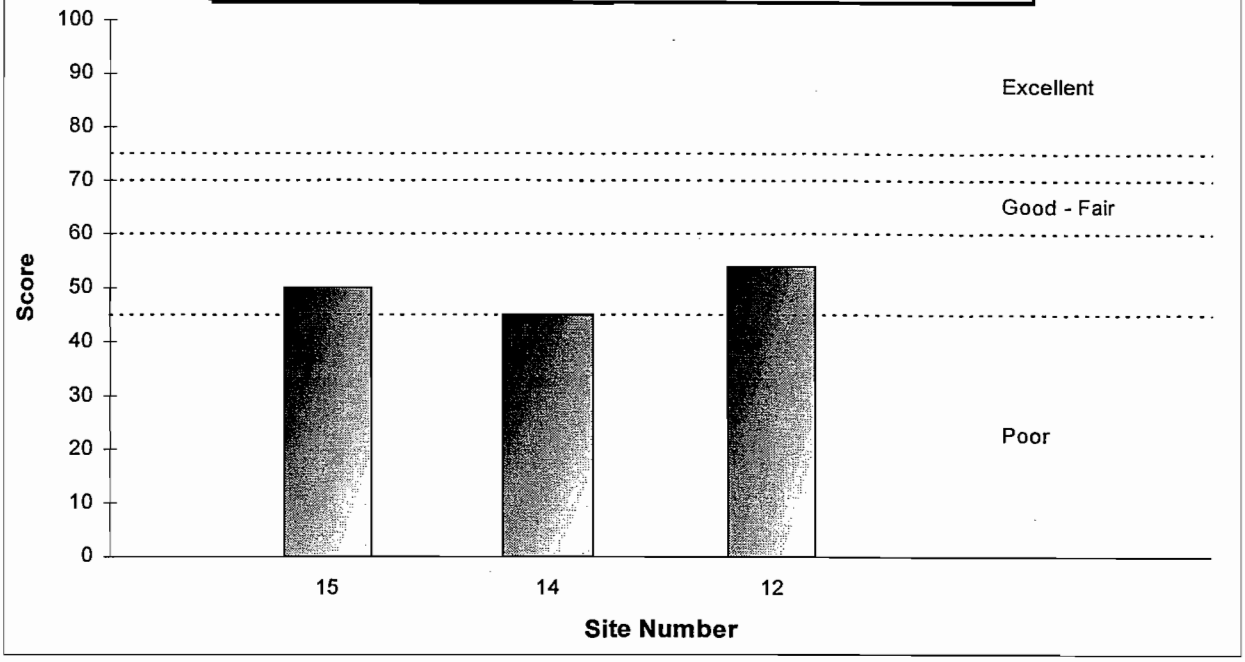


Site #14 (41° 30.732' N, 81° 35.430' W) is located on Dugway Brook's West Branch downstream of the NEORSD flood control dam at Lakeview Cemetery. In 1997, Site #14 obtained a QHEI score of 45 (Appendix D).



Site #15 (41° 30.735' N, 81° 34.250' W) is located on the East Branch of Dugway Brook at Cumberland Park in Cleveland Heights, south of Mayfield Road. In 1997, Site #15 obtained a QHEI score of 50 (Appendix D).

Figure 24
Dugway Brook Qualitative Habitat Evaluation Index Scores
1997



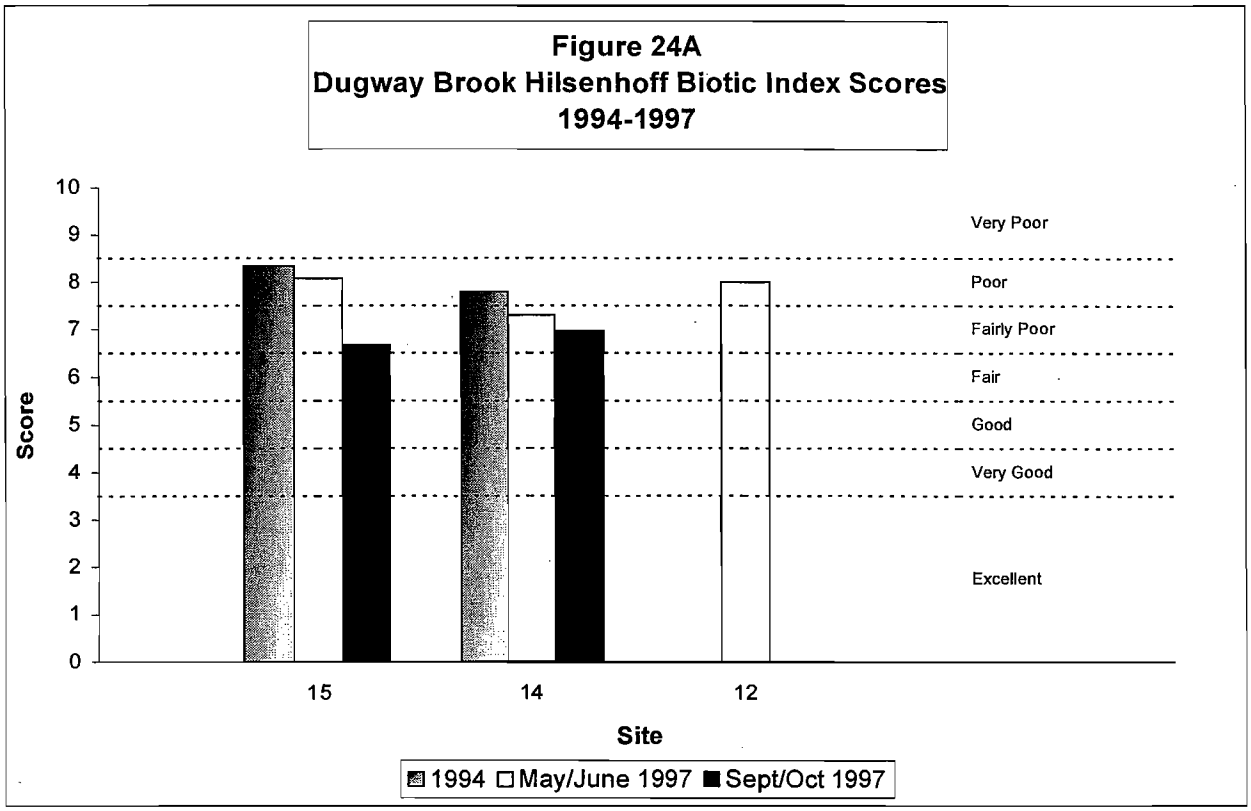
Benthic Macroinvertebrate Sampling on Dugway Brook

HBI Scores for Dugway Brook are presented in Figure 24A. Five macroinvertebrate samples were collected from Dugway Brook in 1997. One sample was collected at Site #12, two were collected at Site #14, and two were collected at Site #15. HBI scores indicate that the water quality of Dugway Brook was poor, with significant to very significant organic pollution impacting the aquatic community.

Site #15 - This site showed a noticeable improvement in HBI scores from 1994 to October 1997. The improvement in the HBI score is attributable to the presence of mayflies in the October 1997 sample, which comprised 8.4% of the sample. Previous samples contained no mayflies. Differences in scores between the June 1997 and October 1997 samples were likely due to seasonal variations in the macroinvertebrate community.

Site #14 - This site also showed a slight improvement in HBI scores from 7.80 in 1994 to 6.97 in October 1997. The macroinvertebrate community structure, however, remains impacted by organic pollution. The community structure at this location was similar to that which was observed at Site #15. Dipterans and non-insects (90%) dominated the site, with only 7.1% of the sample composed of Ephemeropteran, Plecopteran, and Tricopteran (EPT) taxa. Like Site #15, differences in scores between the samples collected in 1997 were likely due to seasonal variations.

Site #12 - The macroinvertebrate community at this location was the most depressed of all the sites. The community at this location consisted of only 7 taxa. Eighty-six percent of the sample was comprised of aquatic worms. The low diversity, low number of total organisms collected (48), and composition of the community indicate that this site has been impacted by significant organic pollution over a prolonged period of time. In 1998, the Northeast Ohio Regional Sewer District identified sources of dry weather discharges to area streams as part of its Easterly CSO Phase II Facilities Plan. As a result of this study, nine outfalls discovered to be discharging to Dugway Brook upstream of this location were found to contain elevated levels of fecal coliform bacteria, which is an indicator of organic pollution. As these environmental disruptions are remediated, the macroinvertebrate community should improve.



Problems and Remediation

-1-

On November 8, 1996, WQIS investigators responded to a report of a milky white color in Dugway Brook at 2828 Edgehill Road. The source of the white color was found to be runoff from the NEORSD's Heights-Hilltop Interceptor construction site located at the corner of Cedar and Coventry Roads. Groundwater from the tunnel construction was being pumped out of the drop shaft and allowed to discharge onto the ground, where it eventually entered a catch basin tributary to Dugway Brook. The high concentration of solids in the water from the shaft had caused the white color in the creek. On November 19, 1996, investigators assisted construction site personnel in locating a

sanitary sewer to which they could discharge the water that was being pumped out of the shaft. As a result, the white discharge to the creek was eliminated.

-2-

In March of 1997, WQIS personnel began an investigation of several dry weather discharges to Dugway Brook's West Branch at Cedar Road and Washington Boulevard. Bacteriological sampling conducted during this investigation did not reveal any sources of sanitary sewage entering Dugway Brook. However, conditions existed in the sewer that could result in dry weather discharges to the environment (e.g., missing inspection plates and large amounts of debris restricting flow in the sewers). In addition, several potable water leaks were also discovered in this area during the investigation. The responsible communities were notified. Because of past findings of intermittent discharges, WQIS will continue to monitor the area for inappropriate discharges to the environment.

-3-

On August 6, 1997, WQIS investigators conducted an inspection of an 18-inch storm sewer on Mayfield Road at Coventry Road. Investigators noted the presence of a weir placed in the storm sewer that contains and diverts dry weather flow in the storm sewer to the sanitary sewer via a 6-inch relief pipe. According to Cleveland Heights personnel, the city installed the weir and relief pipe as a corrective measure to the numerous sources of sewage found entering the storm sewer. However, when the relief pipe becomes blocked, flow passes over the weir and enters Dugway Brook beneath Mayfield Road. Cleveland Heights Service Department personnel were advised to regularly check this location to prevent the unnecessary overflow of sewage to the environment.

-4-

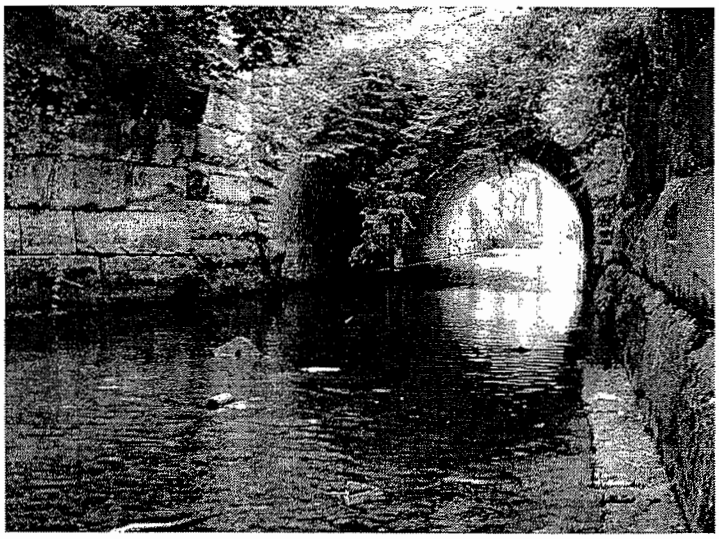
On July 31, 1998, WQIS investigators responded to a complaint of sanitary sewage entering Dugway Brook near Superior and Hillcrest Roads in Cleveland Heights. No signs of sanitary sewage were observed, but bacteriological sampling indicated fecal coliform concentrations of 14,000 colonies per 100 mL in the discharge to the creek. The source of the fecal coliform was determined to be a sanitary sewer overflow on Hillcrest Road at Superior Road that, according to Cleveland Heights Service Department personnel, frequently overflows due to recurring blockages in the sanitary sewer. Investigators will continue to monitor this area.

DOAN BROOK

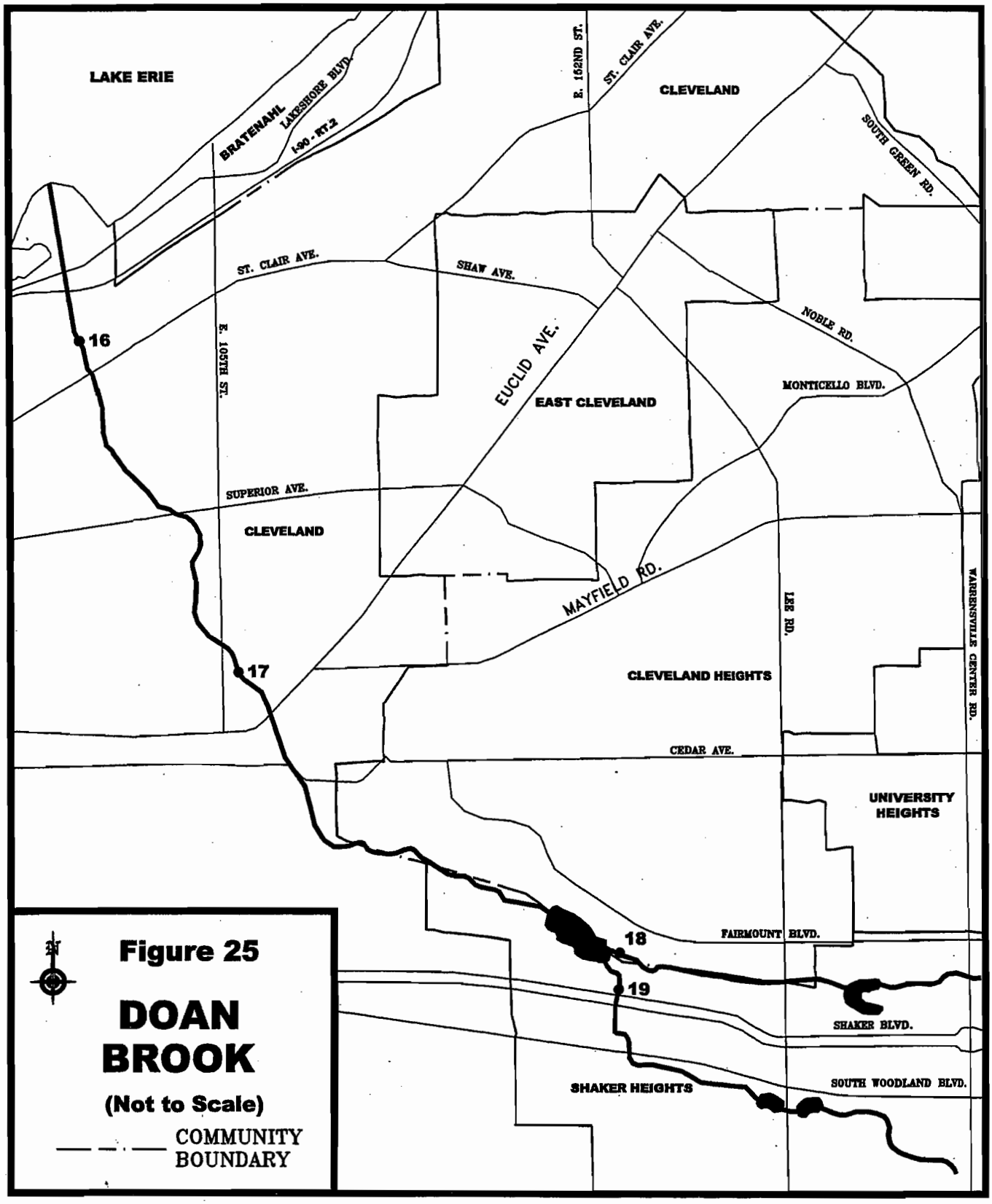
Doan Brook's drainage area includes the communities of Cleveland, Cleveland Heights, and Shaker Heights. Doan Brook has a total length of 8.1 miles and a drainage area of 11.7 square miles. Approximately 1.3 miles of the brook is culverted. The brook flows through Shaker Lakes Park, Ambler Park, University Circle, and Rockefeller Park into Lake Erie near Gordon Park.

The Ohio EPA has designated Doan Brook Aquatic Life Warmwater Habitat, Agricultural Water Supply, Industrial Water Supply and Primary Contact Recreational Use. Sections of Doan Brook within the boundaries of the Shaker Lakes Regional Nature Center have also been designated State Resource Water. The NEORSD has selected four locations on Doan Brook which are routinely sampled for chemical, bacteriological, and benthic analysis (Figure 25). Chemical and bacteriological data from Doan Brook are presented in Appendix B.

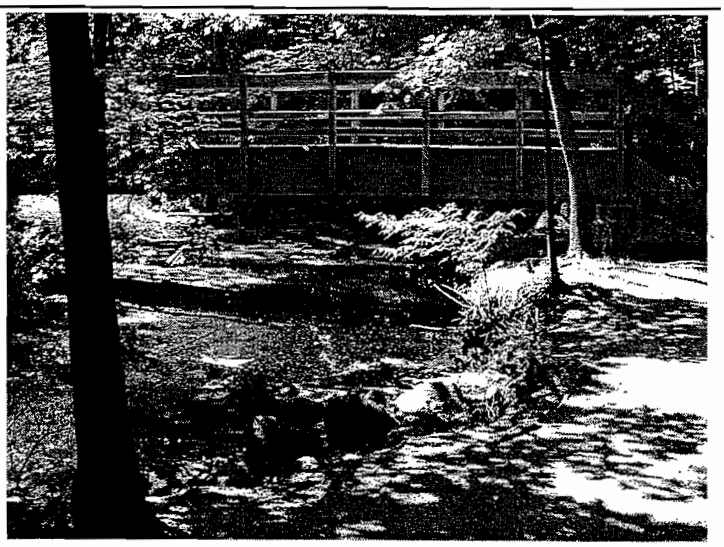
Site #16 (41° 32.261' N, 81° 37.807' W) is located on Doan Brook, north of St. Clair Avenue, east of Martin Luther King, Jr. Drive. In 1998, Site #16 obtained a QHEI score of 53.75 (Appendix D).



Site #17 (41° 30.494' N, 81° 36.791' W) is located on Doan Brook, north of the Cleveland Museum of Art, 11150 East Boulevard. In 1998, Site #17 obtained a QHEI score of 70.25 (Appendix D).


LAKE ERIE
BRATENAHL
LAKESHORE BLVD.
I-90 - RT.2
E. 152ND ST.
ST. CLAIR AVE.
CLEVELAND
SOUTH GREEN RD.
ST. CLAIR AVE.
SHAW AVE.
NOBLE RD.
16
E. 105TH ST.
EUCLID AVE.
EAST CLEVELAND
MONTICELLO BLVD.
SUPERIOR AVE.
CLEVELAND
MAYFIELD RD.
LEE RD.
WARRENSVILLE CENTER RD.
17
CLEVELAND HEIGHTS
CEDAR AVE.
UNIVERSITY HEIGHTS
FAIRMOUNT BLVD.
18
19
SHAKER BLVD.
SHAKER HEIGHTS
SOUTH WOODLAND BLVD.
Figure 25
DOAN BROOK
(Not to Scale)
COMMUNITY BOUNDARY

Site #18 (41° 29.055' N, 81° 34.443' W) is located on the North Branch of Doan Brook, northeast of the Shaker Lakes Regional Nature Center Office, 2600 South Park Boulevard. In 1997, Site #18 obtained a QHEI score of 68.25 (Appendix D).



Site #19 (41° 29.177' N, 81° 34.485' W) is located on the South Branch of Doan Brook, southeast of the Shaker Lakes Regional Nature Center Office. In 1997, Site #19 obtained a QHEI score of 75 (Appendix D).

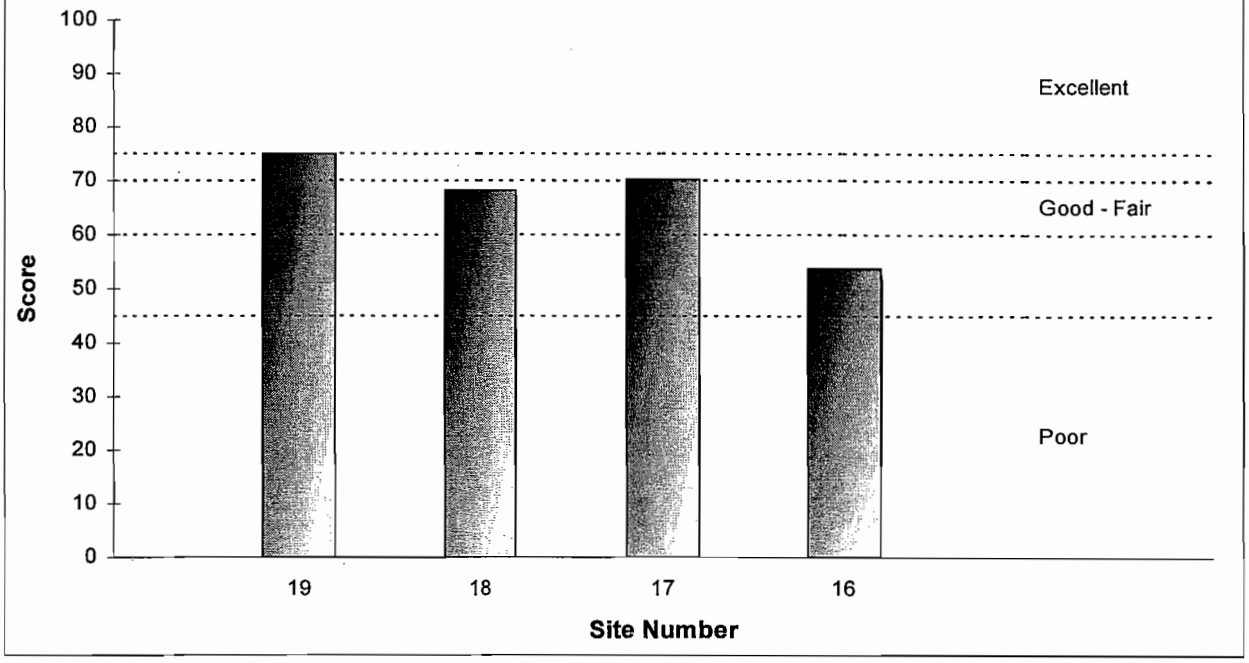
Benthic Macroinvertebrate Sampling on Doan Brook

During 1997 and 1998, NEORSD investigators collected semi-quantitative macroinvertebrate samples from several sites on Doan Brook. Samples were collected during both years at Sites 17, 17.1, 19, and 19.5. The locations of Sites 17 and 19 are described on the first page of the Doan Brook section of this report. Site #17.1 is located in Ambler Park just north of the intersection of Martin Luther King Jr. Drive and Fairhill Road. Site #19.5 is located on the south branch between Attleboro and Torrington Roads.

At all sites where samples were collected in May 1997, Hilsenhoff Biotic Index (HBI) scores were in the *Fairly Poor* range, indicating the presence of significant organic pollution. All samples collected at these sites after May 1997 produced HBI scores in the *Fair* range, with the exception of samples collected in August 1997 at Site #17.1 and August 1998 at Site #19.5, where scores were in the *Good* range. A similar trend was observed at sites on several other area streams where samples were collected in

May 1997 and then again, later in the season. These results may be attributable to seasonal variability. Various taxa including aquatic worms, blackfly larvae, several midge species from the genera *Cricotopus* and *Diamesa*, were more abundant in the May 1997 samples than in samples collected later in the year. This may be attributable to the life cycles of these organisms.

Figure 26
Doan Brook Qualitative Habitat Evaluation Index Scores
1997-1998

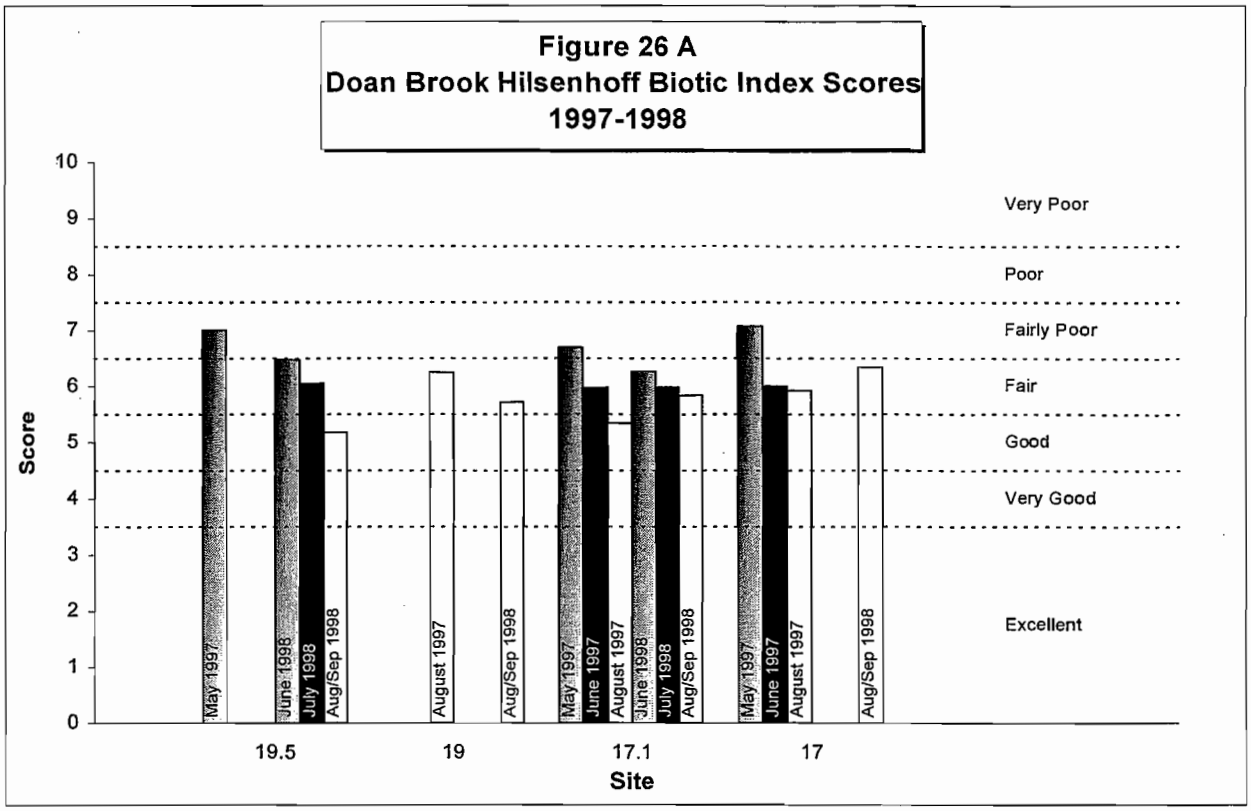


With the exception of those collected in May 1997, macroinvertebrate samples indicate that Doan Brook water quality remained relatively unchanged upstream of Site #17 from 1994 to 1998. A noticeable improvement in water quality was observed at Site #17, however, where HBI scores improved from *Fairly Poor* in 1994 to *Fair* in 1997 and 1998. This improvement is attributable to the NEORSD's discovery and elimination of a dry weather discharge of sanitary sewage to Doan Brook between Sites 17 and 17.1. (See Problems and Remediation Section, Item #1.) HBI scores from 1997 and 1998 for these four sites are displayed graphically in Figure 26-A.

During 1998, NEORSD investigators collected macroinvertebrate samples at eight locations throughout Doan Brook in conjunction with the District's Doan Brook Watershed Study. Quantitative macroinvertebrate samples collected using Hester-Dendy artificial substrate samplers were used to calculate Invertebrate Community Index (ICI) scores at each site. Macroinvertebrates were identified and ICI scores were calculated by the Davey Resource Group, a NEORSD subconsultant for the Doan Brook study. Site descriptions and results of samples collected using the Hester-Dendy samplers can be found in *Doan Brook Watershed Study Existing Conditions Inventory*

and Assessment Volume III Macroinvertebrate Sampling and Analysis, prepared by Davey Resource Group.

Figure 26 A
Doan Brook Hilsenhoff Biotic Index Scores
1997-1998



In addition to the quantitative macroinvertebrate samples referred to above, NEORSD investigators collected semi-quantitative kick net samples at each of the eight Doan Brook sites sampled in 1998. Four of those sites (17, 17.1, 19, and 19.5) correspond with sites at which investigators had previously collected samples, and the results are discussed above. HBI scores at seven of the eight Doan Brook Watershed Study sites were in the *Fair* range in 1998.

An additional site, #18.5, which was not part of the Doan Brook Watershed Study, was located on the north branch adjacent to North Park Boulevard and Hathaway Brown School, 100 feet downstream of Sherbrooke Road. HBI scores at this site were in the *Fairly Poor* range.

Various macroinvertebrate community tolerance metrics indicate that the primary source of impairment in Doan Brook is organic pollution.

Problems and Remediation

-1-

Historically, the NEORSD has documented high concentrations of fecal coliform in Doan Brook at its routine monitoring Site #17, located just north of Wade Lagoon at the

Cleveland Museum of Art. In response, WQIS personnel conducted a culvert walk of the section of creek passing beneath University Circle on August 30, 1996. A discharge of approximately 240,000 gallons per day and a fecal coliform concentration of 410,000 organisms per 100 mL were discovered entering the creek via a 54-inch storm sewer at the bottom of Cedar Road hill. The source of this sewage entering the creek was found to be a blocked, and previously unknown, leaping weir combined sewer overflow (CSO). Once this overflow was identified, NEORSD Sewer Maintenance and Control crews cleared the blockage and added this location to their regular schedule of CSO monitoring and maintenance.

-2-

During June and July of 1997, WQIS personnel investigated sources of several dry weather flows discovered in storm sewers on Euclid Heights Boulevard, Hampshire Road, Edgehill Road and East Overlook Road in Cleveland Heights. Dye testing revealed that at least one residence on each of the aforementioned streets was found to have its sanitary facilities connected to the storm sewer. Cleveland Heights was notified of the improper connections and the NEORSD will continue to monitor the area to ensure that the proper corrective actions are taken.

-3-

On April 21, 1997, WQIS investigators responded to a fish kill on the South Branch of Doan Brook near the Shaker Lakes Nature Center (2600 South Park Boulevard). Approximately 30-50 Rock bass were observed along a 1,000-foot section of creek. Instream field measurements and grab sample analyses did not reveal any results that would indicate what had caused the fish kill.

-4-

On October 21, 1997, NEORSD personnel responded to a complaint of sewage entering Doan Brook at the Shaker Lakes Nature Center. The source of the sewage was traced to a blockage in a sanitary sewer resulting in the overflow of sewage via a sanitary sewer overflow located on Wellington Road at Fairmount Boulevard. The City of Cleveland Heights Sewer Department was apprised of the situation. The correction of the blockage was verified by WQIS personnel on October 23, 1997.

-5-

On July 30, 1998, WQIS investigators responded to a complaint of a green color in Doan Brook at 15900 South Woodland Road. An inspection of the creek found that low flows in conjunction with instream flow restrictions had created a stagnant pool. Bacteriological samples did not indicate any sanitary sewage contamination. Investigators concluded that the green color was likely the result of algal blooms in the creek similar to those observed in a lake immediately upstream of this location.

On September 8, 1998, WQIS investigators responded to a complaint of sanitary sewage entering Doan Brook near the intersection of Eaton Road and North Park Boulevard in Shaker Heights. A sanitary sewer overflow was discovered on Eaton Road, approximately 50 feet south of North Park Boulevard. Flow in the sanitary sewer was within two inches of the overflow outlet. This suggests that overflows of sewage at this location are likely during periods of increased flow, i.e., morning and evening flows.

ROCKY RIVER

The Rocky River has two branches, East and West, the confluence of which is at Cedar Point Road in North Olmsted. The main stem of the Rocky River flows north from the confluence approximately ten miles through the communities of North Olmsted, Brook Park, Fairview Park, Cleveland, Rocky River, and Lakewood, where the river enters Lake Erie.

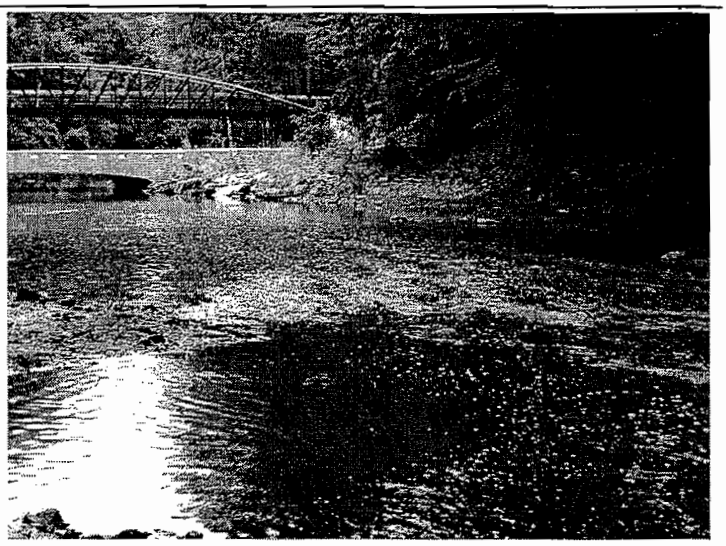
The East Branch of the Rocky River enters Cuyahoga County from Medina County and flows northwest through the communities of North Royalton, Strongsville, Middleburg Heights, Berea, and Olmsted Township to its confluence with the West Branch in North Olmsted. The West Branch of the Rocky River enters Cuyahoga County from Lorain County and flows north through the communities of Olmsted Falls and North Olmsted to the confluence.

Wastewater Treatment Plants which discharge effluents to the Rocky River include: Strongsville "B" and "C" WWTP's; North Royalton "B" WWTP; Columbia Township Subdivision WWTP; Columbia Mobile Home Park WWTP; Olmsted Trailer Park WWTP; Vinewood subdivision WWTP; and others.

Major tributaries to the Rocky River include: Plum Creek, which joins the West Branch in Olmsted Falls; Blodgett Creek, which also joins the West Branch in Olmsted Falls; Baldwin Creek, which joins the East Branch in Berea, and includes the North Royalton "B" WWTP effluent; and Abram Creek, which joins the main stem in Cleveland.

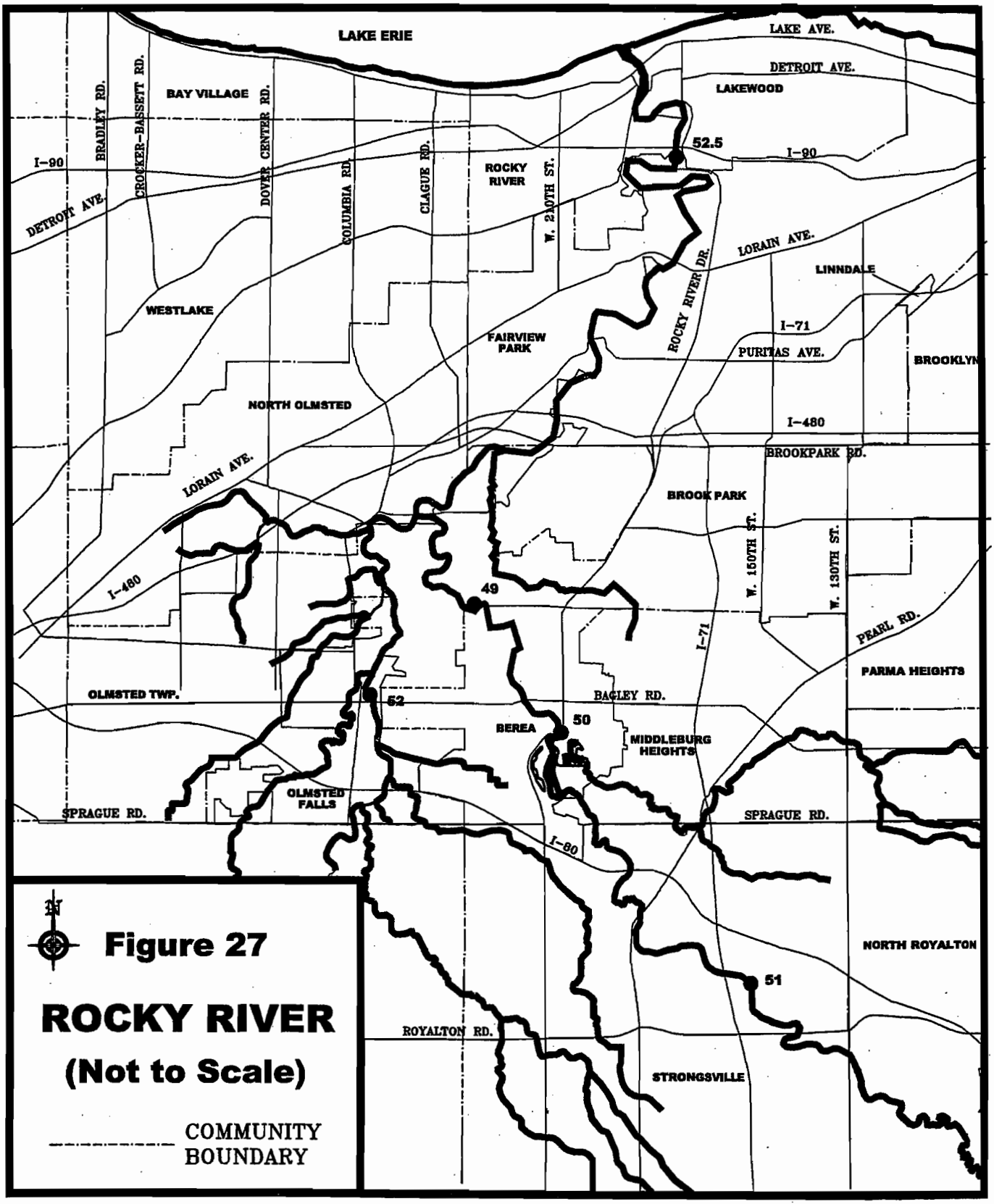
The Ohio EPA has designated the Rocky River State Resource Water, Aquatic Life Warmwater Habitat, Agricultural Water Supply, Industrial Water Supply, Primary Contact Recreational Use and Seasonal Salmonid Habitat. The NEORSD has selected five locations on the Rocky River which are routinely sampled for chemical, bacteriological, and benthic analysis (Figure 27). Chemical and bacteriological data from Rocky River are presented in Appendix B.

Site #49 (40° 23.212' N, 81° 51.966' W) is located in Berea on the East Branch of the Rocky River, approximately 300 yards upstream of Valley Parkway, north of Falls Lane. In 1997, Site #49 obtained a QHEI score of 69.5 (Appendix D).

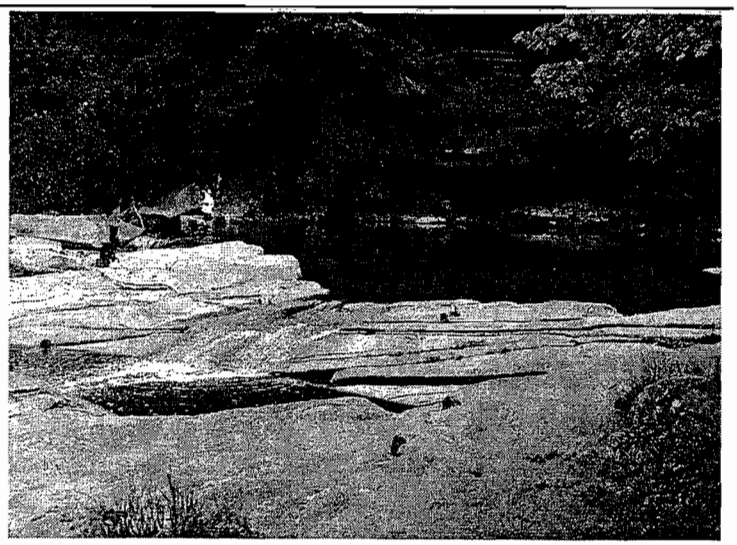


Site #50 (41° 18.460' N, 81° 54.856' W) is located on the East Branch of the Rocky River at West Bridge Street in Berea. This site is upstream of the former Berea WWTP effluent discharge and about 100 yards downstream of the City of Berea Water Purification Plant. Site #50 obtained a QHEI score of 62 in 1997 (Appendix D).

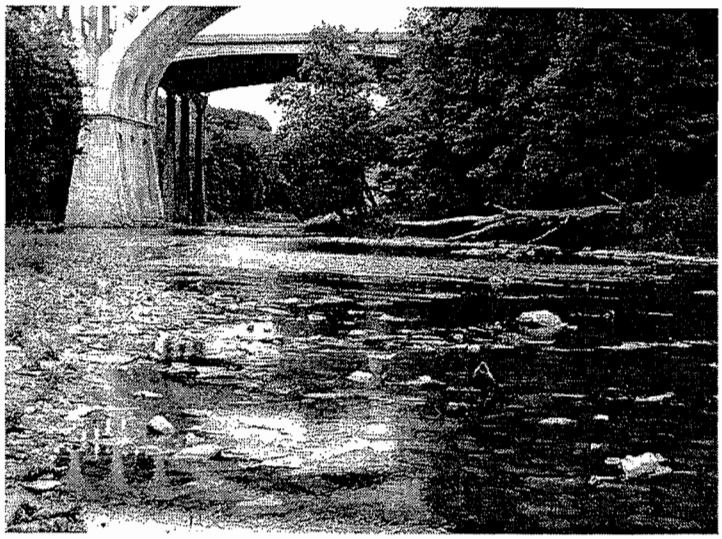
Site #51 (41° 19.106' N, 81° 48.533' W) is located on the East Branch of the Rocky River in Strongsville, approximately 75 feet upstream of East Access Road in the Metroparks Mill Stream Run Reservation. In 1997, Site #51 obtained a QHEI score of 61.5 (Appendix D).


LAKE ERIE
LAKE AVE.
DETROIT AVE.
LAKEWOOD
BAY VILLAGE
BRADLEY RD.
CROCKER-BASSETT RD.
DOVER CENTER RD.
COLUMBIA RD.
CLAGUE RD.
ROCKY RIVER
W. 210TH ST.
52.5
I-90
I-90
DETROIT AVE.
LORAIN AVE.
ROCKY RIVER DR.
LINNDALE
WESTLAKE
FAIRVIEW PARK
I-71
PURITAS AVE.
BROOKLYN
NORTH OLMSTED
I-480
BROOKPARK RD.
LORAIN AVE.
BROOK PARK
W. 150TH ST.
W. 130TH ST.
I-480
49
I-71
PEARL RD.
PARMA HEIGHTS
OLMSTED TWP.
52
BAGLEY RD.
BEREA
50
MIDDLEBURG HEIGHTS
OLMSTED FALLS
SPRAGUE RD.
SPRAGUE RD.
I-80
NORTH ROYALTON
51
ROYALTON RD.
STRONGSVILLE
Figure 27
ROCKY RIVER
(Not to Scale)
COMMUNITY BOUNDARY

Site #52 (41° 22.679' N, 81° 53.958' W) is located on the West Branch of the Rocky River in Olmsted Falls north of Bagley Road. This site is immediately upstream of the confluence with Plum Creek. Site #52 obtained a QHEI score of 67 in 1998 (Appendix D).



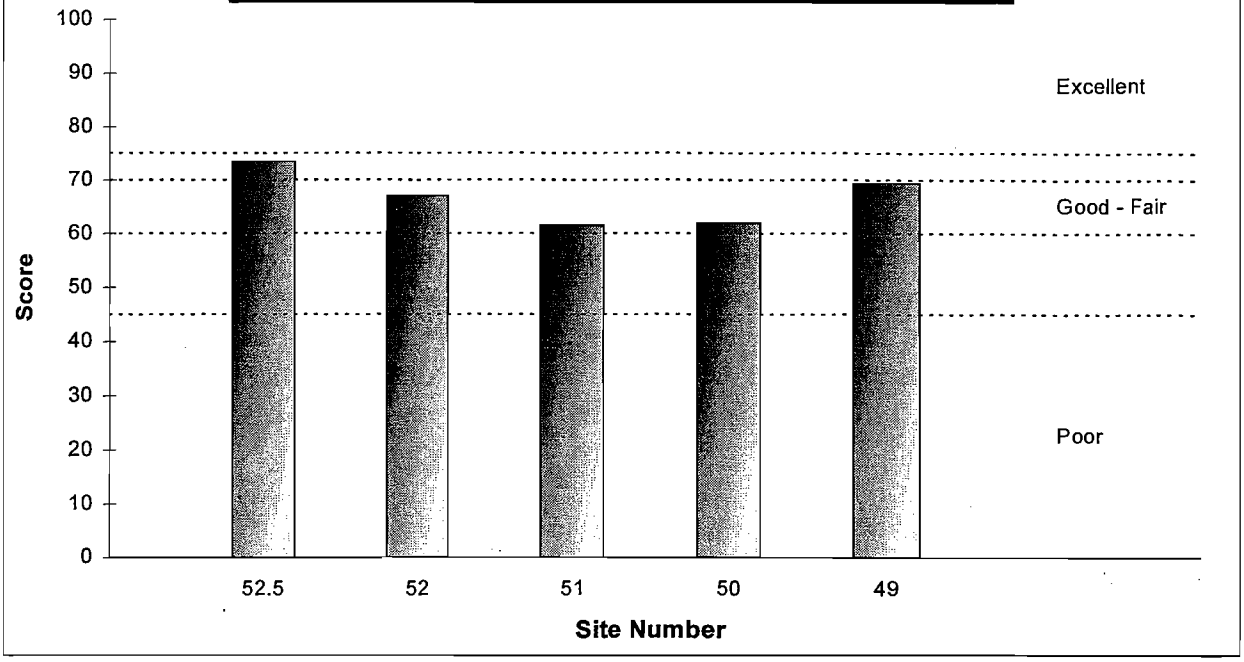
Site #52.5 (41° 28.237' N, 81° 49.391' W) is located on the main stem of the Rocky River in the Cleveland Metroparks Rocky River Reservation, approximately 30 yards upstream of the Hilliard Road Bridge. This site is approximately 200 yards downstream of the storm sewer outfall at Riverside Drive and Hog's Back Lane, which is the northernmost point of the NEORSD service area on the Rocky River. Site #52.5 was selected to reflect the environmental impact on the Rocky River from seven upstream storm sewer outfalls, to which numerous combined sewer overflows are known to be tributary. In 1997, Site #52.5 obtained a QHEI score of 73.5 (Appendix D).



Benthic Macroinvertebrate Sampling on the Rocky River

Macroinvertebrate sampling conducted on the Rocky River during 1996 is discussed in Appendix G at the end of this report.

Figure 28
Rocky River Qualitative Habitat Evaluation Index Scores
1997-1998



Problems and Remediation

-1-

While conducting routine sampling of Rocky River at Site #50 on July 22, 1996, NEORSD investigators discovered sanitary sewage entering the river through a storm sewer outfall under West Bridge Street. Investigators traced the sewage to a blocked sanitary sewer on Riverside Drive at East Bridge Street. The blockage caused the sanitary sewer to become surcharged, resulting in the overflow of sewage into the river

through a sanitary sewer overflow at this location. The City of Berea Service Department was notified of this problem and the blockage was cleared. A follow-up inspection by investigators on August 9, 1996 verified the elimination of this source of pollution in Rocky River.

However, on August 20, 1996, NEORSD investigators found the sanitary influent recurring and again traced its source to Riverside Drive at East Bridge Street. Notification of the City of Berea Service Department on August 22, 1996, again resulted in correction of the problem by removal of the Riverside Drive sanitary sewer blockage.

On March 2, 1998, a third occurrence of a blockage in the Riverside Drive sanitary sewer was discovered by NEORSD investigators, again resulting in sewage entering

Rocky River under West Bridge Street. The City of Berea Service Department was notified of this problem, and a subsequent inspection by NEORSD investigators on March 16, 1998 indicated no further pollution from this source. The recurring nature of the problem, however, warrants continued monitoring of this location.

-2-

A recurring dry weather discharge to Rocky River, which was discussed in NEORSD's Greater Cleveland Area Environmental Water Quality Assessment 1991-1992 and 1993-1995 Reports, was eliminated in 1997. Since 1991, NEORSD investigators have discovered numerous recurrences of blockages in the sanitary sewer between 17730 and 18200 Lorain Avenue. As a result of these blockages, sanitary sewage infiltrated into the storm sewer which discharges to the Rocky River through a storm sewer outfall north of the Lorain Avenue bridge. Despite repeated remedial efforts by the City of Cleveland Division of Water Pollution Control, blockages continued to occur in the sanitary sewer.

On February 13, 1997, while performing a follow-up inspection of this outfall, NEORSD investigators learned of a sewer improvement project on Lorain Avenue near Fairview General Hospital. According to a construction supervisor at the site, the project included replacing sections of the sanitary and storm sewers from 17303 to 18200 Lorain Avenue.

Subsequent inspections by NEORSD investigators on April 15 and August 20, 1997 revealed no further incidences of blockages in the Lorain Avenue sanitary sewer. In addition, however, investigators found that potable water continues to be discharged to the Rocky River from a water main leak on Lorain Avenue. NEORSD investigators first discovered this water main leak, between 17303 and 17400 Lorain Avenue, in 1991. Despite repeated notifications of the City of Cleveland Division of Water, the water main leak continued unabated.

-3-

On April 4, 1997, NEORSD investigators discovered evidence of sanitary sewage in a tributary to the Rocky River, north of West 181st Street and west of Rocky River Drive. Investigators traced the contaminated flow to a 36-inch storm sewer outfall located behind 4253 West 181st Street. Bacteriological analysis of this flow revealed a fecal coliform concentration of 1,900,000 colonies per 100 mL. The flow was measured at an approximate rate of 35,000 gallons per day. The source of the sewage was traced to a blocked sanitary sewer at 17700 Fairway Drive. The blockage caused sewage to leak into the storm sewer and ultimately discharge to the river. Following this discovery, the City of Cleveland Division of Water Pollution Control was notified of the problem. On April 23, 1997, NEORSD investigators verified that the sanitary sewer had been unblocked, eliminating this source of contamination in the Rocky River.

On August 19, 1997, however, NEORSD investigators discovered the recurrence of a dry weather sanitary influent to the Rocky River tributary through the storm sewer outfall behind 4253 West 181st Street. Bacteriological analysis of this flow showed a fecal coliform concentration of 6,000,000 colonies per 100 mL. The rate of this discharge was measured at approximately 12,000 gallons per day. The sewage was traced to Fairway Drive at West 180th Street. A blockage of the Fairway Drive sanitary sewage at this location had resulted in sewage leaking into the storm sewer. The City of Cleveland Division of Water Pollution Control was notified of this problem, and a subsequent inspection by NEORSD investigators on September 9, 1997 verified the elimination of this source of pollution in the Rocky River.

-4-

The source of the dry weather sanitary sewage contamination to a tributary of the Rocky River through a West 197th Street storm sewer was identified by NEORSD investigators in 1997. In June 1994, investigators discovered sanitary sewage in a tributary of the Rocky River at 19609 Parkmount Avenue. The source of the contamination was traced back to the West 197th Street storm sewer. The City of Cleveland Division of Water Pollution Control was notified of these findings.

On April 9, 1997, NEORSD investigators performed a follow-up inspection and found that the dry weather discharge continued. Bacteriological analysis of this flow revealed a fecal coliform concentration of 95,000 colonies per 100 mL. The flow was measured at an approximate rate of 1,400 gallons per day. NEORSD investigators identified the source of the sewage as an improper connection of a residential sanitary discharge to the storm sewer at 4671 West 197th Street. Following this discovery, the problem was reported to the City of Cleveland Division of Water Pollution Control on May 29, 1997. A subsequent inspection by investigators on November 3, 1998, revealed that no corrective action had been taken to remediate this problem.

-5-

On March 27, 1998, NEORSD investigators found sanitary sewage entering a tributary to the Rocky River through a 54-inch storm sewer outfall located just west of Larchwood Avenue and Riveredge Drive. Bacteriological analysis of this discharge showed a fecal coliform concentration of 1,600,000 colonies per 100 mL. Inspections by NEORSD investigators revealed that the dry weather flow contaminated by sanitary sewage was from several sources throughout the sewer system.

Investigators traced the sewage to the storm sewer at 17003 Valleyview Avenue, the Rocky River Drive storm sewer between Elsienna Avenue and Fairway Avenue, and to three locations on the storm sewer system on Pearldale Avenue. The exact sources of the contamination were not identified but may be improper connections of residential sanitary discharges to the storm sewers, leaks to the storm sewer through inspection plates, and/or infiltration from the sanitary sewer to the storm sewers through structural leaks.

Finally, investigators traced back flow contaminated with sanitary sewage to the Westdale Avenue storm sewer. Dye tests showed that the residences at 15906 and 15916 Westdale Avenue had sanitary discharges which were improperly connected to the storm sewer. The City of Cleveland Division of Water Pollution Control was notified of these findings on July 21, 1998.

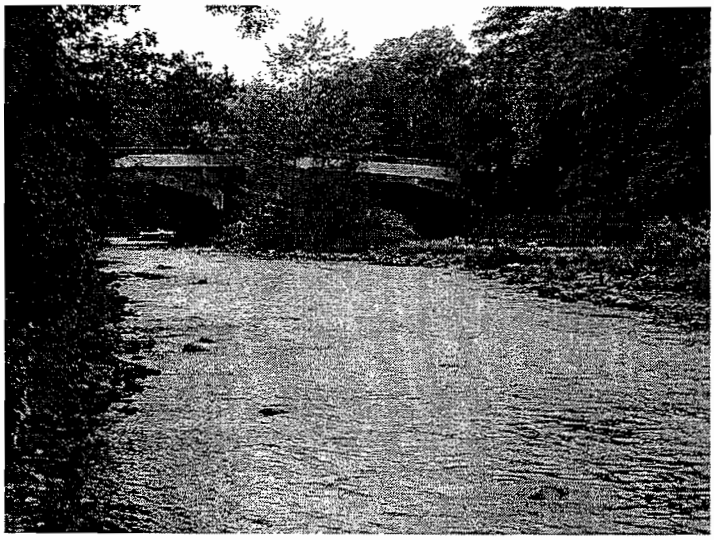
CHAGRIN RIVER

The Chagrin River has a total length of 48 miles, with a drainage area of 267 square miles. The land use is primarily rural with a low density of residential housing. Communities located in the Chagrin River drainage area include: Aurora, Chagrin Falls, Chesterland, Eastlake, Mayfield Heights, the Village of Mayfield, Newbury, Solon, Willoughby, Willoughby Hills, and several other eastern suburbs of Cleveland. Development pressures in the drainage area are potential causes of degradation of the habitat. However, the majority of the Chagrin River has good to exceptional water quality with a healthy biological community.

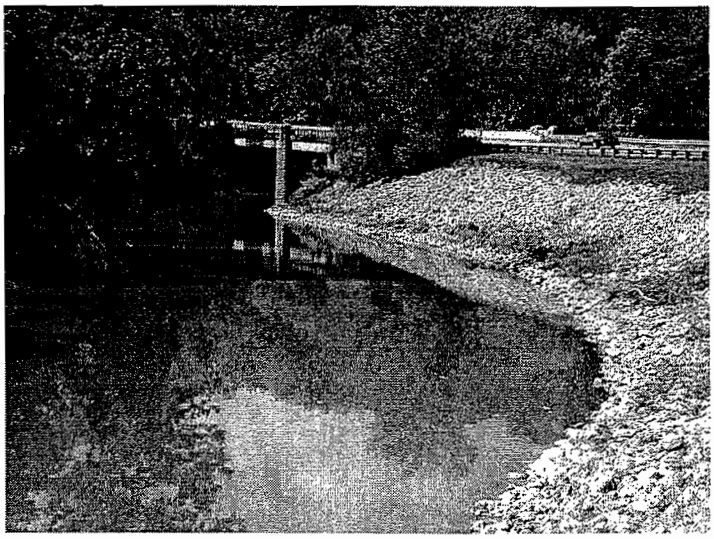
The entire Chagrin River basin is considered a State Resource Water. The main stem of the Chagrin River from the headwaters to River Mile 4.8 has been designated by the Ohio EPA Warmwater Habitat and Primary Contact Recreational Use. From River Mile 4.8 to the mouth, the river has been designated Warmwater and Seasonal Salmonid Habitat, and Primary Contact Recreational Use. The Ohio EPA has designated the following tributaries of the Chagrin River as Exceptional Warmwater Habitat and Primary Contact Recreational Use: Griswald Creek, Willey Creek, McFarland Creek, and Beaver Creek. Coldwater Habitat and Primary Contact Recreational Use designations apply to Silver Creek and the East Branch along with its tributaries.

The Chagrin River has been assigned two sites for routine sampling by the NEORSD. These sites had been chosen to evaluate the potential impact on Chagrin River water quality from the NEORSD-owned and operated Beech Hill Pump Station at 6830 Wilson Mills Road and the Bonnieview Comminutor Station at Beech Hill and Bonnieview Roads. The Bonnieview Station was decommissioned on May 26, 1995 and the Beech Hill Station was decommissioned on June 1, 1995. One site is located upstream of the former sewage pumping stations' bypass effluents (Site #59) and the other is located downstream of the effluents (Site #58). Chemical and bacteriological data from Chagrin River are presented in Appendix B.

Site #58 (41° 32.987' N, 81° 24.855' W) is located on the main stem of the Chagrin River at River Mile 15.1, approximately 3,500 feet downstream of the confluence with Beech Hill/Bonnieview Creek and 1,500 feet east of the Chagrin River Road bridge. Beech Hill/ Bonnieview Creek formerly received flow from the Beech Hill and Bonnieview Pump Stations during bypass events. In 1997, Site #58 obtained a QHEI score of 77 (Appendix D).



Site #59 (41° 31.770' N, 81° 24.704' W) is located on the main stem of the Chagrin River at River Mile 17.4, which is approximately 1.6 miles upstream of the confluence with Beech Hill/Bonnieview Creek. Samples are obtained from the south side of the Mayfield Road bridge. In 1997, Site #59 obtained a QHEI score of 84.25 (Appendix D).



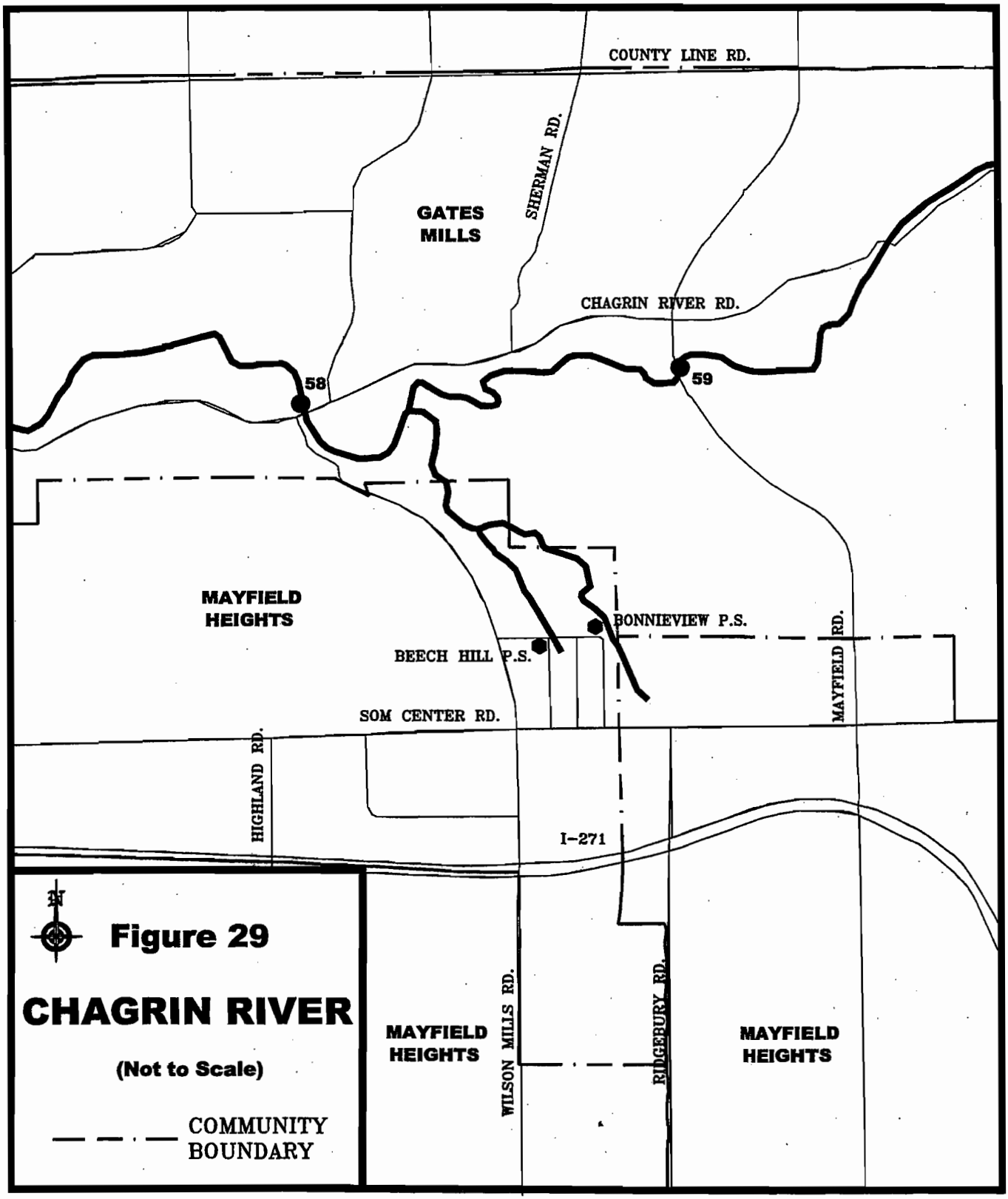
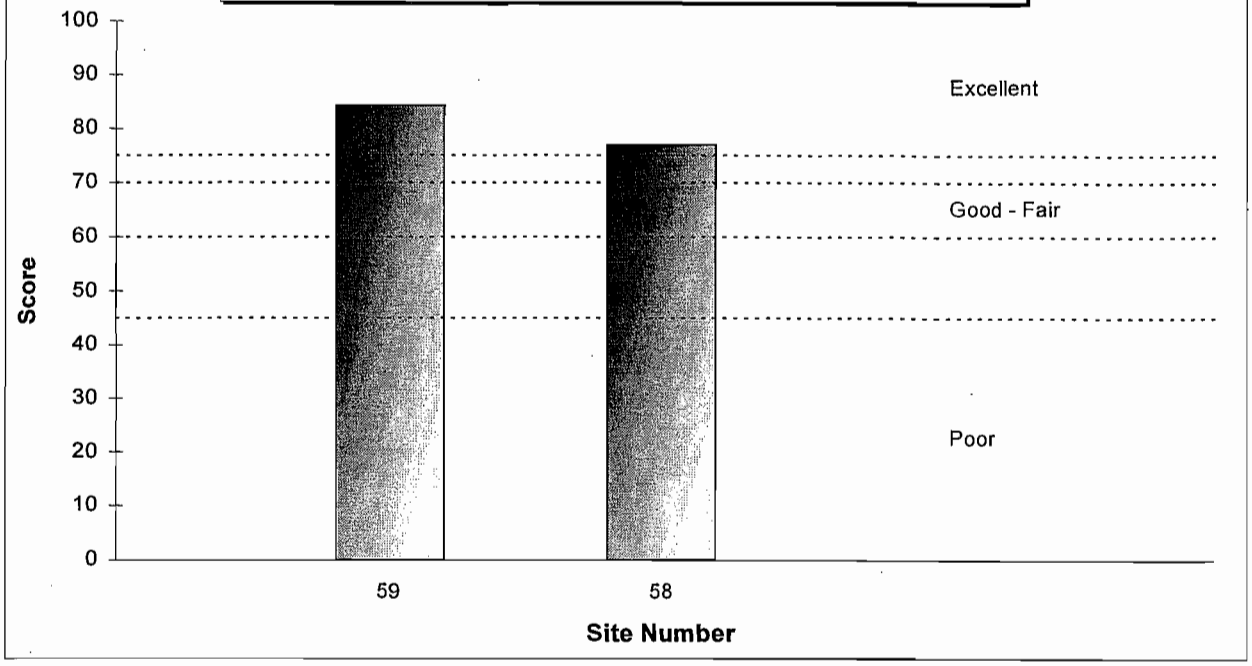

COUNTY LINE RD.
SHERMAN RD.
GATES MILLS
CHAGRIN RIVER RD.
58
59
MAYFIELD HEIGHTS
BONNIEVIEW P.S.
BEECH HILL P.S.
MAYFIELD RD.
SOM CENTER RD.
HIGHLAND RD.
I-271
WILSON MILLS RD.
RIDGEBURY RD.
MAYFIELD HEIGHTS
MAYFIELD HEIGHTS
Figure 29
CHAGRIN RIVER
(Not to Scale)
COMMUNITY BOUNDARY

Figure 30
Chagrin River Qualitative Habitat Evaluation Index Scores
1997



Benthic Macroinvertebrate Sampling on the Chagrin River

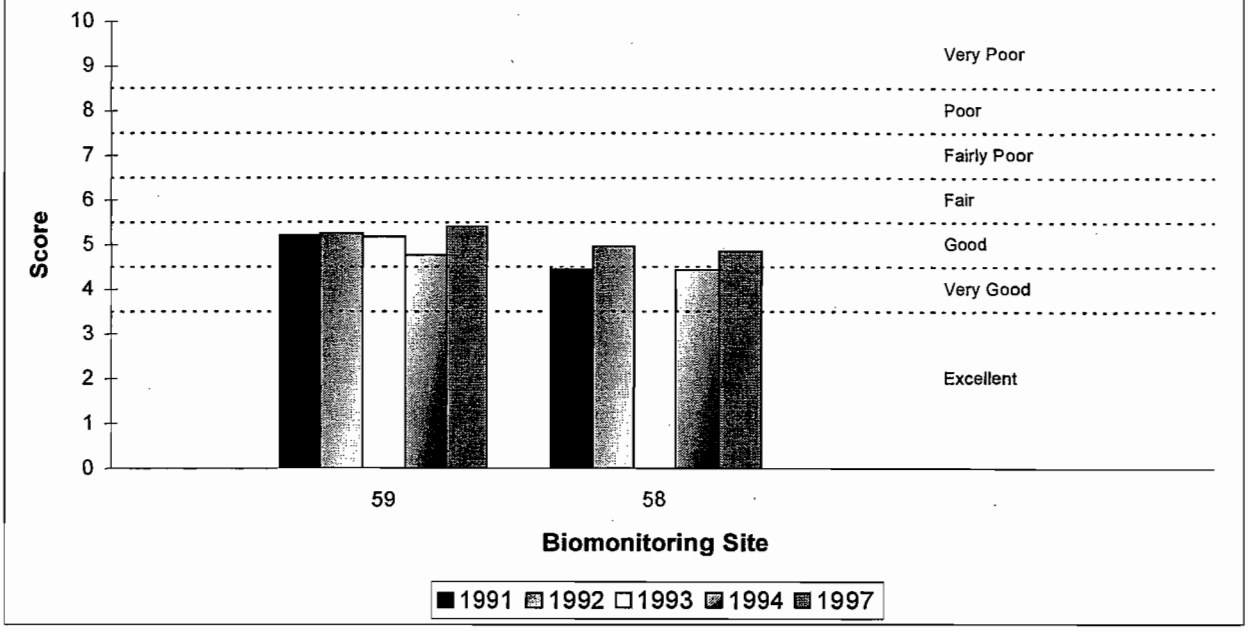
HBI Scores for the Chagrin River are presented in Figure 30 A. The Chagrin River has been a point of interest to the NEORSD. In May of 1995, NEORSD decommissioned a pump station and a comminutor station on a tributary to the Chagrin River. This tributary entered the Chagrin River between sample Sites 58 and 59. The HBI scores for both locations remained nearly constant from 1991 to 1997. Scores were slightly higher upstream at Site #59 than at Site #58. Overall, the invertebrate community appears to be healthy and the water quality is good.

Site #59 - HBI Scores at this site remained relatively constant from 1991 to 1997, achieving a "Good" narrative rating in each of the five years during which sampling was conducted. Despite these "Good" ratings, there has been a shift in the invertebrate community at this site. A large decrease in the percent Ephemeropteran, Plecopteran, and Tricopteran (EPT) composition has occurred in conjunction with an increase in pollution tolerant organisms. This indicates that some organic and/or toxic disruption is impacting this site. HBI scores were higher at this site than at Site #58. Differences in HBI scores are likely due to habitat differences between the sites. Site #58 had much more extensive riffle habitat for sampling than Site #59.

Site #58 - As with Site #59, HBI scores at Site #58 remained relatively consistent from 1991 to 1997. The fluctuations observed in the narrative ratings for this site were the result of a shift in the structure of the benthic macroinvertebrate community. As was

observed at the upstream location, there was a sharp decline in the percent EPT composition at this site in 1997 along with a corresponding increase in the percentage of pollution tolerant organisms.

Figure 30A
Chagrin River HBI Scores
1991-1998



Problems and Remediation

-1-

On April 30, 1998, WQIS investigators responded to spill at Mayfran International located at 6650 Beta Drive in Mayfield Village. An employee was observed emptying a 200-gallon tank of watertight test coolant into a catch basin the previous day. This catch basin discharged to a drainage ditch which was tributary to the Chagrin River. Chemtron conducted the remediation and removed approximately 6000 gallons of coolant-contaminated water from the ditch. The amount of the coolant which reached the river was unknown.

LAKE ERIE

In 1990, the NEORSD initiated sampling of Lake Erie water quality in the vicinity of Greater Cleveland. The NEORSD's service area is located entirely within the Lake Erie basin, and therefore all waters from NEORSD facilities are ultimately tributary to Lake Erie.

The lake is the site of the area's heaviest recreational water use, including bathing, boating, and fishing. Additionally, the City of Cleveland uses Lake Erie as its public water supply, pumping water for domestic, commercial, and industrial uses from intakes located offshore.

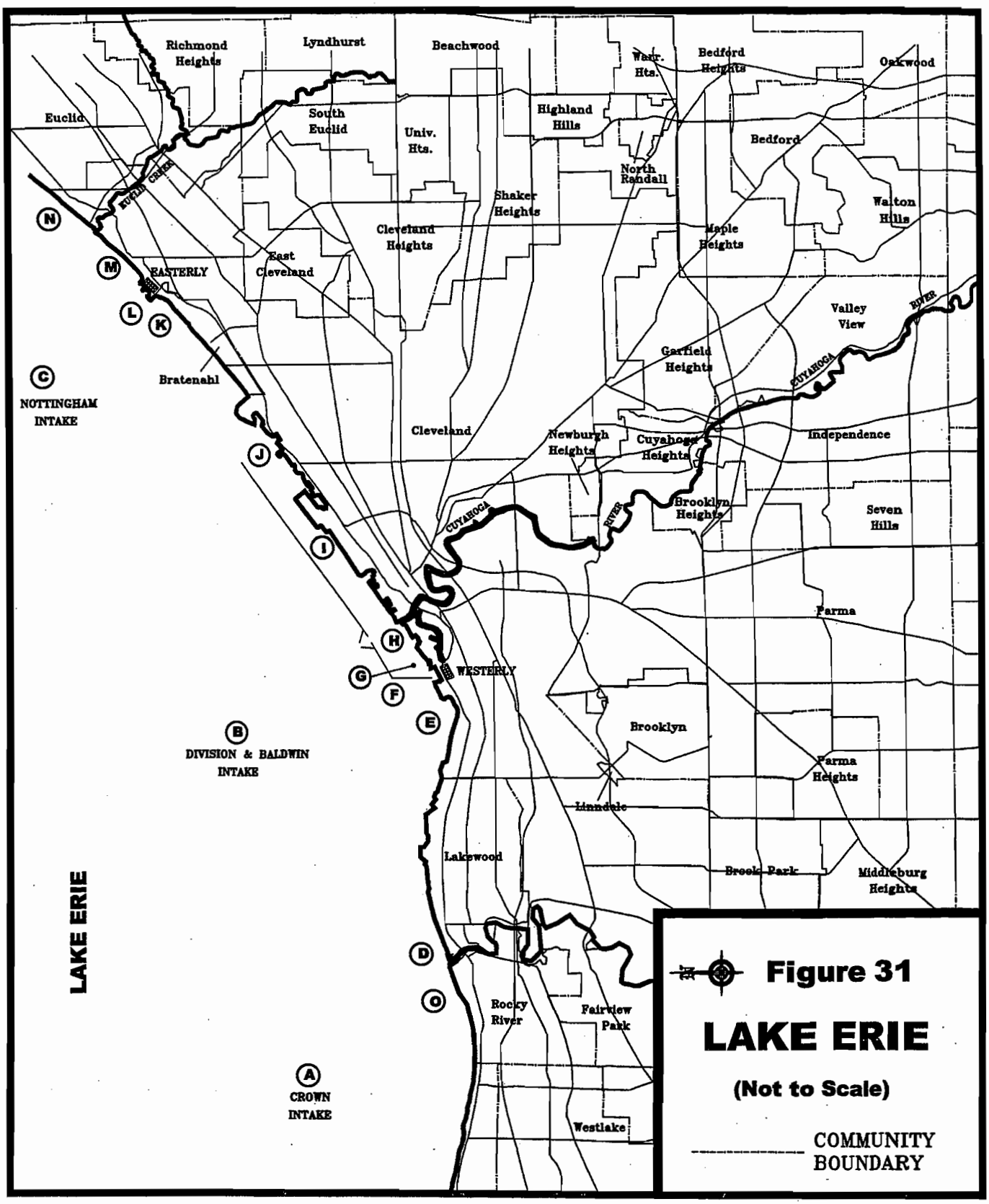
The 15 NEORSD Lake Erie routine sampling sites were selected to evaluate the impact of potential sources of pollution on ambient water quality, at sites where it is most critical to the uses to be protected and where the impact is likely to be most severe (Figure 31). Samples are collected using a NEORSD-owned boat from near the lake surface at each site for chemical and bacteriological analysis and also near the lake bottom for chemical analysis at the three sites near the public water intakes.

No attempt has been made by the NEORSD to limit the routine lake sampling to conditions of dry weather pollution impacts. Wet weather sources may affect lake water quality for a much longer period of time than they affect stream water quality, although the impact is diminished by greater dilution in the lake. Water quality is less subject to variability in a large water body's lentic environment than in a stream's lotic environment.

The Ohio EPA has designated Lake Erie Exceptional Warmwater Habitat, State Resource Water, Public Water Supply, Agricultural Water Supply, Industrial Water Supply, and Bathing Waters for Recreational Use. Public Water Supply criteria only apply within 500 yards of surface water intakes. Chemical and bacteriological data from the NEORSD routine sampling of Lake Erie are presented in Appendix C.

Site A is located near the submerged Crown Water Intake, at 41° 31.16' N, 81° 52.80' W. The site is about 2.6 miles offshore on a heading of 310 degrees northwest from the east side of the mouth of the Rocky River. The average water depth at Site A has been measured at 46 feet.

Site B is located within 500 yards west of the visible Baldwin Water Intake Crib at 41° 32.90' N, 81° 45.00' W. Also in this vicinity is the submerged Garret A. Morgan (Division) Water Intake at 41° 32.83' N, 81° 45.83' W. The average water depth at Site B has been measured at 48 feet.


Richmond Heights
Lyndhurst
Beachwood
Warr. Hts.
Bedford Heights
Oakwood
Euclid
South Euclid
Univ. Hts.
Highland Hills
Bedford
North Randall
Shaker Heights
Walton Hills
Cleveland Heights
Maple Heights
East Cleveland
EASTERLY
Valley View
RIVER
Garfield Heights
CUYAHOGA
Bratenahl
NOTTINGHAM INTAKE
Cleveland
Newburgh Heights
Cuyahoga Heights
Independence
Brooklyn Heights
Seven Hills
Parma
WESTERLY
DIVISION & BALDWIN INTAKE
Brooklyn
Parma Heights
Linndale
Lakewood
Brook Park
Middleburg Heights
LAKE ERIE
Rocky River
Fairview Park
CROWN INTAKE
Westlake
Figure 31
LAKE ERIE
(Not to Scale)
COMMUNITY BOUNDARY

Site C is located near the submerged Nottingham Water Intake at 41.° 37.08' N, 81.° 37.05' W. The site is about 3.5 miles offshore on a heading of 315 degrees northwest of the mouth of Euclid Creek. The average water depth at Site C has been measured at 48 feet.

Site D (41° 29.57' N, 81° 50.09' W) is located east of the Rocky River mouth. Site D was selected to evaluate the impact of flow from the Rocky River on water quality in Lake Erie. The average depth at Site D has been measured at 12 feet.

Site E (41° 29.41' N, 81° 44.45' W) is located offshore of Edgewater Beach. This site was selected to evaluate the water quality of Lake Erie in this area of heavy recreational use. The average water depth at Site E has been measured at 10 feet.

Site F (41° 30.05' N, 81° 43.66' W) is located near the NEORSD Westerly WWTP treated effluent discharge to Lake Erie, which is submerged 185 feet north of the northwest corner of the Cleveland Harbor break wall. This site was selected to evaluate the water quality of Lake Erie within the plant's effluent mixing zone. The average water depth measured at this location has been 30 feet.

Site G (41° 29.74' N, 81° 43.58' W) is located inside the Cleveland Harbor, east of the location of the NEORSD Westerly Combined Sewer Overflow Treatment Facility (CSOTF) discharge to the harbor. This site was selected to evaluate the water quality in the west end of Cleveland Harbor, which is potentially impacted by flows from both the Westerly CSOTF discharge and the Cuyahoga River. The average water depth at this location has been measured at 20 feet.

Site H (41° 30.25' N, 81° 42.76' W) is located within the Cleveland Harbor, approximately 50 feet northwest of the mouth of the Cuyahoga River. This site was selected to evaluate the influence of the Cuyahoga River on the water quality of Lake Erie within the Cleveland Harbor. This location is in a high-traffic area during the commercial shipping and recreational boating season. The average water depth at Site H has been measured at 33 feet.

Site I (41° 31.22' N, 81° 40.93' W) is located inside the Cleveland Harbor break wall offshore from Burke Lakefront Airport, just east of Channel Marker #9. This site was selected to evaluate the water quality of Lake Erie within the eastern Cleveland Harbor and potential impacts on it, including five combined sewer overflows along the lakefront between East 20th Street and East 38th Street. The average water depth at Site I has been measured at 25 feet.

Site J (41° 32.33' N, 81° 38.77' W) is located approximately 200 feet offshore from Gordon Park, at the east end of the Cleveland Harbor. This site was selected to evaluate the water quality inside the harbor as it enters the open area of Lake Erie. The average water depth at Site J has been measured at 27 feet.

Site K (41° 34.15' N, 81° 35.54' W) is located between Nine-Mile Creek to the west and the NEORSD Easterly WWTP to the east, approximately 200 feet offshore from White City Beach, west of its break wall. This site was selected to evaluate the potential impact on Lake Erie water quality from several Cleveland East Side streams, including the severely polluted Dugway Brook and Nine-Mile Creek, and a major combined sewer overflow outlet located at the end of a pier between White City Beach and the Easterly WWTP. The average water depth at Site K has been measured at 10 feet.

Site L (41° 34.46' N, 81° 35.33' W) is located approximately 50 feet north of the Easterly WWTP discharge to Lake Erie. This site was selected to evaluate the water quality of Lake Erie within the Easterly WWTP effluent mixing zone. The average water depth at Site L has been measured at 19 feet.

Site M (41° 35.07' N, 81° 34.25' W) is located approximately 300 feet offshore from Euclid Beach and one mile northeast of the Easterly WWTP. This site was selected to evaluate the water quality of Lake Erie in the vicinity of the beach, where recreational use is relatively heavy. The average water depth at Site M has been measured at 13 feet.

Site N (41° 36.01' N, 81° 33.07' W) is located approximately 300 feet offshore from Euclid General Hospital, about one mile northeast of the mouth of Euclid Creek. This site was selected to evaluate the water quality of Lake Erie entirely "down-lake" from the NEORSD service area. The average water depth at Site N has been measured at 13 feet.

Site O (41° 29.34' N, 81° 50.86' W) is located west of the mouth of the Rocky River. This site was selected to evaluate the water quality of Lake Erie entirely "up-lake" and outside of any expected influence from the NEORSD service area. The average water depth at Site O has been measured at 11 feet.

Problems and Remediation

-1-

On September 16, 1997, WQIS investigators responded to a spill of 750 gallons of hydraulic oil at Millar Elevator located at 1100 East 55th Street. A hose on an oil holding tank had become loose, releasing the contents of the tank into a nearby catch basin. Once it was determined that the oil had entered the storm sewer, the U.S. Coast Guard was notified of the release, responded to the site of the spill and coordinated remediation efforts. WQIS investigators returned to the scene on September 17, 1997 to assist personnel from the Coast Guard and Inland Waters of Ohio (the company which was contracted to conduct the remediation) in locating the storm sewer outfall to Lake Erie. Once the outfall was located, oil absorbent booms and pads were deployed to contain oil that was discharging from the outfall. In a follow-up inspection on

September 19, 1997, WQIS investigators observed that a majority of the oil had been contained and removed. However, Inland Waters of Ohio remained at the scene and continued their remediation efforts.

APPENDICES

APPENDIX A
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APPENDIX B
CLEVELAND AREA STREAMS CHEMICAL AND BACTERIOLOGICAL DATA, 1996-1998

DATA TABLE KEY

Individual data are presented by sampling date as month/day/year. The sampled water body, with the NEORSD-assigned sample site number and/or letter in parentheses, also appears in the heading. For streams, data presented are from analyses of surface grab samples obtained under dry weather conditions (following at least three days of no significant rainfall). Routine stream sampling was performed under dry weather conditions to maximize data comparability and to facilitate identification of dry weather pollutant sources. These sources have the greatest potential for environmental impact due to the combination of maximal pollutant concentration with minimal instream dilution.

All chemical and bacteriological parameters analyzed in the sample are listed in the first column, followed by analytical units in parentheses. When a measured value exceeds a State of Ohio water quality criterion, the applicable water use designation, with the exceeded numerical criterion in parentheses, appears in the "Excursion" column. An asterisk appears when no maximum criterion is applicable and the single value only exceeds an average criterion (therefore not necessarily representing an excursion from water quality standards).

Applicable Ohio EPA Water Use Designations

ASW	=	Agricultural Water Supply
BW	=	Bathing Waters Recreational Use
EWH	=	Exceptional Warmwater Habitat Aquatic Life Use
HHSR	=	Human Health (Single-Route Exposure)
LRW	=	Limited Resource Water
PCU	=	Primary Contact Recreational Use
PWS	=	Public Water Supply
SCU	=	Secondary Contact Recreational Use
SSH	=	Seasonal Salmonid Habitat Aquatic Life Use
WHAL	=	Warmwater Habitat Aquatic Life Use
WL	=	Protection of Wildlife

Other Acronyms and Abbreviations

BOD-5	=	Biochemical Oxygen Demand (5-day test)
COD	=	Chemical Oxygen Demand
E Coli	=	*Escherichia coli*
N	=	Nitrogen
TKN	=	Total Kjeldahl Nitrogen

mg/L	=	milligrams per liter
mS/cm	=	millisiemens per centimeter
ug/L	=	micrograms per liter
s.u.	=	standard units
NTU	=	Nephelometric Turbidity Units

Samples were collected by direct immersion of the sample bottles below the water surface. At bridge or manhole sites, samples were collected with an acid-cleaned, de-ionized water-rinsed plastic bucket and drop line. The bucket was further rinsed with stream water from the sample site prior to the collection of each sample. All samples obtained at bridge or manhole sites were collected from midstream, while all other stream samples were collected near the bank.

Closed and labeled plastic containers were used to transport samples, on ice for preservation, to NEORSD Analytical Services. All bottles used to transport samples for bacteriological analysis had been sterilized prior to sampling.

Field measurements for water temperature and dissolved oxygen concentration were obtained at the time of sampling using a calibrated YSI Model 57 or 51B Oxygen Meter. Specific conductance was measured in-field using an Orion Model 128 conductivity meter. An Orion Model 260 pH meter was used to measure pH.

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EUCLID CREEK (0.5) - 07/24/96

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	10.2	-
BOD-5	(mg/L)	8	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	4	-
Total Solids	(mg/L)	633	-
Dissolved Solids	(mg/L)	564	-
Specific Conductance	(mS/cm)	1.300	-
Turbidity	(NTU)	2.50	-
Ammonia-N	(mg/L)	0.30	-
Phosphorus	(mg/L)	0.06	-
Soluble Phosphorus	(mg/L)	0.05	-
Nitrate-N	(mg/L)	0.30	-
TKN	(mg/L)	1.10	-
Chlorides	(mg/L)	196	-
Sulfates	(mg/L)	104	-
Alkalinity	(mg/L)	130	-
Hardness	(mg/L)	239	-
Nickel	(mg/L)	0.0080	-
Copper	(mg/L)	0.0120	-
Total Chromium	(mg/L)	0.0030	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.7000	WHAL(0.2437)
Iron	(mg/L)	0.2100	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	320	-
pH	(s.u.)	7.5	-
E Coli	(organisms/100ml)	120	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	4.60	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

EUCLID CREEK (0.5) - 05/23/97

Parameter		Value	Excursion
Temperature	(degrees C)	12.0	-
Dissolved Oxygen	(mg/L)	11.5	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	10	-
Suspended Solids	(mg/L)	1	-
Total Solids	(mg/L)	520	-
Dissolved Solids	(mg/L)	483	-
Specific Conductance	(mS/cm)	1.100	-
Turbidity	(NTU)	1.20	-
Ammonia-N	(mg/L)	0.01	-
Phosphorus	(mg/L)	0.04	-
Soluble Phosphorus	(mg/L)	0.02	-
Nitrate-N	(mg/L)	0.40	-
TKN	(mg/L)	0.60	-
Chlorides	(mg/L)	160	-
Sulfates	(mg/L)	82	-
Alkalinity	(mg/L)	134	-
Hardness	(mg/L)	206	-
Nickel	(mg/L)	0.0070	-
Copper	(mg/L)	0.0100	-
Total Chromium	(mg/L)	0.0040	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	0.2100	-
Cadmium	(mg/L)	0.0010	-
Lead	(mg/L)	0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	2200	PCU(2000)
pH	(s.u.)	7.5	-
E Coli	(organisms/100ml)	1900	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	3.80	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

EUCLID CREEK (0.5) - 07/30/97

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	6.5	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	15	-
Suspended Solids	(mg/L)	3	-
Total Solids	(mg/L)	510	-
Dissolved Solids	(mg/L)	460	-
Specific Conductance	(mS/cm)	1.100	-
Turbidity	(NTU)	3.90	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.12	-
Soluble Phosphorus	(mg/L)	0.11	-
Nitrate-N	(mg/L)	0.02	-
TKN	(mg/L)	0.90	-
Chlorides	(mg/L)	170	-
Sulfates	(mg/L)	90	-
Alkalinity	(mg/L)	140	-
Hardness	(mg/L)	199	-
Nickel	(mg/L)	0.0050	-
Copper	(mg/L)	0.0080	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0200	-
Iron	(mg/L)	0.3500	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	270	-
pH	(s.u.)	7.1	-
E Coli	(organisms/100ml)	95	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	4.10	-

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WQIS

EUCLID CREEK (0.5) - 07/30/98

Parameter		Value	Excursion
Temperature	(degrees C)	24.0	-
Dissolved Oxygen	(mg/L)	8.8	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	470	-
Dissolved Solids	(mg/L)	460	-
Specific Conductance	(mS/cm)	0.800	-
Turbidity	(NTU)	1.50	-
Ammonia-N	(mg/L)	<0.01	-
Phosphorus	(mg/L)	0.21	-
Soluble Phosphorus	(mg/L)	0.20	-
Nitrate-N	(mg/L)	0.03	-
TKN	(mg/L)	0.60	-
Chlorides	(mg/L)	120	-
Sulfates	(mg/L)	80	-
Alkalinity	(mg/L)	109	-
Hardness	(mg/L)	196	-
Nickel	(mg/L)	0.0035	-
Copper	(mg/L)	0.0020	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0270	-
Iron	(mg/L)	0.2050	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0061	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	490	-
pH	(s.u.)	7.9	-
E Coli	(organisms/100ml)	360	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

EUCLID CREEK (1) - 07/24/96

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	9.8	-
BOD-5	(mg/L)	6	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	672	-
Dissolved Solids	(mg/L)	590	-
Specific Conductance	(mS/cm)	1.300	-
Turbidity	(NTU)	1.50	-
Ammonia-N	(mg/L)	0.20	-
Phosphorus	(mg/L)	0.05	-
Soluble Phosphorus	(mg/L)	0.04	-
Nitrate-N	(mg/L)	0.50	-
TKN	(mg/L)	1.40	-
Chlorides	(mg/L)	202	-
Sulfates	(mg/L)	103	-
Alkalinity	(mg/L)	124	-
Hardness	(mg/L)	235	-
Nickel	(mg/L)	0.0090	-
Copper	(mg/L)	0.0110	-
Total Chromium	(mg/L)	0.0110	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.1700	-
Iron	(mg/L)	0.1800	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	1500	-
pH	(s.u.)	7.8	-
E Coli	(organisms/100ml)	220	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	0.0030	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	4.80	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

EUCLID CREEK (1) - 05/23/97

Parameter		Value	Excursion
Temperature	(degrees C)	11.0	-
Dissolved Oxygen	(mg/L)	11.8	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	493	-
Dissolved Solids	(mg/L)	465	-
Specific Conductance	(mS/cm)	1.200	-
Turbidity	(NTU)	1.10	-
Ammonia-N	(mg/L)	0.02	-
Phosphorus	(mg/L)	0.02	-
Soluble Phosphorus	(mg/L)	0.01	-
Nitrate-N	(mg/L)	<0.01	-
TKN	(mg/L)	0.60	-
Chlorides	(mg/L)	56	-
Sulfates	(mg/L)	84	-
Alkalinity	(mg/L)	128	-
Hardness	(mg/L)	202	-
Nickel	(mg/L)	0.0007	-
Copper	(mg/L)	0.0130	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	0.2200	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	6400	PCU(2000)
pH	(s.u.)	7.3	-
E Coli	(organisms/100ml)	2100	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

EUCLID CREEK (1) - 07/30/97

Parameter		Value	Excursion
Temperature	(degrees C)	21.0	-
Dissolved Oxygen	(mg/L)	8.8	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	12	-
Suspended Solids	(mg/L)	<1	-
Total Solids	(mg/L)	516	-
Dissolved Solids	(mg/L)	453	-
Specific Conductance	(mS/cm)	1.100	-
Turbidity	(NTU)	1.40	-
Ammonia-N	(mg/L)	0.01	-
Phosphorus	(mg/L)	0.11	-
Soluble Phosphorus	(mg/L)	0.10	-
Nitrate-N	(mg/L)	0.30	-
TKN	(mg/L)	0.60	-
Chlorides	(mg/L)	152	-
Sulfates	(mg/L)	93	-
Alkalinity	(mg/L)	138	-
Hardness	(mg/L)	204	-
Nickel	(mg/L)	0.0040	-
Copper	(mg/L)	0.0060	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0100	-
Iron	(mg/L)	0.1900	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.0200	-
Fecal Coliform	(organisms/100ml)	2000	-
pH	(s.u.)	7.5	-
E Coli	(organisms/100ml)	2000	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	3.80	-

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WQIS

EUCLID CREEK (1) - 07/30/98

Parameter		Value	Excursion
Temperature	(degrees C)	24.0	-
Dissolved Oxygen	(mg/L)	9.3	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	450	-
Dissolved Solids	(mg/L)	450	-
Specific Conductance	(mS/cm)	0.800	-
Turbidity	(NTU)	1.50	-
Ammonia-N	(mg/L)	0.01	-
Phosphorus	(mg/L)	0.23	-
Soluble Phosphorus	(mg/L)	0.22	-
Nitrate-N	(mg/L)	0.10	-
TKN	(mg/L)	0.50	-
Chlorides	(mg/L)	130	-
Sulfates	(mg/L)	75	-
Alkalinity	(mg/L)	116	-
Hardness	(mg/L)	186	-
Nickel	(mg/L)	0.0042	-
Copper	(mg/L)	0.0031	-
Total Chromium	(mg/L)	0.0016	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0700	-
Iron	(mg/L)	0.1810	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0100	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	700	-
pH	(s.u.)	8.2	-
E Coli	(organisms/100ml)	290	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

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EUCLID CREEK (2) - 07/24/96

Parameter		Value	Excursion
Temperature	(degrees C)	21.5	-
Dissolved Oxygen	(mg/L)	8.0	-
BOD-5	(mg/L)	6	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	3	-
Total Solids	(mg/L)	804	-
Dissolved Solids	(mg/L)	711	-
Specific Conductance	(mS/cm)	1.500	-
Turbidity	(NTU)	0.70	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.04	-
Soluble Phosphorus	(mg/L)	0.05	-
Nitrate-N	(mg/L)	0.30	-
TKN	(mg/L)	0.70	-
Chlorides	(mg/L)	260	-
Sulfates	(mg/L)	117	-
Alkalinity	(mg/L)	120	-
Hardness	(mg/L)	255	-
Nickel	(mg/L)	0.0160	-
Copper	(mg/L)	0.0220	-
Total Chromium	(mg/L)	0.0090	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.1000	-
Iron	(mg/L)	0.1400	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0050	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	120	-
pH	(s.u.)	7.5	-
E Coli	(organisms/100ml)	76	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	0.0020	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	5.00	-
Cobalt	(mg/L)	<0.0010	-

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EUCLID CREEK (2) - 05/23/97

Parameter		Value	Excursion
Temperature	(degrees C)	10.0	-
Dissolved Oxygen	(mg/L)	11.2	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	12	-
Suspended Solids	(mg/L)	1	-
Total Solids	(mg/L)	650	-
Dissolved Solids	(mg/L)	603	-
Specific Conductance	(mS/cm)	1.400	-
Turbidity	(NTU)	0.56	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.01	-
Soluble Phosphorus	(mg/L)	<0.01	-
Nitrate-N	(mg/L)	0.40	-
TKN	(mg/L)	0.40	-
Chlorides	(mg/L)	248	-
Sulfates	(mg/L)	93	-
Alkalinity	(mg/L)	128	-
Hardness	(mg/L)	228	-
Nickel	(mg/L)	0.0080	-
Copper	(mg/L)	0.0160	-
Total Chromium	(mg/L)	0.0040	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0200	-
Iron	(mg/L)	0.0700	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	84	-
pH	(s.u.)	7.2	-
E Coli	(organisms/100ml)	72	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	3.80	-
Cobalt	(mg/L)	<0.0011	-

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EUCLID CREEK (2) - 07/30/97

Parameter		Value	Excursion
Temperature	(degrees C)	20.5	-
Dissolved Oxygen	(mg/L)	8.3	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	14	-
Suspended Solids	(mg/L)	<1	-
Total Solids	(mg/L)	528	-
Dissolved Solids	(mg/L)	488	-
Specific Conductance	(mS/cm)	1.200	-
Turbidity	(NTU)	0.59	-
Ammonia-N	(mg/L)	0.01	-
Phosphorus	(mg/L)	0.08	-
Soluble Phosphorus	(mg/L)	0.07	-
Nitrate-N	(mg/L)	0.10	-
TKN	(mg/L)	0.60	-
Chlorides	(mg/L)	188	-
Sulfates	(mg/L)	89	-
Alkalinity	(mg/L)	115	-
Hardness	(mg/L)	184	-
Nickel	(mg/L)	0.0040	-
Copper	(mg/L)	0.0070	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0200	-
Iron	(mg/L)	0.0400	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	52	-
pH	(s.u.)	7.4	-
E Coli	(organisms/100ml)	52	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	3.60	-

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EUCLID CREEK (2) - 07/30/98

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	9.6	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	3	-
Total Solids	(mg/L)	490	-
Dissolved Solids	(mg/L)	480	-
Specific Conductance	(mS/cm)	1.490	-
Turbidity	(NTU)	1.00	-
Ammonia-N	(mg/L)	<0.01	-
Phosphorus	(mg/L)	0.22	-
Soluble Phosphorus	(mg/L)	0.22	-
Nitrate-N	(mg/L)	0.04	-
TKN	(mg/L)	0.50	-
Chlorides	(mg/L)	160	-
Sulfates	(mg/L)	69	-
Alkalinity	(mg/L)	112	-
Hardness	(mg/L)	183	-
Nickel	(mg/L)	0.0032	-
Copper	(mg/L)	0.0020	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0230	-
Iron	(mg/L)	0.0550	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	72	-
pH	(s.u.)	8.0	-
E Coli	(organisms/100ml)	72	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	0.0010	-

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EUCLID CREEK (3) - 07/24/96

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	10.6	-
BOD-5	(mg/L)	7	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	586	-
Dissolved Solids	(mg/L)	519	-
Specific Conductance	(mS/cm)	1.100	-
Ammonia-N	(mg/L)	0.10	-
Nitrate-N	(mg/L)	1.30	-
Chlorides	(mg/L)	170	-
Sulfates	(mg/L)	81	-
Alkalinity	(mg/L)	133	-
Hardness	(mg/L)	238	-
Nickel	(mg/L)	0.0100	-
Copper	(mg/L)	0.0110	-
Total Chromium	(mg/L)	0.0090	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.1400	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	160	-
pH	(s.u.)	7.9	-
E Coli	(organisms/100ml)	100	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	4.40	-
Cobalt	(mg/L)	<0.0010	-

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EUCLID CREEK (3) - 05/23/97

Parameter		Value	Excursion
Temperature	(degrees C)	11.0	-
Dissolved Oxygen	(mg/L)	11.0	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	14	-
Suspended Solids	(mg/L)	1	-
Total Solids	(mg/L)	490	-
Dissolved Solids	(mg/L)	400	-
Specific Conductance	(mS/cm)	1.000	-
Turbidity	(NTU)	0.92	-
Ammonia-N	(mg/L)	0.03	-
Phosphorus	(mg/L)	0.04	-
Soluble Phosphorus	(mg/L)	0.04	-
Nitrate-N	(mg/L)	0.80	-
TKN	(mg/L)	0.50	-
Chlorides	(mg/L)	126	-
Sulfates	(mg/L)	66	-
Alkalinity	(mg/L)	114	-
Hardness	(mg/L)	189	-
Nickel	(mg/L)	0.0070	-
Copper	(mg/L)	0.0170	-
Total Chromium	(mg/L)	0.0030	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.1200	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0040	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	100	-
pH	(s.u.)	7.3	-
E Coli	(organisms/100ml)	64	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	2.70	-
Cobalt	(mg/L)	<0.0010	-

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EUCLID CREEK (3) - 07/30/97

Parameter		Value	Excursion
Temperature	(degrees C)	21.0	-
Dissolved Oxygen	(mg/L)	9.4	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	11	-
Suspended Solids	(mg/L)	1	-
Total Solids	(mg/L)	480	-
Dissolved Solids	(mg/L)	418	-
Specific Conductance	(mS/cm)	1.000	-
Turbidity	(NTU)	1.30	-
Ammonia-N	(mg/L)	<0.01	-
Phosphorus	(mg/L)	0.13	-
Soluble Phosphorus	(mg/L)	0.12	-
Nitrate-N	(mg/L)	0.90	-
TKN	(mg/L)	0.70	-
Chlorides	(mg/L)	146	-
Sulfates	(mg/L)	68	-
Alkalinity	(mg/L)	134	-
Hardness	(mg/L)	190	-
Nickel	(mg/L)	0.0050	-
Copper	(mg/L)	0.0070	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0100	-
Iron	(mg/L)	0.2500	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	110	-
pH	(s.u.)	7.5	-
E Coli	(organisms/100ml)	68	-
Arsenic	(mg/L)	<0.0070	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	4.00	-

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EUCLID CREEK (3) - 07/30/98

Parameter		Value	Excursion
Temperature	(degrees C)	23.0	-
Dissolved Oxygen	(mg/L)	9.8	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	4	-
Total Solids	(mg/L)	340	-
Dissolved Solids	(mg/L)	340	-
Specific Conductance	(mS/cm)	0.600	-
Turbidity	(NTU)	1.70	-
Ammonia-N	(mg/L)	0.02	-
Phosphorus	(mg/L)	0.31	-
Soluble Phosphorus	(mg/L)	0.29	-
Nitrate-N	(mg/L)	0.20	-
TKN	(mg/L)	0.40	-
Chlorides	(mg/L)	84	-
Sulfates	(mg/L)	51	-
Alkalinity	(mg/L)	109	-
Hardness	(mg/L)	159	-
Nickel	(mg/L)	0.0049	-
Copper	(mg/L)	0.0031	-
Total Chromium	(mg/L)	0.0016	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0190	-
Iron	(mg/L)	0.1030	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0033	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	110	-
pH	(s.u.)	8.2	-
E Coli	(organisms/100ml)	100	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

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EUCLID CREEK (4) - 07/24/96

Parameter		Value	Excursion
Temperature	(degrees C)	24.0	-
Dissolved Oxygen	(mg/L)	11.8	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	3	-
Total Solids	(mg/L)	948	-
Dissolved Solids	(mg/L)	845	-
Specific Conductance	(mS/cm)	1.700	-
Turbidity	(NTU)	1.10	-
Ammonia-N	(mg/L)	0.20	-
Phosphorus	(mg/L)	0.04	-
Soluble Phosphorus	(mg/L)	0.04	-
Nitrate-N	(mg/L)	0.10	-
TKN	(mg/L)	0.60	-
Chlorides	(mg/L)	326	-
Sulfates	(mg/L)	104	-
Alkalinity	(mg/L)	123	-
Hardness	(mg/L)	259	-
Nickel	(mg/L)	0.0040	-
Copper	(mg/L)	0.0060	-
Total Chromium	(mg/L)	0.0030	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	0.1300	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0010	-
Mercury	(ug/L)	<0.0030	-
Fecal Coliform	(organisms/100ml)	7400	PCU(2000)
pH	(s.u.)	8.0	-
E Coli	(organisms/100ml)	300	PCU(298)
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.2000	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	6.00	-
Cobalt	(mg/L)	<0.0010	-

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EUCLID CREEK (4) - 05/23/97

Parameter		Value	Excursion
Temperature	(degrees C)	11.5	-
Dissolved Oxygen	(mg/L)	12.0	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	884	-
Dissolved Solids	(mg/L)	762	-
Specific Conductance	(mS/cm)	1.800	-
Turbidity	(NTU)	1.80	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.02	-
Soluble Phosphorus	(mg/L)	0.01	-
Nitrate-N	(mg/L)	0.30	-
TKN	(mg/L)	0.60	-
Chlorides	(mg/L)	266	-
Sulfates	(mg/L)	93	-
Alkalinity	(mg/L)	123	-
Hardness	(mg/L)	260	-
Nickel	(mg/L)	0.0100	-
Copper	(mg/L)	0.0200	-
Total Chromium	(mg/L)	0.0040	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	0.3000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	90	-
pH	(s.u.)	7.3	-
E Coli	(organisms/100ml)	85	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	4.00	-
Cobalt	(mg/L)	<0.0010	-

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EUCLID CREEK (4) - 07/30/97

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	12.0	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	16	-
Suspended Solids	(mg/L)	<1	-
Total Solids	(mg/L)	652	-
Dissolved Solids	(mg/L)	604	-
Specific Conductance	(mS/cm)	1.400	-
Turbidity	(NTU)	1.70	-
Ammonia-N	(mg/L)	0.01	-
Phosphorus	(mg/L)	0.09	-
Soluble Phosphorus	(mg/L)	0.08	-
Nitrate-N	(mg/L)	0.10	-
TKN	(mg/L)	8.00	-
Chlorides	(mg/L)	264	-
Sulfates	(mg/L)	84	-
Alkalinity	(mg/L)	125	-
Hardness	(mg/L)	210	-
Nickel	(mg/L)	<0.0030	-
Copper	(mg/L)	0.0060	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.2600	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	160	-
pH	(s.u.)	7.8	-
E Coli	(organisms/100ml)	80	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	4.60	-

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EUCLID CREEK (4) - 07/30/98

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	11.0	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	5	-
Total Solids	(mg/L)	640	-
Dissolved Solids	(mg/L)	620	-
Specific Conductance	(mS/cm)	1.100	-
Turbidity	(NTU)	2.50	-
Ammonia-N	(mg/L)	0.03	-
Phosphorus	(mg/L)	0.24	-
Soluble Phosphorus	(mg/L)	0.23	-
Nitrate-N	(mg/L)	0.10	-
TKN	(mg/L)	0.60	-
Chlorides	(mg/L)	220	-
Sulfates	(mg/L)	69	-
Alkalinity	(mg/L)	109	-
Hardness	(mg/L)	190	-
Nickel	(mg/L)	0.0034	-
Copper	(mg/L)	0.0045	-
Total Chromium	(mg/L)	0.0022	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0250	-
Iron	(mg/L)	0.2930	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	290	-
pH	(s.u.)	7.8	-
E Coli	(organisms/100ml)	250	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

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GREEN CREEK (5) - 08/05/96

Parameter		Value	Excursion
Temperature	(degrees C)	19.5	-
Dissolved Oxygen	(mg/L)	8.5	-
BOD-5	(mg/L)	4	-
COD	(mg/L)	11	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	509	-
Dissolved Solids	(mg/L)	477	-
Specific Conductance	(mS/cm)	0.740	-
Turbidity	(NTU)	2.00	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.16	-
Soluble Phosphorus	(mg/L)	0.15	-
Nitrate-N	(mg/L)	1.10	-
TKN	(mg/L)	0.70	-
Chlorides	(mg/L)	122	-
Sulfates	(mg/L)	83	-
Alkalinity	(mg/L)	205	-
Hardness	(mg/L)	251	-
Nickel	(mg/L)	0.0190	-
Copper	(mg/L)	0.0120	-
Total Chromium	(mg/L)	0.0050	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0500	-
Iron	(mg/L)	0.1700	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	270	-
pH	(s.u.)	7.7	-
E Coli	(organisms/100ml)	180	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	4.60	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

GREEN CREEK (5) - 07/30/97

Parameter		Value	Excursion
Temperature	(degrees C)	17.5	-
Dissolved Oxygen	(mg/L)	7.8	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	15	-
Suspended Solids	(mg/L)	1	-
Total Solids	(mg/L)	500	-
Dissolved Solids	(mg/L)	436	-
Specific Conductance	(mS/cm)	1.000	-
Turbidity	(NTU)	1.30	-
Ammonia-N	(mg/L)	0.01	-
Phosphorus	(mg/L)	0.13	-
Soluble Phosphorus	(mg/L)	0.13	-
Nitrate-N	(mg/L)	0.60	-
TKN	(mg/L)	0.50	-
Chlorides	(mg/L)	108	-
Sulfates	(mg/L)	101	-
Alkalinity	(mg/L)	172	-
Hardness	(mg/L)	244	-
Nickel	(mg/L)	<0.0010	-
Copper	(mg/L)	0.0060	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0600	-
Iron	(mg/L)	0.1800	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	120	-
pH	(s.u.)	7.5	-
E Coli	(organisms/100ml)	75	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	7.00	-

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GREEN CREEK (5) - 07/30/98

Parameter		Value	Excursion
Temperature	(degrees C)	20.0	-
Dissolved Oxygen	(mg/L)	8.4	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	4	-
Total Solids	(mg/L)	350	-
Dissolved Solids	(mg/L)	330	-
Specific Conductance	(mS/cm)	0.600	-
Turbidity	(NTU)	3.00	-
Ammonia-N	(mg/L)	0.04	-
Phosphorus	(mg/L)	0.47	-
Soluble Phosphorus	(mg/L)	0.27	-
Nitrate-N	(mg/L)	0.50	-
TKN	(mg/L)	0.20	-
Chlorides	(mg/L)	56	-
Sulfates	(mg/L)	52	-
Alkalinity	(mg/L)	147	-
Hardness	(mg/L)	202	-
Nickel	(mg/L)	0.0025	-
Copper	(mg/L)	0.0052	-
Total Chromium	(mg/L)	0.0016	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0600	-
Iron	(mg/L)	0.2520	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	200	-
pH	(s.u.)	7.8	-
E Coli	(organisms/100ml)	160	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

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GREEN CREEK (6) - 08/05/96

Parameter		Value	Excursion
Temperature	(degrees C)	19.0	-
Dissolved Oxygen	(mg/L)	7.4	-
BOD-5	(mg/L)	5	-
COD	(mg/L)	20	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	474	-
Dissolved Solids	(mg/L)	423	-
Specific Conductance	(mS/cm)	1.100	-
Turbidity	(NTU)	1.50	-
Ammonia-N	(mg/L)	0.50	-
Phosphorus	(mg/L)	0.32	-
Soluble Phosphorus	(mg/L)	0.30	-
Nitrate-N	(mg/L)	1.00	-
TKN	(mg/L)	1.60	-
Chlorides	(mg/L)	134	-
Sulfates	(mg/L)	86	-
Alkalinity	(mg/L)	144	-
Hardness	(mg/L)	202	-
Nickel	(mg/L)	0.0180	-
Copper	(mg/L)	0.0170	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.1000	-
Iron	(mg/L)	0.1700	-
Cadmium	(mg/L)	0.0010	-
Lead	(mg/L)	0.0060	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	5100	-
pH	(s.u.)	7.4	-
E Coli	(organisms/100ml)	3900	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	4.20	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

GREEN CREEK (6) - 07/30/97

Parameter		Value	Excursion
Temperature	(degrees C)	19.0	-
Dissolved Oxygen	(mg/L)	7.4	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	11	-
Suspended Solids	(mg/L)	5	-
Total Solids	(mg/L)	456	-
Dissolved Solids	(mg/L)	424	-
Specific Conductance	(mS/cm)	1.000	-
Turbidity	(NTU)	3.60	-
Ammonia-N	(mg/L)	0.01	-
Phosphorus	(mg/L)	0.13	-
Soluble Phosphorus	(mg/L)	0.12	-
Nitrate-N	(mg/L)	0.40	-
TKN	(mg/L)	0.30	-
Chlorides	(mg/L)	120	-
Sulfates	(mg/L)	90	-
Alkalinity	(mg/L)	150	-
Hardness	(mg/L)	202	-
Nickel	(mg/L)	0.0010	-
Copper	(mg/L)	0.0050	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0200	-
Iron	(mg/L)	0.3700	-
Cadmium	(mg/L)	0.0010	-
Lead	(mg/L)	0.0070	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	210	-
pH	(s.u.)	7.3	-
E Coli	(organisms/100ml)	110	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	3.70	-

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GREEN CREEK (6) - 07/30/98

Parameter		Value	Excursion
Temperature	(degrees C)	20.0	-
Dissolved Oxygen	(mg/L)	8.6	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	5	-
Total Solids	(mg/L)	290	-
Dissolved Solids	(mg/L)	280	-
Specific Conductance	(mS/cm)	1.100	-
Turbidity	(NTU)	2.00	-
Ammonia-N	(mg/L)	0.03	-
Phosphorus	(mg/L)	0.30	-
Soluble Phosphorus	(mg/L)	0.28	-
Nitrate-N	(mg/L)	0.40	-
TKN	(mg/L)	0.30	-
Chlorides	(mg/L)	51	-
Sulfates	(mg/L)	40	-
Alkalinity	(mg/L)	106	-
Hardness	(mg/L)	153	-
Nickel	(mg/L)	0.0033	-
Copper	(mg/L)	0.0052	-
Total Chromium	(mg/L)	0.0022	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0360	-
Iron	(mg/L)	0.1870	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	1500	-
pH	(s.u.)	7.8	-
E Coli	(organisms/100ml)	780	-
Antimony	(mg/L)	<0.0200	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0300	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

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GREEN CREEK (7) - 08/05/96

Parameter		Value	Excursion
Temperature	(degrees C)	20.0	-
Dissolved Oxygen	(mg/L)	7.8	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	4	-
Total Solids	(mg/L)	290	-
Dissolved Solids	(mg/L)	266	-
Specific Conductance	(mS/cm)	0.430	-
Turbidity	(NTU)	1.60	-
Ammonia-N	(mg/L)	<0.01	-
Phosphorus	(mg/L)	0.06	-
Soluble Phosphorus	(mg/L)	0.05	-
Nitrate-N	(mg/L)	0.40	-
TKN	(mg/L)	0.40	-
Chlorides	(mg/L)	134	-
Sulfates	(mg/L)	50	-
Alkalinity	(mg/L)	74	-
Hardness	(mg/L)	165	-
Nickel	(mg/L)	0.0290	-
Copper	(mg/L)	0.0060	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.1100	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	1100	-
pH	(s.u.)	7.4	-
E Coli	(organisms/100ml)	900	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	2.80	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

GREEN CREEK (7) - 07/30/97

Parameter		Value	Excursion
Temperature	(degrees C)	18.5	-
Dissolved Oxygen	(mg/L)	7.6	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	10	-
Suspended Solids	(mg/L)	6	-
Total Solids	(mg/L)	313	-
Dissolved Solids	(mg/L)	280	-
Specific Conductance	(mS/cm)	0.450	-
Turbidity	(NTU)	3.30	-
Ammonia-N	(mg/L)	0.02	-
Phosphorus	(mg/L)	0.10	-
Soluble Phosphorus	(mg/L)	0.10	-
Nitrate-N	(mg/L)	0.20	-
TKN	(mg/L)	0.20	-
Chlorides	(mg/L)	56	-
Sulfates	(mg/L)	62	-
Alkalinity	(mg/L)	135	-
Hardness	(mg/L)	170	-
Nickel	(mg/L)	<0.0010	-
Copper	(mg/L)	0.0080	-
Total Chromium	(mg/L)	0.0010	-
Zinc	(mg/L)	0.0100	-
Iron	(mg/L)	0.2800	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	1000	-
pH	(s.u.)	7.3	-
E Coli	(organisms/100ml)	620	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	3.30	-

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WQIS

GREEN CREEK (7) - 07/30/98

Parameter		Value	Excursion
Temperature	(degrees C)	20.0	-
Dissolved Oxygen	(mg/L)	8.3	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	5	-
Total Solids	(mg/L)	220	-
Dissolved Solids	(mg/L)	210	-
Specific Conductance	(mS/cm)	0.975	-
Turbidity	(NTU)	3.00	-
Ammonia-N	(mg/L)	0.04	-
Phosphorus	(mg/L)	0.27	-
Soluble Phosphorus	(mg/L)	0.26	-
Nitrate-N	(mg/L)	0.20	-
TKN	(mg/L)	0.30	-
Chlorides	(mg/L)	41	-
Sulfates	(mg/L)	29	-
Alkalinity	(mg/L)	99	-
Hardness	(mg/L)	131	-
Nickel	(mg/L)	0.0029	-
Copper	(mg/L)	0.0028	-
Total Chromium	(mg/L)	0.0014	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0330	-
Iron	(mg/L)	0.1590	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0031	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	430	-
pH	(s.u.)	7.8	-
E Coli	(organisms/100ml)	220	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

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NINE-MILE CREEK (8A) - 08/05/96

Parameter		Value	Excursion
Temperature	(degrees C)	20.0	-
Dissolved Oxygen	(mg/L)	3.6	WHAL(4.0)
BOD-5	(mg/L)	5	-
COD	(mg/L)	16	-
Suspended Solids	(mg/L)	4	-
Total Solids	(mg/L)	477	-
Dissolved Solids	(mg/L)	447	-
Specific Conductance	(mS/cm)	1.100	-
Turbidity	(NTU)	3.10	-
Ammonia-N	(mg/L)	0.60	-
Phosphorus	(mg/L)	0.24	-
Soluble Phosphorus	(mg/L)	0.22	-
Nitrate-N	(mg/L)	0.50	-
TKN	(mg/L)	1.20	-
Chlorides	(mg/L)	128	-
Sulfates	(mg/L)	78	-
Alkalinity	(mg/L)	163	-
Hardness	(mg/L)	206	-
Nickel	(mg/L)	0.0300	-
Copper	(mg/L)	0.0170	-
Total Chromium	(mg/L)	0.3600	AWS(0.10)*
Hexavalent Chromium	(mg/L)	0.3100	WHAL(0.015)
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	0.3400	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	13000	PCU(2000)
pH	(s.u.)	7.0	-
E Coli	(organisms/100ml)	6500	PCU(298)
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	5.10	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

NINE-MILE CREEK (8A) - 06/25/97

Parameter		Value	Excursion
Temperature	(degrees C)	20.0	-
Dissolved Oxygen	(mg/L)	3.0	WHAL(4.0)
BOD-5	(mg/L)	3	-
COD	(mg/L)	12	-
Suspended Solids	(mg/L)	4	-
Total Solids	(mg/L)	590	-
Dissolved Solids	(mg/L)	548	-
Specific Conductance	(mS/cm)	1.200	-
Turbidity	(NTU)	4.10	-
Ammonia-N	(mg/L)	0.40	-
Phosphorus	(mg/L)	0.22	-
Soluble Phosphorus	(mg/L)	0.19	-
Nitrate-N	(mg/L)	1.00	-
TKN	(mg/L)	0.90	-
Chlorides	(mg/L)	150	-
Sulfates	(mg/L)	122	-
Alkalinity	(mg/L)	155	-
Hardness	(mg/L)	248	-
Nickel	(mg/L)	0.0120	-
Copper	(mg/L)	0.0110	-
Total Chromium	(mg/L)	0.0500	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0600	-
Iron	(mg/L)	0.5000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	640	-
pH	(s.u.)	7.5	-
E Coli	(organisms/100ml)	480	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	5.60	-

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WQIS

NINE-MILE CREEK (8A) - 05/28/98

Parameter		Value	Excursion
Temperature	(degrees C)	16.0	-
Dissolved Oxygen	(mg/L)	5.0	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	14	-
Total Solids	(mg/L)	470	-
Dissolved Solids	(mg/L)	450	-
Specific Conductance	(mS/cm)	0.800	-
Turbidity	(NTU)	0.65	-
Ammonia-N	(mg/L)	0.20	-
Phosphorus	(mg/L)	0.27	-
Soluble Phosphorus	(mg/L)	0.26	-
Nitrate-N	(mg/L)	1.30	-
TKN	(mg/L)	0.80	-
Chlorides	(mg/L)	110	-
Sulfates	(mg/L)	59	-
Alkalinity	(mg/L)	139	-
Hardness	(mg/L)	208	-
Nickel	(mg/L)	0.0057	-
Copper	(mg/L)	0.0074	-
Total Chromium	(mg/L)	0.0170	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.1200	-
Iron	(mg/L)	0.6100	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0064	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	320	-
pH	(s.u.)	7.7	-
E Coli	(organisms/100ml)	160	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

NINE-MILE CREEK (8B) - 08/05/96

Parameter		Value	Excursion
Temperature	(degrees C)	20.5	-
Dissolved Oxygen	(mg/L)	7.8	-
BOD-5	(mg/L)	4	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	428	-
Dissolved Solids	(mg/L)	385	-
Specific Conductance	(mS/cm)	1.000	-
Turbidity	(NTU)	1.10	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.18	-
Soluble Phosphorus	(mg/L)	0.18	-
Nitrate-N	(mg/L)	0.90	-
TKN	(mg/L)	0.50	-
Chlorides	(mg/L)	134	-
Sulfates	(mg/L)	71	-
Alkalinity	(mg/L)	133	-
Hardness	(mg/L)	182	-
Nickel	(mg/L)	0.0140	-
Copper	(mg/L)	0.0110	-
Total Chromium	(mg/L)	0.0030	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.1300	-
Iron	(mg/L)	0.2000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0040	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	13000	PCU(2000)
pH	(s.u.)	7.4	-
E Coli	(organisms/100ml)	12000	PCU(298)
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	3.40	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

NINE-MILE CREEK (8B) - 06/25/97

Parameter		Value	Excursion
Temperature	(degrees C)	20.0	-
Dissolved Oxygen	(mg/L)	8.4	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	12	-
Suspended Solids	(mg/L)	1	-
Total Solids	(mg/L)	561	-
Dissolved Solids	(mg/L)	520	-
Specific Conductance	(mS/cm)	1.200	-
Turbidity	(NTU)	0.90	-
Ammonia-N	(mg/L)	0.30	-
Phosphorus	(mg/L)	0.16	-
Soluble Phosphorus	(mg/L)	0.13	-
Nitrate-N	(mg/L)	0.80	-
TKN	(mg/L)	0.60	-
Chlorides	(mg/L)	160	-
Sulfates	(mg/L)	102	-
Alkalinity	(mg/L)	148	-
Hardness	(mg/L)	219	-
Nickel	(mg/L)	0.0100	-
Copper	(mg/L)	0.0110	-
Total Chromium	(mg/L)	<0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.1600	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	1600	-
pH	(s.u.)	7.5	-
E Coli	(organisms/100ml)	800	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	5.20	-

NEORSD

WQIS

NINE-MILE CREEK (8B) - 05/28/98

Parameter		Value	Excursion
Temperature	(degrees C)	16.0	-
Dissolved Oxygen	(mg/L)	9.0	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	3	-
Total Solids	(mg/L)	420	-
Dissolved Solids	(mg/L)	400	-
Specific Conductance	(mS/cm)	0.700	-
Turbidity	(NTU)	0.70	-
Ammonia-N	(mg/L)	0.20	-
Phosphorus	(mg/L)	0.25	-
Soluble Phosphorus	(mg/L)	0.25	-
Nitrate-N	(mg/L)	1.20	-
TKN	(mg/L)	0.60	-
Chlorides	(mg/L)	110	-
Sulfates	(mg/L)	110	-
Alkalinity	(mg/L)	120	-
Hardness	(mg/L)	176	-
Nickel	(mg/L)	0.0067	-
Copper	(mg/L)	0.0064	-
Total Chromium	(mg/L)	0.0019	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0880	-
Iron	(mg/L)	0.1800	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0042	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	30000	-
pH	(s.u.)	8.4	-
E Coli	(organisms/100ml)	660	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

NINE-MILE CREEK (9) - 08/05/96

Parameter		Value	Excursion
Temperature	(degrees C)	19.0	-
Dissolved Oxygen	(mg/L)	6.8	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	11	-
Suspended Solids	(mg/L)	1	-
Total Solids	(mg/L)	1049	-
Dissolved Solids	(mg/L)	985	-
Specific Conductance	(mS/cm)	1.900	-
Turbidity	(NTU)	0.40	-
Ammonia-N	(mg/L)	<0.01	-
Phosphorus	(mg/L)	0.06	-
Soluble Phosphorus	(mg/L)	0.05	-
Nitrate-N	(mg/L)	2.20	-
TKN	(mg/L)	0.90	-
Chlorides	(mg/L)	254	-
Sulfates	(mg/L)	298	-
Alkalinity	(mg/L)	166	-
Hardness	(mg/L)	398	-
Nickel	(mg/L)	0.0280	-
Copper	(mg/L)	0.0200	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0500	-
Iron	(mg/L)	0.0400	-
Cadmium	(mg/L)	0.0030	-
Lead	(mg/L)	0.0040	-
Mercury	(ug/L)	0.3000	HHSR(0.012)*
Fecal Coliform	(organisms/100ml)	90	-
pH	(s.u.)	7.2	-
E Coli	(organisms/100ml)	65	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	0.0100	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	7.30	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

NINE-MILE CREEK (9) - 06/25/97

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	7.7	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	9	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	803	-
Dissolved Solids	(mg/L)	745	-
Specific Conductance	(mS/cm)	1.400	-
Turbidity	(NTU)	1.10	-
Ammonia-N	(mg/L)	0.20	-
Phosphorus	(mg/L)	0.08	-
Soluble Phosphorus	(mg/L)	0.07	-
Nitrate-N	(mg/L)	1.70	-
TKN	(mg/L)	0.60	-
Chlorides	(mg/L)	170	-
Sulfates	(mg/L)	222	-
Alkalinity	(mg/L)	143	-
Hardness	(mg/L)	308	-
Nickel	(mg/L)	0.0200	-
Copper	(mg/L)	0.0140	-
Total Chromium	(mg/L)	<0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0700	-
Iron	(mg/L)	0.1800	-
Cadmium	(mg/L)	0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	120	-
pH	(s.u.)	6.9	-
E Coli	(organisms/100ml)	80	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	8.00	-

NEORSD

WQIS

NINE-MILE CREEK (9) - 05/28/98

Parameter		Value	Excursion
Temperature	(degrees C)	17.0	-
Dissolved Oxygen	(mg/L)	7.1	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	6	-
Total Solids	(mg/L)	810	-
Dissolved Solids	(mg/L)	790	-
Specific Conductance	(mS/cm)	1.300	-
Turbidity	(NTU)	2.00	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.07	-
Soluble Phosphorus	(mg/L)	0.03	-
Nitrate-N	(mg/L)	2.20	-
TKN	(mg/L)	1.00	-
Chlorides	(mg/L)	160	-
Sulfates	(mg/L)	190	-
Alkalinity	(mg/L)	147	-
Hardness	(mg/L)	309	-
Nickel	(mg/L)	0.0230	-
Copper	(mg/L)	0.0200	-
Total Chromium	(mg/L)	0.0027	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.1400	-
Iron	(mg/L)	0.4000	-
Cadmium	(mg/L)	0.0031	-
Lead	(mg/L)	0.0035	-
Mercury	(ug/L)	0.2200	PHH(0.0031)* WL(0.0013)*
Fecal Coliform	(organisms/100ml)	100	-
pH	(s.u.)	7.6	-
E Coli	(organisms/100ml)	60	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

NINE-MILE CREEK (10) - 08/05/96

Parameter		Value	Excursion
Temperature	(degrees C)	20.0	-
Dissolved Oxygen	(mg/L)	6.8	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	3	-
Total Solids	(mg/L)	415	-
Dissolved Solids	(mg/L)	386	-
Specific Conductance	(mS/cm)	1.200	-
Turbidity	(NTU)	1.20	-
Ammonia-N	(mg/L)	0.03	-
Phosphorus	(mg/L)	0.20	-
Soluble Phosphorus	(mg/L)	0.17	-
Nitrate-N	(mg/L)	0.10	-
TKN	(mg/L)	0.70	-
Chlorides	(mg/L)	138	-
Sulfates	(mg/L)	55	-
Alkalinity	(mg/L)	131	-
Hardness	(mg/L)	167	-
Nickel	(mg/L)	0.0080	-
Copper	(mg/L)	0.0080	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.1700	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	260	-
pH	(s.u.)	7.2	-
E Coli	(organisms/100ml)	120	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	3.60	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

NINE-MILE CREEK (10) - 06/25/97

Parameter		Value	Excursion
Temperature	(degrees C)	22.5	-
Dissolved Oxygen	(mg/L)	5.8	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	1	-
Total Solids	(mg/L)	506	-
Dissolved Solids	(mg/L)	470	-
Specific Conductance	(mS/cm)	1.100	-
Turbidity	(NTU)	0.54	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.09	-
Soluble Phosphorus	(mg/L)	0.09	-
Nitrate-N	(mg/L)	0.60	-
TKN	(mg/L)	0.70	-
Chlorides	(mg/L)	140	-
Sulfates	(mg/L)	82	-
Alkalinity	(mg/L)	147	-
Hardness	(mg/L)	199	-
Nickel	(mg/L)	0.0060	-
Copper	(mg/L)	0.0100	-
Total Chromium	(mg/L)	<0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0600	-
Iron	(mg/L)	0.0700	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	140	-
pH	(s.u.)	6.9	-
E Coli	(organisms/100ml)	110	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	4.90	-

NEORSD

WQIS

NINE-MILE CREEK (10) - 05/28/98

Parameter		Value	Excursion
Temperature	(degrees C)	16.0	-
Dissolved Oxygen	(mg/L)	7.3	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	390	-
Dissolved Solids	(mg/L)	360	-
Specific Conductance	(mS/cm)	0.600	-
Turbidity	(NTU)	0.70	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.54	-
Soluble Phosphorus	(mg/L)	0.23	-
Nitrate-N	(mg/L)	1.10	-
TKN	(mg/L)	0.90	-
Chlorides	(mg/L)	82	-
Sulfates	(mg/L)	23	-
Alkalinity	(mg/L)	121	-
Hardness	(mg/L)	165	-
Nickel	(mg/L)	0.0043	-
Copper	(mg/L)	0.0069	-
Total Chromium	(mg/L)	0.0021	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0830	-
Iron	(mg/L)	0.0930	-
Cadmium	(mg/L)	0.0010	-
Lead	(mg/L)	0.0140	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	320	-
pH	(s.u.)	7.8	-
E Coli	(organisms/100ml)	200	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

DUGWAY BROOK (12) - 08/14/96

Parameter		Value	Excursion
Temperature	(degrees C)	20.0	-
Dissolved Oxygen	(mg/L)	1.8	-
BOD-5	(mg/L)	8	-
COD	(mg/L)	21	-
Suspended Solids	(mg/L)	26	-
Total Solids	(mg/L)	1039	-
Dissolved Solids	(mg/L)	976	-
Specific Conductance	(mS/cm)	2.800	-
Turbidity	(NTU)	12.00	-
Ammonia-N	(mg/L)	1.30	-
Phosphorus	(mg/L)	0.32	-
Soluble Phosphorus	(mg/L)	0.24	-
Nitrate-N	(mg/L)	0.40	-
TKN	(mg/L)	2.40	-
Chlorides	(mg/L)	376	-
Sulfates	(mg/L)	123	-
Alkalinity	(mg/L)	209	-
Hardness	(mg/L)	338	-
Nickel	(mg/L)	0.0100	-
Copper	(mg/L)	0.0130	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0500	-
Iron	(mg/L)	1.5000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0100	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	4800	-
pH	(s.u.)	7.1	-
E Coli	(organisms/100ml)	3300	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	5.40	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

DUGWAY BROOK (12) - 06/25/97

Parameter		Value	Excursion
Temperature	(degrees C)	16.5	-
Dissolved Oxygen	(mg/L)	7.1	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	18	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	1062	-
Dissolved Solids	(mg/L)	1011	-
Specific Conductance	(mS/cm)	2.000	-
Turbidity	(NTU)	7.80	-
Ammonia-N	(mg/L)	0.50	-
Phosphorus	(mg/L)	0.20	-
Soluble Phosphorus	(mg/L)	0.17	-
Nitrate-N	(mg/L)	1.10	-
TKN	(mg/L)	1.10	-
Chlorides	(mg/L)	132	-
Sulfates	(mg/L)	146	-
Alkalinity	(mg/L)	227	-
Hardness	(mg/L)	257	-
Nickel	(mg/L)	0.0050	-
Copper	(mg/L)	0.0110	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0600	-
Iron	(mg/L)	1.3000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	8000	-
pH	(s.u.)	6.9	-
E Coli	(organisms/100ml)	3300	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	6.20	-

NEORSD

WQIS

DUGWAY BROOK (12) - 05/28/98

Parameter		Value	Excursion
Temperature	(degrees C)	15.0	-
Dissolved Oxygen	(mg/L)	5.6	-
BOD-5	(mg/L)	12	-
COD	(mg/L)	23	-
Suspended Solids	(mg/L)	4	-
Total Solids	(mg/L)	1100	-
Dissolved Solids	(mg/L)	1000	-
Specific Conductance	(mS/cm)	1.800	-
Turbidity	(NTU)	37.00	-
Ammonia-N	(mg/L)	2.30	-
Phosphorus	(mg/L)	0.33	-
Soluble Phosphorus	(mg/L)	0.27	-
Nitrate-N	(mg/L)	1.30	-
TKN	(mg/L)	3.10	-
Chlorides	(mg/L)	350	-
Sulfates	(mg/L)	110	-
Alkalinity	(mg/L)	240	-
Hardness	(mg/L)	369	-
Nickel	(mg/L)	0.0087	-
Copper	(mg/L)	0.0071	-
Total Chromium	(mg/L)	<0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0650	-
Iron	(mg/L)	1.6000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0031	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	7300	-
pH	(s.u.)	7.5	-
E Coli	(organisms/100ml)	3900	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

DUGWAY BROOK (13) - 08/14/96

Parameter		Value	Excursion
Temperature	(degrees C)	19.5	-
Dissolved Oxygen	(mg/L)	9.0	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	3	-
Total Solids	(mg/L)	836	-
Dissolved Solids	(mg/L)	770	-
Turbidity	(NTU)	4.10	-
Ammonia-N	(mg/L)	0.20	-
Phosphorus	(mg/L)	0.07	-
Soluble Phosphorus	(mg/L)	0.05	-
Nitrate-N	(mg/L)	1.70	-
TKN	(mg/L)	0.90	-
Chlorides	(mg/L)	234	-
Sulfates	(mg/L)	142	-
Alkalinity	(mg/L)	203	-
Hardness	(mg/L)	329	-
Nickel	(mg/L)	0.0050	-
Copper	(mg/L)	0.0080	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.1000	-
Iron	(mg/L)	0.5800	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	270	-
E Coli	(organisms/100ml)	150	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	5.20	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

DUGWAY BROOK (13) - 06/25/97

Parameter		Value	Excursion
Temperature	(degrees C)	21.0	-
Dissolved Oxygen	(mg/L)	8.4	-
BOD-5	(mg/L)	5	-
COD	(mg/L)	25	-
Suspended Solids	(mg/L)	5	-
Total Solids	(mg/L)	457	-
Dissolved Solids	(mg/L)	427	-
Specific Conductance	(mS/cm)	0.750	-
Turbidity	(NTU)	2.70	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.19	-
Soluble Phosphorus	(mg/L)	0.17	-
Nitrate-N	(mg/L)	0.60	-
TKN	(mg/L)	1.10	-
Chlorides	(mg/L)	132	-
Sulfates	(mg/L)	84	-
Alkalinity	(mg/L)	125	-
Hardness	(mg/L)	189	-
Nickel	(mg/L)	0.0070	-
Copper	(mg/L)	0.0120	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	0.4900	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0040	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	900	-
pH	(s.u.)	7.6	-
E Coli	(organisms/100ml)	460	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	3.50	-

NEORSD

WQIS

DUGWAY BROOK (13) - 05/28/98

Parameter		Value	Excursion
Temperature	(degrees C)	18.0	-
Dissolved Oxygen	(mg/L)	6.0	-
BOD-5	(mg/L)	36	-
COD	(mg/L)	47	-
Suspended Solids	(mg/L)	20	-
Total Solids	(mg/L)	620	-
Dissolved Solids	(mg/L)	600	-
Specific Conductance	(mS/cm)	1.100	-
Turbidity	(NTU)	10.00	-
Ammonia-N	(mg/L)	7.60	-
Phosphorus	(mg/L)	0.85	-
Soluble Phosphorus	(mg/L)	0.82	-
Nitrate-N	(mg/L)	0.40	-
TKN	(mg/L)	7.80	-
Chlorides	(mg/L)	170	-
Sulfates	(mg/L)	73	-
Alkalinity	(mg/L)	174	-
Hardness	(mg/L)	234	-
Nickel	(mg/L)	0.0048	-
Copper	(mg/L)	0.0130	-
Total Chromium	(mg/L)	0.0011	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.2200	-
Iron	(mg/L)	0.5900	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0110	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	480000	-
pH	(s.u.)	7.6	-
E Coli	(organisms/100ml)	40000	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

DUGWAY BROOK (14) - 08/14/96

Parameter		Value	Excursion
Temperature	(degrees C)	23.0	-
Dissolved Oxygen	(mg/L)	10.6	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	1	-
Total Solids	(mg/L)	735	-
Dissolved Solids	(mg/L)	651	-
Specific Conductance	(mS/cm)	1.700	-
Turbidity	(NTU)	0.82	-
Ammonia-N	(mg/L)	0.20	-
Phosphorus	(mg/L)	0.18	-
Soluble Phosphorus	(mg/L)	0.19	-
Nitrate-N	(mg/L)	0.40	-
TKN	(mg/L)	0.80	-
Chlorides	(mg/L)	234	-
Sulfates	(mg/L)	93	-
Alkalinity	(mg/L)	131	-
Hardness	(mg/L)	268	-
Nickel	(mg/L)	0.0060	-
Copper	(mg/L)	0.0120	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0200	-
Iron	(mg/L)	0.1100	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	240	-
pH	(s.u.)	8.1	-
E Coli	(organisms/100ml)	230	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	0.0040	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	3.70	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

DUGWAY BROOK (14) - 06/25/97

Parameter		Value	Excursion
Temperature	(degrees C)	27.0	-
Dissolved Oxygen	(mg/L)	9.4	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	13	-
Suspended Solids	(mg/L)	4	-
Total Solids	(mg/L)	867	-
Dissolved Solids	(mg/L)	843	-
Specific Conductance	(mS/cm)	1.400	-
Turbidity	(NTU)	5.80	-
Ammonia-N	(mg/L)	0.20	-
Phosphorus	(mg/L)	0.10	-
Soluble Phosphorus	(mg/L)	0.10	-
Nitrate-N	(mg/L)	0.50	-
TKN	(mg/L)	0.80	-
Chlorides	(mg/L)	266	-
Sulfates	(mg/L)	122	-
Alkalinity	(mg/L)	207	-
Hardness	(mg/L)	1046	-
Nickel	(mg/L)	0.0080	-
Copper	(mg/L)	0.0130	-
Total Chromium	(mg/L)	0.0130	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.6400	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	110	-
pH	(s.u.)	7.7	-
E Coli	(organisms/100ml)	130	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	4.10	-

NEORSD

WQIS

DUGWAY BROOK (14) - 05/28/98

Parameter		Value	Excursion
Temperature	(degrees C)	17.0	-
Dissolved Oxygen	(mg/L)	9.3	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	530	-
Dissolved Solids	(mg/L)	520	-
Specific Conductance	(mS/cm)	0.900	-
Turbidity	(NTU)	3.60	-
Ammonia-N	(mg/L)	0.30	-
Phosphorus	(mg/L)	0.29	-
Soluble Phosphorus	(mg/L)	0.28	-
Nitrate-N	(mg/L)	0.80	-
TKN	(mg/L)	0.90	-
Chlorides	(mg/L)	160	-
Sulfates	(mg/L)	50	-
Alkalinity	(mg/L)	136	-
Hardness	(mg/L)	210	-
Nickel	(mg/L)	0.0019	-
Copper	(mg/L)	0.0096	-
Total Chromium	(mg/L)	0.0016	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0500	-
Iron	(mg/L)	0.0680	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	220	-
pH	(s.u.)	7.7	-
E Coli	(organisms/100ml)	150	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

DUGWAY BROOK (15) - 08/14/96

Parameter		Value	Excursion
Temperature	(degrees C)	19.0	-
Dissolved Oxygen	(mg/L)	6.0	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	871	-
Dissolved Solids	(mg/L)	755	-
Specific Conductance	(mS/cm)	1.900	-
Turbidity	(NTU)	4.40	-
Ammonia-N	(mg/L)	0.30	-
Phosphorus	(mg/L)	0.11	-
Soluble Phosphorus	(mg/L)	0.11	-
Nitrate-N	(mg/L)	0.50	-
TKN	(mg/L)	0.90	-
Chlorides	(mg/L)	280	-
Sulfates	(mg/L)	116	-
Alkalinity	(mg/L)	182	-
Hardness	(mg/L)	324	-
Nickel	(mg/L)	0.0100	-
Copper	(mg/L)	0.0120	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.6000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0040	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	3100	-
pH	(s.u.)	7.3	-
E Coli	(organisms/100ml)	2200	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	4.80	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

DUGWAY BROOK (15) - 06/25/97

Parameter		Value	Excursion
Temperature	(degrees C)	19.5	-
Dissolved Oxygen	(mg/L)	4.4	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	28	-
Suspended Solids	(mg/L)	1	-
Total Solids	(mg/L)	712	-
Dissolved Solids	(mg/L)	670	-
Specific Conductance	(mS/cm)	1.400	-
Turbidity	(NTU)	1.30	-
Ammonia-N	(mg/L)	0.40	-
Phosphorus	(mg/L)	0.42	-
Soluble Phosphorus	(mg/L)	0.42	-
Nitrate-N	(mg/L)	0.50	-
TKN	(mg/L)	1.20	-
Chlorides	(mg/L)	226	-
Sulfates	(mg/L)	94	-
Alkalinity	(mg/L)	187	-
Hardness	(mg/L)	256	-
Nickel	(mg/L)	0.0040	-
Copper	(mg/L)	0.0110	-
Total Chromium	(mg/L)	<0.0010	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	0.1800	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	600	-
pH	(s.u.)	6.9	-
E Coli	(organisms/100ml)	480	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	4.10	-

NEORSD

WQIS

DUGWAY BROOK (15) - 05/28/98

Parameter		Value	Excursion
Temperature	(degrees C)	15.0	-
Dissolved Oxygen	(mg/L)	6.3	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	3	-
Total Solids	(mg/L)	820	-
Dissolved Solids	(mg/L)	780	-
Specific Conductance	(mS/cm)	1.400	-
Turbidity	(NTU)	10.00	-
Ammonia-N	(mg/L)	0.20	-
Phosphorus	(mg/L)	0.13	-
Soluble Phosphorus	(mg/L)	0.13	-
Nitrate-N	(mg/L)	0.70	-
TKN	(mg/L)	0.60	-
Chlorides	(mg/L)	250	-
Sulfates	(mg/L)	38	-
Alkalinity	(mg/L)	193	-
Hardness	(mg/L)	309	-
Nickel	(mg/L)	0.0033	-
Copper	(mg/L)	0.0069	-
Total Chromium	(mg/L)	0.0021	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.1500	-
Iron	(mg/L)	0.4600	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0046	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	700	-
pH	(s.u.)	7.7	-
E Coli	(organisms/100ml)	600	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

DOAN BROOK (16) - 08/07/96

Parameter		Value	Excursion
Temperature	(degrees C)	24.0	-
Dissolved Oxygen	(mg/L)	3.0	WHAL(4.0)
BOD-5	(mg/L)	6	-
COD	(mg/L)	10	-
Suspended Solids	(mg/L)	19	-
Total Solids	(mg/L)	445	-
Dissolved Solids	(mg/L)	410	-
Specific Conductance	(mS/cm)	1.100	-
Turbidity	(NTU)	2.50	-
Ammonia-N	(mg/L)	0.40	-
Phosphorus	(mg/L)	0.19	-
Soluble Phosphorus	(mg/L)	0.17	-
Nitrate-N	(mg/L)	0.50	-
TKN	(mg/L)	1.60	-
Chlorides	(mg/L)	144	-
Sulfates	(mg/L)	54	-
Alkalinity	(mg/L)	122	-
Hardness	(mg/L)	186	-
Nickel	(mg/L)	0.0080	-
Copper	(mg/L)	0.0120	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0600	-
Iron	(mg/L)	0.3000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0050	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	520	-
pH	(s.u.)	7.1	-
E Coli	(organisms/100ml)	360	PCU(298)
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	3.10	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

DOAN BROOK (16) - 05/14/97

Parameter		Value	Excursion
Temperature	(degrees C)	17.0	-
Dissolved Oxygen	(mg/L)	7.2	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	2	-
Specific Conductance	(mS/cm)	1.600	-
Ammonia-N	(mg/L)	0.20	-
Phosphorus	(mg/L)	0.05	-
Nitrate-N	(mg/L)	0.60	-
TKN	(mg/L)	1.00	-
Chlorides	(mg/L)	290	-
Alkalinity	(mg/L)	157	-
Hardness	(mg/L)	272	-
Nickel	(mg/L)	0.0070	-
Copper	(mg/L)	0.0150	-
Total Chromium	(mg/L)	0.0050	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	0.4400	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	720	-
pH	(s.u.)	6.7	-
E Coli	(organisms/100ml)	520	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	0.0010	-
Beryllium	(mg/L)	<0.0010	-

NEORSD

WQIS

DOAN BROOK (16) - 07/31/97

Parameter		Value	Excursion
Temperature	(degrees C)	22.5	-
Dissolved Oxygen	(mg/L)	4.6	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	18	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	260	-
Dissolved Solids	(mg/L)	224	-
Specific Conductance	(mS/cm)	0.400	-
Turbidity	(NTU)	1.50	-
Ammonia-N	(mg/L)	0.20	-
Phosphorus	(mg/L)	0.15	-
Soluble Phosphorus	(mg/L)	0.14	-
Nitrate-N	(mg/L)	0.60	-
TKN	(mg/L)	0.70	-
Chlorides	(mg/L)	68	-
Sulfates	(mg/L)	54	-
Alkalinity	(mg/L)	103	-
Hardness	(mg/L)	131	-
Nickel	(mg/L)	0.0010	-
Copper	(mg/L)	0.0030	-
Total Chromium	(mg/L)	0.0010	-
Zinc	(mg/L)	0.0500	-
Iron	(mg/L)	0.1500	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	100	-
pH	(s.u.)	6.7	-
E Coli	(organisms/100ml)	55	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	0.84	-

NEORSD

WQIS

DOAN BROOK (16) - 09/14/98

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	4.9	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	1	-
Total Solids	(mg/L)	210	-
Dissolved Solids	(mg/L)	210	-
Specific Conductance	(mS/cm)	0.400	-
Turbidity	(NTU)	0.70	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.13	-
Soluble Phosphorus	(mg/L)	0.09	-
Nitrate-N	(mg/L)	0.40	-
TKN	(mg/L)	0.60	-
Chlorides	(mg/L)	62	-
Sulfates	(mg/L)	76	-
Alkalinity	(mg/L)	94	-
Hardness	(mg/L)	124	-
Nickel	(mg/L)	0.0081	-
Copper	(mg/L)	0.0240	WHAL(0.0170)*
Total Chromium	(mg/L)	0.0042	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.1900	WHAL(0.140)*
Iron	(mg/L)	0.1340	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0033	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	120	-
pH	(s.u.)	6.8	-
E Coli	(organisms/100ml)	50	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

DOAN BROOK (17) - 08/07/96

Parameter		Value	Excursion
Temperature	(degrees C)	23.4	-
Dissolved Oxygen	(mg/L)	3.5	WHAL(4.0)
BOD-5	(mg/L)	6	-
COD	(mg/L)	20	-
Suspended Solids	(mg/L)	4	-
Total Solids	(mg/L)	521	-
Dissolved Solids	(mg/L)	441	-
Specific Conductance	(mS/cm)	1.100	-
Turbidity	(NTU)	2.00	-
Ammonia-N	(mg/L)	1.40	-
Phosphorus	(mg/L)	0.54	-
Soluble Phosphorus	(mg/L)	0.52	-
Nitrate-N	(mg/L)	0.10	-
TKN	(mg/L)	2.80	-
Chlorides	(mg/L)	172	-
Sulfates	(mg/L)	60	-
Alkalinity	(mg/L)	126	-
Hardness	(mg/L)	184	-
Nickel	(mg/L)	0.0060	-
Copper	(mg/L)	0.0130	-
Total Chromium	(mg/L)	0.0030	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.1400	-
Iron	(mg/L)	0.1900	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	71000	PCU(2000)
pH	(s.u.)	7.1	-
E Coli	(organisms/100ml)	46000	PCU(298)
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	3.20	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

DOAN BROOK (17) - 05/14/97

Parameter		Value	Excursion
Temperature	(degrees C)	17.0	-
Dissolved Oxygen	(mg/L)	8.2	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	1	-
Specific Conductance	(mS/cm)	1.400	-
Ammonia-N	(mg/L)	0.20	-
Phosphorus	(mg/L)	0.09	-
Nitrate-N	(mg/L)	0.70	-
TKN	(mg/L)	0.90	-
Chlorides	(mg/L)	216	-
Alkalinity	(mg/L)	144	-
Hardness	(mg/L)	225	-
Nickel	(mg/L)	0.0070	-
Copper	(mg/L)	0.0130	-
Total Chromium	(mg/L)	0.0060	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0700	-
Iron	(mg/L)	0.1200	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0040	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	1000	-
pH	(s.u.)	7.4	-
E Coli	(organisms/100ml)	630	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	0.0010	-
Beryllium	(mg/L)	<0.0010	-

NEORSD

WQIS

DOAN BROOK (17) - 07/31/97

Parameter		Value	Excursion
Temperature	(degrees C)	21.0	-
Dissolved Oxygen	(mg/L)	6.3	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	16	-
Suspended Solids	(mg/L)	4	-
Total Solids	(mg/L)	540	-
Dissolved Solids	(mg/L)	500	-
Specific Conductance	(mS/cm)	1.200	-
Turbidity	(NTU)	1.40	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.28	-
Soluble Phosphorus	(mg/L)	0.26	-
Nitrate-N	(mg/L)	1.30	-
TKN	(mg/L)	0.80	-
Chlorides	(mg/L)	158	-
Sulfates	(mg/L)	79	-
Alkalinity	(mg/L)	143	-
Hardness	(mg/L)	199	-
Nickel	(mg/L)	0.0020	-
Copper	(mg/L)	0.0060	-
Total Chromium	(mg/L)	0.0010	-
Zinc	(mg/L)	0.4000	WHAL(0.2088)
Iron	(mg/L)	0.1200	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	1900	-
pH	(s.u.)	7.2	-
E Coli	(organisms/100ml)	1000	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	3.60	-

NEORSD

WQIS

DOAN BROOK (17) - 09/14/98

Parameter		Value	Excursion
Temperature	(degrees C)	20.0	-
Dissolved Oxygen	(mg/L)	7.0	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	1	-
Total Solids	(mg/L)	390	-
Dissolved Solids	(mg/L)	380	-
Specific Conductance	(mS/cm)	0.700	-
Turbidity	(NTU)	0.70	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.19	-
Soluble Phosphorus	(mg/L)	0.19	-
Nitrate-N	(mg/L)	0.80	-
TKN	(mg/L)	0.60	-
Chlorides	(mg/L)	170	-
Sulfates	(mg/L)	68	-
Alkalinity	(mg/L)	116	-
Hardness	(mg/L)	168	-
Nickel	(mg/L)	0.0028	-
Copper	(mg/L)	0.0100	-
Total Chromium	(mg/L)	0.0051	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0750	-
Iron	(mg/L)	0.1370	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
		<0.2000	-
Fecal Coliform	(organisms/100ml)	1900	-
pH	(s.u.)	6.8	-
E Coli	(organisms/100ml)	820	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

DOAN BROOK (18) - 08/07/96

Parameter		Value	Excursion
Temperature	(degrees C)	23.5	-
Dissolved Oxygen	(mg/L)	6.5	-
BOD-5	(mg/L)	20	-
COD	(mg/L)	84	-
Suspended Solids	(mg/L)	62	-
Total Solids	(mg/L)	381	-
Dissolved Solids	(mg/L)	280	-
Specific Conductance	(mS/cm)	0.490	-
Turbidity	(NTU)	25.00	-
Ammonia-N	(mg/L)	0.20	-
Phosphorus	(mg/L)	0.54	-
Soluble Phosphorus	(mg/L)	0.11	-
Nitrate-N	(mg/L)	0.20	-
TKN	(mg/L)	5.60	-
Chlorides	(mg/L)	116	-
Sulfates	(mg/L)	33	-
Alkalinity	(mg/L)	90	-
Hardness	(mg/L)	114	-
Nickel	(mg/L)	0.0080	-
Copper	(mg/L)	0.0230	WHAL(0.0202)
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0900	-
Iron	(mg/L)	1.2000	WHAL(1.0)*
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0060	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	18000	PCU(2000)
pH	(s.u.)	7.7	-
E Coli	(organisms/100ml)	13000	PCU(298)
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	3.70	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

DOAN BROOK (18) - 05/14/97

Parameter		Value	Excursion
Temperature	(degrees C)	16.0	-
Dissolved Oxygen	(mg/L)	7.5	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	2	-
Specific Conductance	(mS/cm)	1.100	-
Ammonia-N	(mg/L)	0.20	-
Phosphorus	(mg/L)	0.06	-
Nitrate-N	(mg/L)	0.40	-
TKN	(mg/L)	0.80	-
Chlorides	(mg/L)	184	-
Alkalinity	(mg/L)	160	-
Hardness	(mg/L)	188	-
Nickel	(mg/L)	0.0040	-
Copper	(mg/L)	0.0100	-
Total Chromium	(mg/L)	0.0070	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0340	-
Iron	(mg/L)	0.3200	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	540	-
pH	(s.u.)	7.1	-
E Coli	(organisms/100ml)	220	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-

NEORSD

WQIS

DOAN BROOK (18) - 07/31/97

Parameter		Value	Excursion
Temperature	(degrees C)	19.0	-
Dissolved Oxygen	(mg/L)	5.1	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	19	-
Suspended Solids	(mg/L)	3	-
Total Solids	(mg/L)	353	-
Dissolved Solids	(mg/L)	330	-
Specific Conductance	(mS/cm)	0.900	-
Turbidity	(NTU)	2.40	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.15	-
Soluble Phosphorus	(mg/L)	0.13	-
Nitrate-N	(mg/L)	0.40	-
TKN	(mg/L)	0.70	-
Chlorides	(mg/L)	116	-
Sulfates	(mg/L)	29	-
Alkalinity	(mg/L)	120	-
Hardness	(mg/L)	137	-
Nickel	(mg/L)	0.0110	-
Copper	(mg/L)	0.0120	-
Total Chromium	(mg/L)	0.0010	-
Zinc	(mg/L)	0.0500	-
Iron	(mg/L)	0.3900	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	240	-
pH	(s.u.)	7.1	-
E Coli	(organisms/100ml)	58	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	2.00	-

NEORSD

WQIS

DOAN BROOK (18) - 09/14/98

Parameter		Value	Excursion
Temperature	(degrees C)	19.0	-
Dissolved Oxygen	(mg/L)	5.2	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	3	-
Total Solids	(mg/L)	270	-
Dissolved Solids	(mg/L)	250	-
Specific Conductance	(mS/cm)	0.500	-
Turbidity	(NTU)	1.60	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.16	-
Soluble Phosphorus	(mg/L)	0.16	-
Nitrate-N	(mg/L)	0.40	-
TKN	(mg/L)	0.60	-
Chlorides	(mg/L)	78	-
Sulfates	(mg/L)	44	-
Alkalinity	(mg/L)	111	-
Hardness	(mg/L)	129	-
Nickel	(mg/L)	0.0025	-
Copper	(mg/L)	0.0072	-
Total Chromium	(mg/L)	0.0042	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0690	-
Iron	(mg/L)	0.2430	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	440	-
pH	(s.u.)	7.2	-
E Coli	(organisms/100ml)	320	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

DOAN BROOK (19) - 08/07/96

Parameter		Value	Excursion
Temperature	(degrees C)	23.5	-
Dissolved Oxygen	(mg/L)	6.5	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	16	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	425	-
Dissolved Solids	(mg/L)	373	-
Specific Conductance	(mS/cm)	0.900	-
Turbidity	(NTU)	1.60	-
Ammonia-N	(mg/L)	0.20	-
Phosphorus	(mg/L)	0.09	-
Soluble Phosphorus	(mg/L)	0.09	-
Nitrate-N	(mg/L)	0.30	-
TKN	(mg/L)	0.90	-
Chlorides	(mg/L)	134	-
Sulfates	(mg/L)	34	-
Alkalinity	(mg/L)	127	-
Hardness	(mg/L)	147	-
Nickel	(mg/L)	0.0050	-
Copper	(mg/L)	0.0080	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	0.2900	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	580	-
pH	(s.u.)	7.6	-
E Coli	(organisms/100ml)	300	PCU(298)
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	3.00	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

DOAN BROOK (19) - 05/14/97

Parameter		Value	Excursion
Temperature	(degrees C)	15.0	-
Dissolved Oxygen	(mg/L)	6.2	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	17	-
Suspended Solids	(mg/L)	2	-
Specific Conductance	(mS/cm)	1.100	-
Ammonia-N	(mg/L)	0.20	-
Phosphorus	(mg/L)	0.08	-
Nitrate-N	(mg/L)	0.20	-
TKN	(mg/L)	0.90	-
Chlorides	(mg/L)	146	-
Alkalinity	(mg/L)	153	-
Hardness	(mg/L)	179	-
Nickel	(mg/L)	0.0040	-
Copper	(mg/L)	0.0100	-
Total Chromium	(mg/L)	0.0030	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0250	-
Iron	(mg/L)	0.2900	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	180	-
pH	(s.u.)	7.4	-
E Coli	(organisms/100ml)	90	-
Antimony	(mg/L)	0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	0.0010	-
Beryllium	(mg/L)	<0.0010	-

NEORSD

WQIS

DOAN BROOK (19) - 07/31/97

Parameter		Value	Excursion
Temperature	(degrees C)	19.0	-
Dissolved Oxygen	(mg/L)	2.8	WHAL(4.0)
BOD-5	(mg/L)	<2	-
COD	(mg/L)	21	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	464	-
Dissolved Solids	(mg/L)	426	-
Specific Conductance	(mS/cm)	1.100	-
Turbidity	(NTU)	2.20	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.17	-
Soluble Phosphorus	(mg/L)	0.15	-
Nitrate-N	(mg/L)	0.10	-
TKN	(mg/L)	0.70	-
Chlorides	(mg/L)	152	-
Sulfates	(mg/L)	35	-
Alkalinity	(mg/L)	160	-
Hardness	(mg/L)	172	-
Nickel	(mg/L)	0.0020	-
Copper	(mg/L)	0.0090	-
Total Chromium	(mg/L)	0.0010	-
Zinc	(mg/L)	0.0200	-
Iron	(mg/L)	0.3400	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0050	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	230	-
pH	(s.u.)	6.9	-
E Coli	(organisms/100ml)	180	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	2.40	-

NEORSD

WQIS

DOAN BROOK (19) - 09/14/98

Parameter		Value	Excursion
Temperature	(degrees C)	20.0	-
Dissolved Oxygen	(mg/L)	8.7	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	4	-
Total Solids	(mg/L)	300	-
Dissolved Solids	(mg/L)	290	-
Specific Conductance	(mS/cm)	0.600	-
Turbidity	(NTU)	1.40	-
Ammonia-N	(mg/L)	0.04	-
Phosphorus	(mg/L)	0.11	-
Soluble Phosphorus	(mg/L)	0.09	-
Nitrate-N	(mg/L)	0.10	-
TKN	(mg/L)	0.60	-
Chlorides	(mg/L)	96	-
Sulfates	(mg/L)	46	-
Alkalinity	(mg/L)	118	-
Hardness	(mg/L)	145	-
Nickel	(mg/L)	0.0036	-
Copper	(mg/L)	0.0088	-
Total Chromium	(mg/L)	0.0032	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0530	-
Iron	(mg/L)	0.1690	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	150	-
pH	(s.u.)	7.0	-
E Coli	(organisms/100ml)	110	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

CUYAHOGA RIVER (20) - 08/13/96

Parameter		Value	Excursion
Temperature	(degrees C)	26.0	-
Dissolved Oxygen	(mg/L)	2.5	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	21	-
Suspended Solids	(mg/L)	6	-
Total Solids	(mg/L)	568	-
Dissolved Solids	(mg/L)	505	-
Specific Conductance	(mS/cm)	1.300	-
Turbidity	(NTU)	12.00	-
Ammonia-N	(mg/L)	0.60	-
Phosphorus	(mg/L)	0.18	-
Soluble Phosphorus	(mg/L)	0.20	-
Nitrate-N	(mg/L)	4.70	-
TKN	(mg/L)	1.40	-
Chlorides	(mg/L)	136	-
Sulfates	(mg/L)	83	-
Alkalinity	(mg/L)	111	-
Hardness	(mg/L)	220	-
Nickel	(mg/L)	0.0240	-
Copper	(mg/L)	0.0130	-
Total Chromium	(mg/L)	0.0030	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0800	-
Iron	(mg/L)	0.8800	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0070	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	6000	-
pH	(s.u.)	7.0	-
E Coli	(organisms/100ml)	1600	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	7.80	-
Cobalt	(mg/L)	0.0010	-

NEORSD

WQIS

CUYAHOGA RIVER (20) - 06/12/97

Parameter		Value	Excursion
Temperature	(degrees C)	20.0	-
Dissolved Oxygen	(mg/L)	6.7	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	20	-
Suspended Solids	(mg/L)	12	-
Total Solids	(mg/L)	412	-
Dissolved Solids	(mg/L)	363	-
Specific Conductance	(mS/cm)	0.560	-
Turbidity	(NTU)	8.60	-
Ammonia-N	(mg/L)	0.60	-
Phosphorus	(mg/L)	0.14	-
Soluble Phosphorus	(mg/L)	0.11	-
Nitrate-N	(mg/L)	2.80	-
TKN	(mg/L)	1.30	-
Chlorides	(mg/L)	102	-
Sulfates	(mg/L)	76	-
Alkalinity	(mg/L)	123	-
Hardness	(mg/L)	165	-
Nickel	(mg/L)	0.0130	-
Copper	(mg/L)	0.0140	-
Total Chromium	(mg/L)	<0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0800	-
Iron	(mg/L)	0.6300	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0060	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	24	-
pH	(s.u.)	6.8	-
E Coli	(organisms/100ml)	28	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	6.10	-

NEORSD

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CUYAHOGA RIVER (20) - 09/16/97

Parameter		Value	Excursion
Temperature	(degrees C)	23.0	-
Dissolved Oxygen	(mg/L)	4.0	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	25	-
Suspended Solids	(mg/L)	17	-
Total Solids	(mg/L)	580	-
Dissolved Solids	(mg/L)	493	-
Specific Conductance	(mS/cm)	1.200	-
Turbidity	(NTU)	14.00	-
Ammonia-N	(mg/L)	0.40	-
Phosphorus	(mg/L)	0.18	-
Soluble Phosphorus	(mg/L)	0.14	-
Nitrate-N	(mg/L)	5.00	-
TKN	(mg/L)	1.20	-
Chlorides	(mg/L)	136	-
Sulfates	(mg/L)	96	-
Alkalinity	(mg/L)	120	-
Hardness	(mg/L)	203	-
Nickel	(mg/L)	0.0150	-
Copper	(mg/L)	0.0090	-
Total Chromium	(mg/L)	0.0030	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0600	-
Iron	(mg/L)	0.7300	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0060	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	52	-
pH	(s.u.)	7.8	-
E Coli	(organisms/100ml)	26	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	0.0080	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	11.50	-

NEORSD

WQIS

CUYAHOGA RIVER (20) - 09/15/98

Parameter		Value	Excursion
Temperature	(degrees C)	25.0	-
Dissolved Oxygen	(mg/L)	4.4	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	15	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	610	-
Dissolved Solids	(mg/L)	550	-
Specific Conductance	(mS/cm)	1.100	-
Turbidity	(NTU)	5.00	-
Ammonia-N	(mg/L)	0.44	-
Phosphorus	(mg/L)	0.22	-
Soluble Phosphorus	(mg/L)	0.20	-
Nitrate-N	(mg/L)	1.10	-
TKN	(mg/L)	1.70	-
Chlorides	(mg/L)	170	-
Sulfates	(mg/L)	130	-
Alkalinity	(mg/L)	135	-
Hardness	(mg/L)	214	-
Nickel	(mg/L)	0.0100	-
Copper	(mg/L)	0.0066	-
Total Chromium	(mg/L)	0.0066	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0840	-
Iron	(mg/L)	0.3470	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	100	-
pH	(s.u.)	7.1	-
E Coli	(organisms/100ml)	30	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

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CUYAHOGA RIVER (21) - 08/13/96

Parameter		Value	Excursion
Temperature	(degrees C)	26.5	-
Dissolved Oxygen	(mg/L)	1.5	-
BOD-5	(mg/L)	4	-
COD	(mg/L)	22	-
Suspended Solids	(mg/L)	28	-
Total Solids	(mg/L)	672	-
Dissolved Solids	(mg/L)	600	-
Specific Conductance	(mS/cm)	1.600	-
Turbidity	(NTU)	20.00	-
Ammonia-N	(mg/L)	0.70	-
Phosphorus	(mg/L)	0.29	-
Soluble Phosphorus	(mg/L)	0.22	-
Nitrate-N	(mg/L)	5.90	-
TKN	(mg/L)	1.70	-
Chlorides	(mg/L)	174	-
Sulfates	(mg/L)	116	-
Alkalinity	(mg/L)	128	-
Hardness	(mg/L)	237	-
Nickel	(mg/L)	0.0300	-
Copper	(mg/L)	0.0120	-
Total Chromium	(mg/L)	0.0030	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0800	-
Iron	(mg/L)	1.6000	WHAL(1.0)*
Cadmium	(mg/L)	0.0010	-
Lead	(mg/L)	0.0080	-
Mercury	(ug/L)	0.2000	HHSR(0.012)*
Fecal Coliform	(organisms/100ml)	450	-
pH	(s.u.)	7.7	-
E Coli	(organisms/100ml)	120	-
Arsenic	(mg/L)	0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	9.90	-
Cobalt	(mg/L)	0.0010	-

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WQIS

CUYAHOGA RIVER (21) - 06/12/97

Parameter		Value	Excursion
Temperature	(degrees C)	21.0	-
Dissolved Oxygen	(mg/L)	6.6	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	20	-
Suspended Solids	(mg/L)	20	-
Total Solids	(mg/L)	470	-
Dissolved Solids	(mg/L)	400	-
Specific Conductance	(mS/cm)	0.900	-
Turbidity	(NTU)	12.00	-
Ammonia-N	(mg/L)	0.90	-
Phosphorus	(mg/L)	0.16	-
Soluble Phosphorus	(mg/L)	0.12	-
Nitrate-N	(mg/L)	3.00	-
TKN	(mg/L)	1.30	-
Chlorides	(mg/L)	112	-
Sulfates	(mg/L)	67	-
Alkalinity	(mg/L)	116	-
Hardness	(mg/L)	178	-
Nickel	(mg/L)	0.0070	-
Copper	(mg/L)	0.0050	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	0.9300	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0040	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	40	-
pH	(s.u.)	6.9	-
E Coli	(organisms/100ml)	32	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	6.80	-

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WQIS

CUYAHOGA RIVER (21) - 09/16/97

Parameter		Value	Excursion
Temperature	(degrees C)	23.0	-
Dissolved Oxygen	(mg/L)	4.4	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	25	-
Suspended Solids	(mg/L)	18	-
Total Solids	(mg/L)	572	-
Dissolved Solids	(mg/L)	534	-
Specific Conductance	(mS/cm)	1.200	-
Turbidity	(NTU)	14.00	-
Ammonia-N	(mg/L)	0.40	-
Phosphorus	(mg/L)	0.20	-
Soluble Phosphorus	(mg/L)	0.19	-
Nitrate-N	(mg/L)	5.30	-
TKN	(mg/L)	1.20	-
Chlorides	(mg/L)	144	-
Sulfates	(mg/L)	97	-
Alkalinity	(mg/L)	124	-
Hardness	(mg/L)	203	-
Nickel	(mg/L)	0.0170	-
Copper	(mg/L)	0.0070	-
Total Chromium	(mg/L)	0.0030	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0600	-
Iron	(mg/L)	0.7500	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0060	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	70	-
pH	(s.u.)	7.3	-
E Coli	(organisms/100ml)	35	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	0.0080	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	11.90	-

NEORSD

WQIS

CUYAHOGA RIVER (21) - 09/15/98

Parameter		Value	Excursion
Temperature	(degrees C)	25.0	-
Dissolved Oxygen	(mg/L)	4.8	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	13	-
Suspended Solids	(mg/L)	5	-
Total Solids	(mg/L)	640	-
Dissolved Solids	(mg/L)	560	-
Specific Conductance	(mS/cm)	1.100	-
Turbidity	(NTU)	5.60	-
Ammonia-N	(mg/L)	0.42	-
Phosphorus	(mg/L)	0.23	-
Soluble Phosphorus	(mg/L)	0.21	-
Nitrate-N	(mg/L)	1.20	-
TKN	(mg/L)	1.90	-
Chlorides	(mg/L)	170	-
Sulfates	(mg/L)	130	-
Alkalinity	(mg/L)	130	-
Hardness	(mg/L)	216	-
Nickel	(mg/L)	0.0130	-
Copper	(mg/L)	0.0160	-
Total Chromium	(mg/L)	0.0095	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0720	-
Iron	(mg/L)	0.3900	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	120	-
pH	(s.u.)	7.1	-
E Coli	(organisms/100ml)	110	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	0.0010	-

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WQIS

CUYAHOGA RIVER (22) - 08/13/96

Parameter		Value	Excursion
Temperature	(degrees C)	26.5	-
Dissolved Oxygen	(mg/L)	4.4	-
BOD-5	(mg/L)	5	-
COD	(mg/L)	27	-
Suspended Solids	(mg/L)	15	-
Total Solids	(mg/L)	641	-
Dissolved Solids	(mg/L)	603	-
Specific Conductance	(mS/cm)	1.600	-
Turbidity	(NTU)	9.00	-
Ammonia-N	(mg/L)	0.60	-
Phosphorus	(mg/L)	0.23	-
Soluble Phosphorus	(mg/L)	0.23	-
Nitrate-N	(mg/L)	7.10	-
TKN	(mg/L)	1.70	-
Chlorides	(mg/L)	268	-
Sulfates	(mg/L)	113	-
Alkalinity	(mg/L)	118	-
Hardness	(mg/L)	230	-
Nickel	(mg/L)	0.0300	-
Copper	(mg/L)	0.0130	-
Total Chromium	(mg/L)	0.0030	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0900	-
Iron	(mg/L)	0.6800	-
Cadmium	(mg/L)	0.0030	-
Lead	(mg/L)	0.0090	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	110	-
pH	(s.u.)	7.2	-
E Coli	(organisms/100ml)	50	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	11.10	-
Cobalt	(mg/L)	0.0010	-

NEORSD

WQIS

CUYAHOGA RIVER (22) - 06/12/97

Parameter		Value	Excursion
Temperature	(degrees C)	22.5	-
Dissolved Oxygen	(mg/L)	6.8	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	26	-
Suspended Solids	(mg/L)	16	-
Total Solids	(mg/L)	503	-
Dissolved Solids	(mg/L)	440	-
Specific Conductance	(mS/cm)	1.000	-
Turbidity	(NTU)	8.40	-
Ammonia-N	(mg/L)	0.30	-
Phosphorus	(mg/L)	0.20	-
Soluble Phosphorus	(mg/L)	0.15	-
Nitrate-N	(mg/L)	3.20	-
TKN	(mg/L)	1.30	-
Chlorides	(mg/L)	122	-
Sulfates	(mg/L)	58	-
Alkalinity	(mg/L)	121	-
Hardness	(mg/L)	196	-
Nickel	(mg/L)	0.0100	-
Copper	(mg/L)	0.0070	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0600	-
Iron	(mg/L)	1.0000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0050	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	24	-
pH	(s.u.)	7.0	-
E Coli	(organisms/100ml)	16	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	8.30	-

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WQIS

CUYAHOGA RIVER (22) - 09/16/97

Parameter		Value	Excursion
Temperature	(degrees C)	25.0	-
Dissolved Oxygen	(mg/L)	7.1	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	30	-
Suspended Solids	(mg/L)	13	-
Total Solids	(mg/L)	621	-
Dissolved Solids	(mg/L)	565	-
Specific Conductance	(mS/cm)	1.200	-
Turbidity	(NTU)	9.00	-
Ammonia-N	(mg/L)	0.30	-
Phosphorus	(mg/L)	0.21	-
Soluble Phosphorus	(mg/L)	0.19	-
Nitrate-N	(mg/L)	5.80	-
TKN	(mg/L)	1.30	-
Chlorides	(mg/L)	132	-
Sulfates	(mg/L)	103	-
Alkalinity	(mg/L)	137	-
Hardness	(mg/L)	214	-
Nickel	(mg/L)	0.0150	-
Copper	(mg/L)	0.0080	-
Total Chromium	(mg/L)	0.0030	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0700	-
Iron	(mg/L)	0.5200	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0050	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	160	-
pH	(s.u.)	7.8	-
E Coli	(organisms/100ml)	64	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	0.0080	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	12.90	-

NEORSD

WQIS

CUYAHOGA RIVER (22) - 09/15/98

Parameter		Value	Excursion
Temperature	(degrees C)	26.0	-
Dissolved Oxygen	(mg/L)	5.4	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	14	-
Suspended Solids	(mg/L)	5	-
Total Solids	(mg/L)	700	-
Dissolved Solids	(mg/L)	610	-
Specific Conductance	(mS/cm)	1.100	-
Turbidity	(NTU)	6.50	-
Ammonia-N	(mg/L)	0.43	-
Phosphorus	(mg/L)	0.28	-
Soluble Phosphorus	(mg/L)	0.27	-
Nitrate-N	(mg/L)	1.40	-
TKN	(mg/L)	1.90	-
Chlorides	(mg/L)	190	-
Sulfates	(mg/L)	140	-
Alkalinity	(mg/L)	151	-
Hardness	(mg/L)	231	-
Nickel	(mg/L)	0.0130	-
Copper	(mg/L)	0.0140	-
Total Chromium	(mg/L)	0.0078	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0940	-
Iron	(mg/L)	0.4730	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	110	-
pH	(s.u.)	7.1	-
E Coli	(organisms/100ml)	68	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	0.0010	-

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CUYAHOGA RIVER (22.5) - 08/13/96

Parameter		Value	Excursion
Temperature	(degrees C)	23.5	-
Dissolved Oxygen	(mg/L)	8.0	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	27	-
Suspended Solids	(mg/L)	27	-
Total Solids	(mg/L)	672	-
Dissolved Solids	(mg/L)	590	-
Specific Conductance	(mS/cm)	1.600	-
Turbidity	(NTU)	12.00	-
Ammonia-N	(mg/L)	0.20	-
Phosphorus	(mg/L)	0.29	-
Soluble Phosphorus	(mg/L)	0.24	-
Nitrate-N	(mg/L)	8.70	-
TKN	(mg/L)	1.50	-
Chlorides	(mg/L)	184	-
Sulfates	(mg/L)	114	-
Alkalinity	(mg/L)	128	-
Hardness	(mg/L)	248	-
Nickel	(mg/L)	0.0400	-
Copper	(mg/L)	0.0110	-
Total Chromium	(mg/L)	0.0030	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.1200	-
Iron	(mg/L)	1.0000	-
Cadmium	(mg/L)	0.0010	-
Lead	(mg/L)	0.0060	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	840	-
pH	(s.u.)	7.6	-
E Coli	(organisms/100ml)	540	PCU(298)
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	12.60	-
Cobalt	(mg/L)	0.0010	-

NEORSD

WQIS

CUYAHOGA RIVER (22.5) - 06/12/97

Parameter		Value	Excursion
Temperature	(degrees C)	20.5	-
Dissolved Oxygen	(mg/L)	7.8	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	19	-
Suspended Solids	(mg/L)	18	-
Total Solids	(mg/L)	520	-
Dissolved Solids	(mg/L)	445	-
Specific Conductance	(mS/cm)	1.000	-
Turbidity	(NTU)	7.40	-
Ammonia-N	(mg/L)	0.20	-
Phosphorus	(mg/L)	0.25	-
Soluble Phosphorus	(mg/L)	0.21	-
Nitrate-N	(mg/L)	3.00	-
TKN	(mg/L)	1.60	-
Chlorides	(mg/L)	136	-
Sulfates	(mg/L)	18	-
Alkalinity	(mg/L)	138	-
Hardness	(mg/L)	202	-
Nickel	(mg/L)	0.0140	-
Copper	(mg/L)	0.0140	-
Total Chromium	(mg/L)	0.0100	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0900	-
Iron	(mg/L)	0.6900	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0070	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	190	-
pH	(s.u.)	7.0	-
E Coli	(organisms/100ml)	90	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	8.50	-

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WQIS

CUYAHOGA RIVER (22.5) - 09/16/97

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	7.8	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	36	-
Suspended Solids	(mg/L)	13	-
Total Solids	(mg/L)	617	-
Dissolved Solids	(mg/L)	563	-
Specific Conductance	(mS/cm)	1.200	-
Turbidity	(NTU)	7.90	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.36	-
Soluble Phosphorus	(mg/L)	0.34	-
Nitrate-N	(mg/L)	6.80	-
TKN	(mg/L)	1.10	-
Chlorides	(mg/L)	152	-
Sulfates	(mg/L)	102	-
Alkalinity	(mg/L)	119	-
Hardness	(mg/L)	222	-
Nickel	(mg/L)	0.0160	-
Copper	(mg/L)	0.0080	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	0.5200	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	320	-
pH	(s.u.)	7.6	-
E Coli	(organisms/100ml)	160	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	0.0080	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-

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CUYAHOGA RIVER (22.5) - 09/15/98

Parameter		Value	Excursion
Temperature	(degrees C)	23.0	-
Dissolved Oxygen	(mg/L)	6.8	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	13	-
Suspended Solids	(mg/L)	24	-
Total Solids	(mg/L)	660	-
Dissolved Solids	(mg/L)	560	-
Specific Conductance	(mS/cm)	1.100	-
Turbidity	(NTU)	12.00	-
Ammonia-N	(mg/L)	0.23	-
Phosphorus	(mg/L)	0.32	-
Soluble Phosphorus	(mg/L)	0.28	-
Nitrate-N	(mg/L)	9.50	-
TKN	(mg/L)	1.90	-
Chlorides	(mg/L)	160	-
Sulfates	(mg/L)	140	-
Alkalinity	(mg/L)	128	-
Hardness	(mg/L)	223	-
Nickel	(mg/L)	0.0150	-
Copper	(mg/L)	0.0130	-
Total Chromium	(mg/L)	0.0130	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0640	-
Iron	(mg/L)	1.0860	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0048	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	500	-
pH	(s.u.)	7.2	-
E Coli	(organisms/100ml)	280	-
Antimony	(mg/L)	0.0140	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	0.0010	-

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WQIS

CUYAHOGA RIVER (22.51) - 08/13/96

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	8.3	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	25	-
Suspended Solids	(mg/L)	30	-
Total Solids	(mg/L)	672	-
Dissolved Solids	(mg/L)	564	-
Specific Conductance	(mS/cm)	1.500	-
Turbidity	(NTU)	11.00	-
Ammonia-N	(mg/L)	0.20	-
Phosphorus	(mg/L)	0.24	-
Soluble Phosphorus	(mg/L)	0.26	-
Nitrate-N	(mg/L)	8.10	-
TKN	(mg/L)	1.80	-
Chlorides	(mg/L)	168	-
Sulfates	(mg/L)	111	-
Alkalinity	(mg/L)	137	-
Hardness	(mg/L)	249	-
Nickel	(mg/L)	0.0400	-
Copper	(mg/L)	0.0140	-
Total Chromium	(mg/L)	0.0030	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.1100	-
Iron	(mg/L)	1.1000	WHAL(1.0)*
Cadmium	(mg/L)	0.0020	-
Lead	(mg/L)	0.0060	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	1600	-
pH	(s.u.)	7.6	-
E Coli	(organisms/100ml)	370	PCU(298)
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	10.90	-
Cobalt	(mg/L)	<0.0010	-

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CUYAHOGA RIVER (22.51) - 06/12/97

Parameter		Value	Excursion
Temperature	(degrees C)	20.0	-
Dissolved Oxygen	(mg/L)	8.0	-
BOD-5	(mg/L)	4	-
COD	(mg/L)	22	-
Suspended Solids	(mg/L)	38	-
Total Solids	(mg/L)	554	-
Dissolved Solids	(mg/L)	430	-
Specific Conductance	(mS/cm)	1.100	-
Turbidity	(NTU)	13.00	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.30	-
Soluble Phosphorus	(mg/L)	0.22	-
Nitrate-N	(mg/L)	3.00	-
TKN	(mg/L)	1.60	-
Chlorides	(mg/L)	128	-
Sulfates	(mg/L)	65	-
Alkalinity	(mg/L)	134	-
Hardness	(mg/L)	199	-
Nickel	(mg/L)	0.0200	-
Copper	(mg/L)	0.0120	-
Total Chromium	(mg/L)	0.0050	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0500	-
Iron	(mg/L)	1.5000	WHAL(1.0)*
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0080	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	160	-
pH	(s.u.)	7.1	-
E Coli	(organisms/100ml)	100	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	0.0070	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	7.90	-

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CUYAHOGA RIVER (22.51) - 09/16/97

Parameter		Value	Excursion
Temperature	(degrees C)	20.5	-
Dissolved Oxygen	(mg/L)	8.0	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	38	-
Suspended Solids	(mg/L)	18	-
Total Solids	(mg/L)	558	-
Dissolved Solids	(mg/L)	512	-
Specific Conductance	(mS/cm)	1.200	-
Turbidity	(NTU)	11.00	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.42	-
Soluble Phosphorus	(mg/L)	0.37	-
Nitrate-N	(mg/L)	6.30	-
TKN	(mg/L)	1.30	-
Chlorides	(mg/L)	138	-
Sulfates	(mg/L)	95	-
Alkalinity	(mg/L)	133	-
Hardness	(mg/L)	192	-
Nickel	(mg/L)	0.0120	-
Copper	(mg/L)	0.0120	-
Total Chromium	(mg/L)	0.0030	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.6800	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0050	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	900	-
pH	(s.u.)	7.6	-
E Coli	(organisms/100ml)	770	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	0.0080	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	11.70	-

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WQIS

CUYAHOGA RIVER (22.51) - 09/15/98

Parameter		Value	Excursion
Temperature	(degrees C)	23.0	-
Dissolved Oxygen	(mg/L)	7.2	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	10	-
Suspended Solids	(mg/L)	19	-
Total Solids	(mg/L)	620	-
Dissolved Solids	(mg/L)	560	-
Specific Conductance	(mS/cm)	0.945	-
Turbidity	(NTU)	8.50	-
Ammonia-N	(mg/L)	0.14	-
Phosphorus	(mg/L)	0.33	-
Soluble Phosphorus	(mg/L)	0.30	-
Nitrate-N	(mg/L)	8.90	-
TKN	(mg/L)	1.70	-
Chlorides	(mg/L)	170	-
Sulfates	(mg/L)	110	-
Alkalinity	(mg/L)	134	-
Hardness	(mg/L)	226	-
Nickel	(mg/L)	0.0130	-
Copper	(mg/L)	0.0110	-
Total Chromium	(mg/L)	0.0130	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0580	-
Iron	(mg/L)	0.9320	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0062	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	300	-
pH	(s.u.)	7.4	-
E Coli	(organisms/100ml)	240	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	0.0010	-

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WQIS

CUYAHOGA RIVER (22.6) - 08/13/96

Parameter		Value	Excursion
Temperature	(degrees C)	22.5	-
Dissolved Oxygen	(mg/L)	8.4	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	26	-
Suspended Solids	(mg/L)	38	-
Total Solids	(mg/L)	708	-
Dissolved Solids	(mg/L)	546	-
Specific Conductance	(mS/cm)	1.400	-
Turbidity	(NTU)	12.00	-
Ammonia-N	(mg/L)	0.30	-
Phosphorus	(mg/L)	0.31	-
Soluble Phosphorus	(mg/L)	0.24	-
Nitrate-N	(mg/L)	8.20	-
TKN	(mg/L)	1.70	-
Chlorides	(mg/L)	162	-
Sulfates	(mg/L)	110	-
Alkalinity	(mg/L)	129	-
Hardness	(mg/L)	249	-
Nickel	(mg/L)	0.0500	-
Copper	(mg/L)	0.0250	-
Total Chromium	(mg/L)	0.0030	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0600	-
Iron	(mg/L)	1.3000	WHAL(1.0)*
Cadmium	(mg/L)	0.0010	-
Lead	(mg/L)	0.0080	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	840	-
pH	(s.u.)	7.5	-
E Coli	(organisms/100ml)	640	PCU(298)
Arsenic	(mg/L)	0.0060	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	0.0010	-
Potassium	(mg/L)	11.70	-
Cobalt	(mg/L)	<0.0010	-

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CUYAHOGA RIVER (22.6) - 06/12/97

Parameter		Value	Excursion
Temperature	(degrees C)	20.5	-
Dissolved Oxygen	(mg/L)	7.8	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	23	-
Suspended Solids	(mg/L)	53	-
Total Solids	(mg/L)	553	-
Dissolved Solids	(mg/L)	447	-
Specific Conductance	(mS/cm)	1.000	-
Turbidity	(NTU)	12.00	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.35	-
Soluble Phosphorus	(mg/L)	0.24	-
Nitrate-N	(mg/L)	3.10	-
TKN	(mg/L)	1.40	-
Chlorides	(mg/L)	136	-
Sulfates	(mg/L)	72	-
Alkalinity	(mg/L)	138	-
Hardness	(mg/L)	197	-
Nickel	(mg/L)	0.0150	-
Copper	(mg/L)	0.0130	-
Total Chromium	(mg/L)	0.0060	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.1000	-
Iron	(mg/L)	1.8000	WHAL(1.0)*
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0090	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	150	-
pH	(s.u.)	7.0	-
E Coli	(organisms/100ml)	110	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	0.0060	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	7.90	-

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WQIS

CUYAHOGA RIVER (22.6) - 09/16/97

Parameter		Value	Excursion
Temperature	(degrees C)	20.5	-
Dissolved Oxygen	(mg/L)	7.8	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	21	-
Suspended Solids	(mg/L)	17	-
Total Solids	(mg/L)	557	-
Dissolved Solids	(mg/L)	505	-
Specific Conductance	(mS/cm)	0.770	-
Turbidity	(NTU)	7.40	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.42	-
Soluble Phosphorus	(mg/L)	0.39	-
Nitrate-N	(mg/L)	6.70	-
TKN	(mg/L)	1.20	-
Chlorides	(mg/L)	122	-
Sulfates	(mg/L)	93	-
Alkalinity	(mg/L)	131	-
Hardness	(mg/L)	199	-
Nickel	(mg/L)	0.0110	-
Copper	(mg/L)	0.0080	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	0.1200	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0040	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	750	-
pH	(s.u.)	7.6	-
E Coli	(organisms/100ml)	560	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	0.0080	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	3.50	-

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CUYAHOGA RIVER (22.6) - 09/15/98

Parameter		Value	Excursion
Temperature	(degrees C)	24.0	-
Dissolved Oxygen	(mg/L)	6.4	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	14	-
Suspended Solids	(mg/L)	28	-
Total Solids	(mg/L)	630	-
Dissolved Solids	(mg/L)	550	-
Specific Conductance	(mS/cm)	0.943	-
Turbidity	(NTU)	12.00	-
Ammonia-N	(mg/L)	0.15	-
Phosphorus	(mg/L)	0.34	-
Soluble Phosphorus	(mg/L)	0.29	-
Nitrate-N	(mg/L)	8.50	-
TKN	(mg/L)	1.70	-
Chlorides	(mg/L)	160	-
Sulfates	(mg/L)	100	-
Alkalinity	(mg/L)	132	-
Hardness	(mg/L)	228	-
Nickel	(mg/L)	0.0120	-
Copper	(mg/L)	0.0150	-
Total Chromium	(mg/L)	0.0140	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0650	-
Iron	(mg/L)	1.2100	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0053	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	440	-
pH	(s.u.)	7.2	-
E Coli	(organisms/100ml)	260	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	0.0010	-

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WQIS

CUYAHOGA RIVER (22.7) - 08/13/96

Parameter		Value	Excursion
Temperature	(degress C)	22.0	-
Dissolved Oxygen	(mg/L)	8.3	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	24	-
Suspended Solids	(mg/L)	29	-
Total Solids	(mg/L)	682	-
Dissolved Solids	(mg/L)	571	-
Specific Conductance	(mS/cm)	1.500	-
Turbidity	(NTU)	12.00	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.30	-
Soluble Phosphorus	(mg/L)	0.25	-
Nitrate-N	(mg/L)	9.20	-
TKN	(mg/L)	1.60	-
Chlorides	(mg/L)	164	-
Sulfates	(mg/L)	104	-
Alkalinity	(mg/L)	117	-
Hardness	(mg/L)	246	-
Nickel	(mg/L)	0.0400	-
Copper	(mg/L)	0.0900	WHAL(0.0439)
Total Chromium	(mg/L)	0.0050	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.1000	-
Iron	(mg/L)	1.1000	WHAL(1.0)*
Cadmium	(mg/L)	0.0010	-
Lead	(mg/L)	0.0070	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	580	-
pH	(s.u.)	7.6	-
E Coli	(organisms/100ml)	640	PCU(298)
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	0.0030	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	12.20	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

CUYAHOGA RIVER (22.7) - 06/12/97

Parameter		Value	Excursion
Temperature	(degrees C)	20.0	-
Dissolved Oxygen	(mg/L)	8.0	-
BOD-5	(mg/L)	4	-
COD	(mg/L)	22	-
Suspended Solids	(mg/L)	41	-
Total Solids	(mg/L)	532	-
Dissolved Solids	(mg/L)	441	-
Specific Conductance	(mS/cm)	1.000	-
Turbidity	(NTU)	12.00	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.35	-
Soluble Phosphorus	(mg/L)	0.27	-
Nitrate-N	(mg/L)	3.30	-
TKN	(mg/L)	1.70	-
Chlorides	(mg/L)	120	-
Sulfates	(mg/L)	72	-
Alkalinity	(mg/L)	133	-
Hardness	(mg/L)	199	-
Nickel	(mg/L)	0.0130	-
Copper	(mg/L)	0.0090	-
Total Chromium	(mg/L)	0.0050	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0200	-
Iron	(mg/L)	1.7000	WHAL(1.0)*
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0050	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	80	-
pH	(s.u.)	7.1	-
E Coli	(organisms/100ml)	65	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	0.0060	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	7.90	-

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WQIS

CUYAHOGA RIVER (22.7) - 09/16/97

Parameter		Value	Excursion
Temperature	(degrees C)	20.5	-
Dissolved Oxygen	(mg/L)	7.8	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	25	-
Suspended Solids	(mg/L)	16	-
Total Solids	(mg/L)	566	-
Dissolved Solids	(mg/L)	505	-
Specific Conductance	(mS/cm)	1.100	-
Turbidity	(NTU)	8.20	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.51	-
Soluble Phosphorus	(mg/L)	0.51	-
Nitrate-N	(mg/L)	7.70	-
TKN	(mg/L)	1.30	-
Chlorides	(mg/L)	132	-
Sulfates	(mg/L)	93	-
Alkalinity	(mg/L)	122	-
Hardness	(mg/L)	212	-
Nickel	(mg/L)	0.0140	-
Copper	(mg/L)	0.0060	-
Total Chromium	(mg/L)	0.0040	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0700	-
Iron	(mg/L)	0.5600	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	180	-
pH	(s.u.)	7.6	-
E Coli	(organisms/100ml)	180	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0070	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	13.40	-

NEORSD

WQIS

CUYAHOGA RIVER (22.7) - 09/15/98

Parameter		Value	Excursion
Temperature	(degrees C)	23.0	-
Dissolved Oxygen	(mg/L)	7.1	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	12	-
Suspended Solids	(mg/L)	13	-
Total Solids	(mg/L)	650	-
Dissolved Solids	(mg/L)	560	-
Specific Conductance	(mS/cm)	1.000	-
Turbidity	(NTU)	7.50	-
Ammonia-N	(mg/L)	0.13	-
Phosphorus	(mg/L)	0.40	-
Soluble Phosphorus	(mg/L)	0.36	-
Nitrate-N	(mg/L)	1.00	-
TKN	(mg/L)	1.60	-
Chlorides	(mg/L)	150	-
Sulfates	(mg/L)	130	-
Alkalinity	(mg/L)	142	-
Hardness	(mg/L)	218	-
Nickel	(mg/L)	0.0089	-
Copper	(mg/L)	0.0078	-
Total Chromium	(mg/L)	0.0083	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	0.6040	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0035	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	270	-
pH	(s.u.)	6.4	WHAL([6.50-9.00])
E Coli	(organisms/100ml)	190	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

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CUYAHOGA RIVER (22.8) - 08/13/96

Parameter		Value	Excursion
Temperature	(degrees C)	21.0	-
Dissolved Oxygen	(mg/L)	8.3	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	15	-
Suspended Solids	(mg/L)	44	-
Total Solids	(mg/L)	652	-
Dissolved Solids	(mg/L)	543	-
Specific Conductance	(mS/cm)	1.500	-
Turbidity	(NTU)	17.00	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.32	-
Soluble Phosphorus	(mg/L)	0.23	-
Nitrate-N	(mg/L)	4.60	-
TKN	(mg/L)	1.10	-
Chlorides	(mg/L)	154	-
Sulfates	(mg/L)	106	-
Alkalinity	(mg/L)	145	-
Hardness	(mg/L)	266	-
Nickel	(mg/L)	0.0140	-
Copper	(mg/L)	0.0180	-
Total Chromium	(mg/L)	0.0040	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	1.3000	WHAL(1.0)*
Cadmium	(mg/L)	0.0010	-
Lead	(mg/L)	0.0050	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	1100	-
pH	(s.u.)	7.7	-
E Coli	(organisms/100ml)	750	PCU(298)
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	0.0030	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	4.40	-
Cobalt	(mg/L)	<0.0010	-

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CUYAHOGA RIVER (22.8) - 06/12/97

Parameter		Value	Excursion
Temperature	(degrees C)	20.0	-
Dissolved Oxygen	(mg/L)	7.9	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	19	-
Suspended Solids	(mg/L)	45	-
Total Solids	(mg/L)	405	-
Dissolved Solids	(mg/L)	346	-
Specific Conductance	(mS/cm)	0.900	-
Turbidity	(NTU)	14.00	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.17	-
Soluble Phosphorus	(mg/L)	0.10	-
Nitrate-N	(mg/L)	1.80	-
TKN	(mg/L)	1.30	-
Chlorides	(mg/L)	106	-
Sulfates	(mg/L)	61	-
Alkalinity	(mg/L)	137	-
Hardness	(mg/L)	190	-
Nickel	(mg/L)	0.0090	-
Copper	(mg/L)	0.0100	-
Total Chromium	(mg/L)	<0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0700	-
Iron	(mg/L)	1.6000	WHAL(1.0)*
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0060	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	82	-
pH	(s.u.)	7.1	-
E Coli	(organisms/100ml)	60	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	0.0060	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	3.50	-

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CUYAHOGA RIVER (22.8) - 09/16/97

Parameter		Value	Excursion
Temperature	(degrees C)	19.0	-
Dissolved Oxygen	(mg/L)	8.0	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	19	-
Suspended Solids	(mg/L)	21	-
Total Solids	(mg/L)	512	-
Dissolved Solids	(mg/L)	450	-
Specific Conductance	(mS/cm)	1.100	-
Turbidity	(NTU)	7.30	-
Ammonia-N	(mg/L)	0.03	-
Phosphorus	(mg/L)	0.22	-
Soluble Phosphorus	(mg/L)	0.18	-
Nitrate-N	(mg/L)	3.60	-
TKN	(mg/L)	0.70	-
Chlorides	(mg/L)	104	-
Sulfates	(mg/L)	85	-
Alkalinity	(mg/L)	142	-
Hardness	(mg/L)	219	-
Nickel	(mg/L)	0.0050	-
Copper	(mg/L)	0.0060	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0600	-
Iron	(mg/L)	0.5800	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	310	-
pH	(s.u.)	7.8	-
E Coli	(organisms/100ml)	310	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	0.0080	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	4.70	-

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CUYAHOGA RIVER (22.8) - 09/15/98

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	7.4	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	20	-
Total Solids	(mg/L)	640	-
Dissolved Solids	(mg/L)	560	-
Specific Conductance	(mS/cm)	1.000	-
Turbidity	(NTU)	9.30	-
Ammonia-N	(mg/L)	0.06	-
Phosphorus	(mg/L)	0.30	-
Soluble Phosphorus	(mg/L)	0.27	-
Nitrate-N	(mg/L)	0.91	-
TKN	(mg/L)	1.00	-
Chlorides	(mg/L)	170	-
Sulfates	(mg/L)	130	-
Alkalinity	(mg/L)	170	-
Hardness	(mg/L)	246	-
Nickel	(mg/L)	0.0032	-
Copper	(mg/L)	0.0130	-
Total Chromium	(mg/L)	0.0090	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0570	-
Iron	(mg/L)	0.9820	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0140	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	500	-
pH	(s.u.)	6.2	WHAL([6.50-9.00])
E Coli	(organisms/100ml)	240	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

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CUYAHOGA RIVER (22.9) - 08/13/96

Parameter		Value	Excursion
Temperature	(degrees C)	21.0	-
Dissolved Oxygen	(mg/L)	8.5	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	18	-
Suspended Solids	(mg/L)	37	-
Total Solids	(mg/L)	610	-
Dissolved Solids	(mg/L)	534	-
Specific Conductance	(mS/cm)	1.500	-
Turbidity	(NTU)	15.00	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.32	-
Soluble Phosphorus	(mg/L)	0.24	-
Nitrate-N	(mg/L)	4.80	-
TKN	(mg/L)	1.20	-
Chlorides	(mg/L)	154	-
Sulfates	(mg/L)	103	-
Alkalinity	(mg/L)	153	-
Hardness	(mg/L)	266	-
Nickel	(mg/L)	0.0260	-
Copper	(mg/L)	0.0200	-
Total Chromium	(mg/L)	0.0040	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0600	-
Iron	(mg/L)	1.5000	WHAL(1.0)*
Cadmium	(mg/L)	0.0010	-
Lead	(mg/L)	0.0090	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	900	-
pH	(s.u.)	7.7	-
E Coli	(organisms/100ml)	680	PCU(298)
Arsenic	(mg/L)	0.0070	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	4.40	-
Cobalt	(mg/L)	0.0010	-

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CUYAHOGA RIVER (22.9) - 06/12/97

Parameter		Value	Excursion
Temperature	(degrees C)	20.0	-
Dissolved Oxygen	(mg/L)	8.0	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	27	-
Suspended Solids	(mg/L)	51	-
Total Solids	(mg/L)	418	-
Dissolved Solids	(mg/L)	361	-
Specific Conductance	(mS/cm)	0.900	-
Turbidity	(NTU)	17.00	-
Ammonia-N	(mg/L)	0.04	-
Phosphorus	(mg/L)	0.22	-
Soluble Phosphorus	(mg/L)	0.10	-
Nitrate-N	(mg/L)	1.80	-
TKN	(mg/L)	1.40	-
Chlorides	(mg/L)	106	-
Sulfates	(mg/L)	62	-
Alkalinity	(mg/L)	123	-
Hardness	(mg/L)	190	-
Nickel	(mg/L)	0.0120	-
Copper	(mg/L)	0.0200	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.1400	-
Iron	(mg/L)	2.3000	WHAL(1.0)*
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0130	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	160	-
pH	(s.u.)	7.1	-
E Coli	(organisms/100ml)	50	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	3.40	-

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CUYAHOGA RIVER (22.9) - 09/16/97

Parameter		Value	Excursion
Temperature	(degrees C)	19.5	-
Dissolved Oxygen	(mg/L)	8.2	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	17	-
Suspended Solids	(mg/L)	14	-
Total Solids	(mg/L)	480	-
Dissolved Solids	(mg/L)	450	-
Specific Conductance	(mS/cm)	1.100	-
Turbidity	(NTU)	6.50	-
Ammonia-N	(mg/L)	0.04	-
Phosphorus	(mg/L)	0.21	-
Soluble Phosphorus	(mg/L)	0.16	-
Nitrate-N	(mg/L)	3.50	-
TKN	(mg/L)	0.80	-
Chlorides	(mg/L)	96	-
Sulfates	(mg/L)	88	-
Alkalinity	(mg/L)	138	-
Hardness	(mg/L)	219	-
Nickel	(mg/L)	0.0040	-
Copper	(mg/L)	0.0060	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	0.6200	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	320	-
pH	(s.u.)	7.8	-
E Coli	(organisms/100ml)	190	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	0.0070	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	4.80	-

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CUYAHOGA RIVER (22.9) - 09/15/98

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	6.7	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	18	-
Total Solids	(mg/L)	660	-
Dissolved Solids	(mg/L)	560	-
Specific Conductance	(mS/cm)	1.000	-
Turbidity	(NTU)	11.00	-
Ammonia-N	(mg/L)	0.04	-
Phosphorus	(mg/L)	0.31	-
Soluble Phosphorus	(mg/L)	0.27	-
Nitrate-N	(mg/L)	0.63	-
TKN	(mg/L)	1.00	-
Chlorides	(mg/L)	170	-
Sulfates	(mg/L)	130	-
Alkalinity	(mg/L)	180	-
Hardness	(mg/L)	248	-
Nickel	(mg/L)	0.0031	-
Copper	(mg/L)	0.0090	-
Total Chromium	(mg/L)	0.0087	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0670	-
Iron	(mg/L)	1.0080	-
Cadmium	(mg/L)	0.0012	-
Lead	(mg/L)	0.0040	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	2900	PCU(2000)
pH	(s.u.)	6.9	-
E Coli	(organisms/100ml)	1600	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

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CUYAHOGA RIVER (23) - 08/13/96

Parameter		Value	Excursion
Temperature	(degrees C)	21.0	-
Dissolved Oxygen	(mg/L)	8.0	-
BOD-5	(mg/L)	4	-
COD	(mg/L)	18	-
Suspended Solids	(mg/L)	37	-
Total Solids	(mg/L)	601	-
Dissolved Solids	(mg/L)	516	-
Specific Conductance	(mS/cm)	1.500	-
Turbidity	(NTU)	13.00	-
Ammonia-N	(mg/L)	0.20	-
Phosphorus	(mg/L)	0.32	-
Soluble Phosphorus	(mg/L)	0.24	-
Nitrate-N	(mg/L)	4.70	-
TKN	(mg/L)	1.10	-
Chlorides	(mg/L)	154	-
Sulfates	(mg/L)	100	-
Alkalinity	(mg/L)	146	-
Hardness	(mg/L)	258	-
Nickel	(mg/L)	0.0300	-
Copper	(mg/L)	0.0190	-
Total Chromium	(mg/L)	0.0110	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0500	-
Iron	(mg/L)	1.3000	WHAL(1.0)*
Cadmium	(mg/L)	0.0010	-
Lead	(mg/L)	0.0080	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	950	-
pH	(s.u.)	7.7	-
E Coli	(organisms/100ml)	730	PCU(298)
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	3.50	-
Cobalt	(mg/L)	0.0010	-

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WQIS

CUYAHOGA RIVER (23) - 06/12/97

Parameter		Value	Excursion
Temperature	(degrees C)	20.0	-
Dissolved Oxygen	(mg/L)	8.0	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	19	-
Suspended Solids	(mg/L)	37	-
Total Solids	(mg/L)	450	-
Dissolved Solids	(mg/L)	391	-
Specific Conductance	(mS/cm)	0.900	-
Turbidity	(NTU)	12.00	-
Ammonia-N	(mg/L)	0.03	-
Phosphorus	(mg/L)	0.09	-
Soluble Phosphorus	(mg/L)	0.04	-
Nitrate-N	(mg/L)	1.80	-
TKN	(mg/L)	1.70	-
Chlorides	(mg/L)	88	-
Sulfates	(mg/L)	61	-
Alkalinity	(mg/L)	121	-
Hardness	(mg/L)	189	-
Nickel	(mg/L)	0.0060	-
Copper	(mg/L)	0.0130	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0600	-
Iron	(mg/L)	1.3000	WHAL(1.0)*
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0090	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	160	-
pH	(s.u.)	7.1	-
E Coli	(organisms/100ml)	85	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	3.00	-

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WQIS

CUYAHOGA RIVER (23) - 09/16/97

Parameter		Value	Excursion
Temperature	(degrees C)	19.0	-
Dissolved Oxygen	(mg/L)	7.8	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	24	-
Suspended Solids	(mg/L)	19	-
Total Solids	(mg/L)	516	-
Dissolved Solids	(mg/L)	451	-
Specific Conductance	(mS/cm)	1.000	-
Turbidity	(NTU)	7.50	-
Ammonia-N	(mg/L)	0.04	-
Phosphorus	(mg/L)	0.22	-
Soluble Phosphorus	(mg/L)	0.17	-
Nitrate-N	(mg/L)	2.80	-
TKN	(mg/L)	0.80	-
Chlorides	(mg/L)	98	-
Sulfates	(mg/L)	85	-
Alkalinity	(mg/L)	137	-
Hardness	(mg/L)	221	-
Nickel	(mg/L)	0.0040	-
Copper	(mg/L)	0.0060	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	0.8400	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0040	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	450	-
pH	(s.u.)	7.6	-
E Coli	(organisms/100ml)	170	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	0.0090	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	4.90	-

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WQIS

CUYAHOGA RIVER (23) - 09/15/98

Parameter		Value	Excursion
Temperature	(degrees C)	23.0	-
Dissolved Oxygen	(mg/L)	6.9	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	12	-
Total Solids	(mg/L)	630	-
Dissolved Solids	(mg/L)	570	-
Specific Conductance	(mS/cm)	1.000	-
Turbidity	(NTU)	7.20	-
Ammonia-N	(mg/L)	0.03	-
Phosphorus	(mg/L)	0.34	-
Soluble Phosphorus	(mg/L)	0.33	-
Nitrate-N	(mg/L)	0.71	-
TKN	(mg/L)	0.90	-
Chlorides	(mg/L)	180	-
Sulfates	(mg/L)	130	-
Alkalinity	(mg/L)	155	-
Hardness	(mg/L)	256	-
Nickel	(mg/L)	0.0032	-
Copper	(mg/L)	0.0110	-
Total Chromium	(mg/L)	0.0074	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.2000	-
Iron	(mg/L)	0.7060	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0034	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	1600	-
pH	(s.u.)	7.0	-
E Coli	(organisms/100ml)	1300	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

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CUYAHOGA RIVER (24) - 08/13/96

Parameter		Value	Excursion
Temperature	(degrees C)	20.0	-
Dissolved Oxygen	(mg/L)	7.8	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	19	-
Suspended Solids	(mg/L)	27	-
Total Solids	(mg/L)	586	-
Dissolved Solids	(mg/L)	518	-
Specific Conductance	(mS/cm)	1.500	-
Turbidity	(NTU)	12.00	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.36	-
Soluble Phosphorus	(mg/L)	0.28	-
Nitrate-N	(mg/L)	5.20	-
TKN	(mg/L)	1.30	-
Chlorides	(mg/L)	148	-
Sulfates	(mg/L)	104	-
Alkalinity	(mg/L)	161	-
Hardness	(mg/L)	254	-
Nickel	(mg/L)	0.0190	-
Copper	(mg/L)	0.0130	-
Total Chromium	(mg/L)	0.0100	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0700	-
Iron	(mg/L)	1.4000	WHAL(1.0)*
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0050	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	2200	PCU(2000)
pH	(s.u.)	7.5	-
E Coli	(organisms/100ml)	1600	PCU(298)
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	3.80	-
Cobalt	(mg/L)	0.0010	-

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CUYAHOGA RIVER (24) - 06/12/97

Parameter		Value	Excursion
Temperature	(degrees C)	19.5	-
Dissolved Oxygen	(mg/L)	7.9	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	21	-
Suspended Solids	(mg/L)	26	-
Total Solids	(mg/L)	490	-
Dissolved Solids	(mg/L)	380	-
Specific Conductance	(mS/cm)	0.550	-
Turbidity	(NTU)	9.10	-
Ammonia-N	(mg/L)	0.04	-
Phosphorus	(mg/L)	0.13	-
Soluble Phosphorus	(mg/L)	0.09	-
Nitrate-N	(mg/L)	1.80	-
TKN	(mg/L)	1.50	-
Chlorides	(mg/L)	92	-
Sulfates	(mg/L)	58	-
Alkalinity	(mg/L)	118	-
Hardness	(mg/L)	175	-
Nickel	(mg/L)	0.0040	-
Copper	(mg/L)	0.0160	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0900	-
Iron	(mg/L)	1.0000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0070	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	100	-
pH	(s.u.)	7.0	-
E Coli	(organisms/100ml)	60	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	2.60	-

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CUYAHOGA RIVER (24) - 09/16/97

Parameter		Value	Excursion
Temperature	(degrees C)	19.0	-
Dissolved Oxygen	(mg/L)	7.6	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	16	-
Suspended Solids	(mg/L)	17	-
Total Solids	(mg/L)	480	-
Dissolved Solids	(mg/L)	440	-
Specific Conductance	(mS/cm)	1.000	-
Turbidity	(NTU)	6.80	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.25	-
Soluble Phosphorus	(mg/L)	0.20	-
Nitrate-N	(mg/L)	3.30	-
TKN	(mg/L)	0.70	-
Chlorides	(mg/L)	90	-
Sulfates	(mg/L)	86	-
Alkalinity	(mg/L)	139	-
Hardness	(mg/L)	208	-
Nickel	(mg/L)	0.0030	-
Copper	(mg/L)	0.0060	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.6400	WHAL(0.2168)
Iron	(mg/L)	0.5900	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0060	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	240	-
pH	(s.u.)	7.4	-
E Coli	(organisms/100ml)	200	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	0.0080	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	4.30	-

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CUYAHOGA RIVER (24) - 09/15/98

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	6.0	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	14	-
Total Solids	(mg/L)	630	-
Dissolved Solids	(mg/L)	570	-
Specific Conductance	(mS/cm)	1.000	-
Turbidity	(NTU)	7.50	-
Ammonia-N	(mg/L)	0.05	-
Phosphorus	(mg/L)	0.33	-
Soluble Phosphorus	(mg/L)	0.32	-
Nitrate-N	(mg/L)	0.80	-
TKN	(mg/L)	0.90	-
Chlorides	(mg/L)	160	-
Sulfates	(mg/L)	200	-
Alkalinity	(mg/L)	156	-
Hardness	(mg/L)	250	-
Nickel	(mg/L)	0.0020	-
Copper	(mg/L)	0.0100	-
Total Chromium	(mg/L)	0.0074	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0750	-
Iron	(mg/L)	0.6660	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	580	-
pH	(s.u.)	7.0	-
E Coli	(organisms/100ml)	320	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

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CUYAHOGA RIVER (24.5) - 08/13/96

Parameter		Value	Excursion
Temperature	(degrees C)	20.0	-
Dissolved Oxygen	(mg/L)	7.8	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	24	-
Suspended Solids	(mg/L)	13	-
Total Solids	(mg/L)	581	-
Dissolved Solids	(mg/L)	534	-
Specific Conductance	(mS/cm)	1.500	-
Turbidity	(NTU)	4.40	-
Ammonia-N	(mg/L)	0.30	-
Phosphorus	(mg/L)	0.29	-
Soluble Phosphorus	(mg/L)	0.27	-
Nitrate-N	(mg/L)	5.50	-
TKN	(mg/L)	1.10	-
Chlorides	(mg/L)	180	-
Sulfates	(mg/L)	99	-
Alkalinity	(mg/L)	150	-
Hardness	(mg/L)	250	-
Nickel	(mg/L)	0.0360	-
Copper	(mg/L)	0.0240	-
Total Chromium	(mg/L)	0.0070	-
Hexavalent Chromium	(mg/L)	<0.0010	-
Zinc	(mg/L)	0.1200	-
Iron	(mg/L)	0.9200	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0040	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	510	-
pH	(s.u.)	7.3	-
E Coli	(organisms/100ml)	400	PCU(298)
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	4.10	-
Cobalt	(mg/L)	0.0010	-

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CUYAHOGA RIVER (24.5) - 06/12/97

Parameter		Value	Excursion
Temperature	(degrees C)	19.5	-
Dissolved Oxygen	(mg/L)	7.7	-
BOD-5	(mg/L)	4	-
COD	(mg/L)	18	-
Suspended Solids	(mg/L)	28	-
Total Solids	(mg/L)	465	-
Dissolved Solids	(mg/L)	392	-
Specific Conductance	(mS/cm)	0.500	-
Turbidity	(NTU)	12.00	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.19	-
Soluble Phosphorus	(mg/L)	0.12	-
Nitrate-N	(mg/L)	2.10	-
TKN	(mg/L)	118.00	-
Chlorides	(mg/L)	169	-
Alkalinity	(mg/L)	88	-
Hardness	(mg/L)	61	-
Nickel	(mg/L)	0.0030	-
Copper	(mg/L)	0.0100	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0500	-
Iron	(mg/L)	1.1000	WHAL(1.0)*
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0050	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	130	-
pH	(s.u.)	7.2	-
E Coli	(organisms/100ml)	92	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	2.90	-

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CUYAHOGA RIVER (24.5) - 09/16/97

Parameter		Value	Excursion
Temperature	(degrees C)	19.0	-
Dissolved Oxygen	(mg/L)	7.5	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	19	-
Suspended Solids	(mg/L)	18	-
Total Solids	(mg/L)	473	-
Dissolved Solids	(mg/L)	436	-
Specific Conductance	(mS/cm)	0.660	-
Turbidity	(NTU)	4.80	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.24	-
Soluble Phosphorus	(mg/L)	0.21	-
Nitrate-N	(mg/L)	3.30	-
TKN	(mg/L)	0.80	-
Chlorides	(mg/L)	84	-
Alkalinity	(mg/L)	143	-
Hardness	(mg/L)	202	-
Nickel	(mg/L)	0.0040	-
Copper	(mg/L)	0.0090	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0500	-
Iron	(mg/L)	0.6700	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0060	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	270	-
pH	(s.u.)	7.1	-
E Coli	(organisms/100ml)	100	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0070	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	4.20	-

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CUYAHOGA RIVER (24.5) - 09/15/98

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	6.4	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	7	-
Total Solids	(mg/L)	650	-
Dissolved Solids	(mg/L)	590	-
Specific Conductance	(mS/cm)	1.000	-
Turbidity	(NTU)	3.50	-
Ammonia-N	(mg/L)	0.05	-
Phosphorus	(mg/L)	0.24	-
Soluble Phosphorus	(mg/L)	0.22	-
Nitrate-N	(mg/L)	0.88	-
TKN	(mg/L)	1.10	-
Chlorides	(mg/L)	180	-
Sulfates	(mg/L)	110	-
Alkalinity	(mg/L)	159	-
Hardness	(mg/L)	261	-
Nickel	(mg/L)	0.0018	-
Copper	(mg/L)	0.0058	-
Total Chromium	(mg/L)	0.0053	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0790	-
Iron	(mg/L)	0.3620	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	660	-
pH	(s.u.)	7.0	-
E Coli	(organisms/100ml)	320	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

BIG CREEK (25) - 07/09/96

Parameter		Value	Excursion
Temperature	(degrees C)	22.5	-
Dissolved Oxygen	(mg/L)	8.3	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	16	-
Suspended Solids	(mg/L)	6	-
Total Solids	(mg/L)	769	-
Dissolved Solids	(mg/L)	735	-
Specific Conductance	(mS/cm)	1.600	-
Turbidity	(NTU)	1.40	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.04	-
Soluble Phosphorus	(mg/L)	0.03	-
Nitrate-N	(mg/L)	0.60	-
TKN	(mg/L)	1.20	-
Chlorides	(mg/L)	284	-
Sulfates	(mg/L)	106	-
Alkalinity	(mg/L)	127	-
Hardness	(mg/L)	222	-
Nickel	(mg/L)	0.0040	-
Copper	(mg/L)	0.0190	-
Total Chromium	(mg/L)	0.0080	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	0.3200	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	3500	PCU(2000)
pH	(s.u.)	7.4	-
E Coli	(organisms/100ml)	1400	PCU(298)
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	4.30	-
Cobalt	(mg/L)	<0.0010	-

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BIG CREEK (25) - 06/10/97

Parameter		Value	Excursion
Temperature	(degrees C)	17.0	-
Dissolved Oxygen	(mg/L)	10.8	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	18	-
Suspended Solids	(mg/L)	6	-
Total Solids	(mg/L)	948	-
Dissolved Solids	(mg/L)	814	-
Specific Conductance	(mS/cm)	1.700	-
Turbidity	(NTU)	2.40	-
Ammonia-N	(mg/L)	0.20	-
Phosphorus	(mg/L)	0.07	-
Soluble Phosphorus	(mg/L)	0.06	-
Nitrate-N	(mg/L)	0.60	-
TKN	(mg/L)	1.00	-
Chlorides	(mg/L)	306	-
Sulfates	(mg/L)	131	-
Alkalinity	(mg/L)	158	-
Hardness	(mg/L)	303	-
Nickel	(mg/L)	0.0070	-
Copper	(mg/L)	0.0070	-
Total Chromium	(mg/L)	<0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	0.3000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	1100	-
pH	(s.u.)	7.4	-
E Coli	(organisms/100ml)	210	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	7.10	-

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WQIS

BIG CREEK (25) - 09/08/97

Parameter		Value	Excursion
Temperature	(degrees C)	19.5	-
Dissolved Oxygen	(mg/L)	7.9	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	17	-
Suspended Solids	(mg/L)	3	-
Total Solids	(mg/L)	633	-
Dissolved Solids	(mg/L)	571	-
Specific Conductance	(mS/cm)	1.300	-
Turbidity	(NTU)	2.20	-
Ammonia-N	(mg/L)	0.20	-
Phosphorus	(mg/L)	0.14	-
Soluble Phosphorus	(mg/L)	0.13	-
Nitrate-N	(mg/L)	0.20	-
TKN	(mg/L)	0.70	-
Chlorides	(mg/L)	210	-
Sulfates	(mg/L)	87	-
Alkalinity	(mg/L)	120	-
Hardness	(mg/L)	195	-
Nickel	(mg/L)	0.0040	-
Copper	(mg/L)	0.0130	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	0.2600	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0040	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	2400	PCU(2000)
pH	(s.u.)	7.7	-
E Coli	(organisms/100ml)	2000	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	5.80	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

BIG CREEK (25) - 08/17/98

Parameter		Value	Excursion
Temperature	(degrees C)	23.0	-
Dissolved Oxygen	(mg/L)	7.8	-
BOD-5	(mg/L)	4	-
COD	(mg/L)	10	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	730	-
Dissolved Solids	(mg/L)	700	-
Specific Conductance	(mS/cm)	1.200	-
Turbidity	(NTU)	1.50	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.10	-
Soluble Phosphorus	(mg/L)	0.09	-
Nitrate-N	(mg/L)	0.30	-
TKN	(mg/L)	0.80	-
Chlorides	(mg/L)	260	-
Sulfates	(mg/L)	110	-
Alkalinity	(mg/L)	125	-
Hardness	(mg/L)	198	-
Nickel	(mg/L)	0.0017	-
Copper	(mg/L)	0.0074	-
Total Chromium	(mg/L)	0.0035	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0540	-
Iron	(mg/L)	0.2160	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	900	-
pH	(s.u.)	6.9	-
E Coli	(organisms/100ml)	590	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

BIG CREEK (26) - 07/09/96

Parameter		Value	Excursion
Temperature	(degrees C)	21.0	-
Dissolved Oxygen	(mg/L)	10.2	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	11	-
Suspended Solids	(mg/L)	1	-
Total Solids	(mg/L)	615	-
Dissolved Solids	(mg/L)	561	-
Specific Conductance	(mS/cm)	1.200	-
Turbidity	(NTU)	0.80	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.04	-
Soluble Phosphorus	(mg/L)	0.04	-
Nitrate-N	(mg/L)	0.40	-
TKN	(mg/L)	0.90	-
Chlorides	(mg/L)	202	-
Sulfates	(mg/L)	105	-
Alkalinity	(mg/L)	153	-
Hardness	(mg/L)	242	-
Nickel	(mg/L)	0.0030	-
Copper	(mg/L)	0.0120	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	0.0800	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	940	-
pH	(s.u.)	8.0	-
E Coli	(organisms/100ml)	140	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	3.10	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

BIG CREEK (26) - 06/10/97

Parameter		Value	Excursion
Temperature	(degrees C)	16.5	-
Dissolved Oxygen	(mg/L)	10.8	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	28	-
Suspended Solids	(mg/L)	4	-
Total Solids	(mg/L)	600	-
Dissolved Solids	(mg/L)	533	-
Specific Conductance	(mS/cm)	1.200	-
Turbidity	(NTU)	1.50	-
Ammonia-N	(mg/L)	0.02	-
Phosphorus	(mg/L)	0.06	-
Soluble Phosphorus	(mg/L)	0.06	-
Nitrate-N	(mg/L)	0.30	-
TKN	(mg/L)	0.70	-
Chlorides	(mg/L)	150	-
Sulfates	(mg/L)	112	-
Alkalinity	(mg/L)	138	-
Hardness	(mg/L)	264	-
Nickel	(mg/L)	0.0080	-
Copper	(mg/L)	0.0090	-
Total Chromium	(mg/L)	<0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.1300	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	450	-
pH	(s.u.)	7.4	-
E Coli	(organisms/100ml)	530	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	3.26	-

NEORSD

WQIS

BIG CREEK (26) - 09/08/97

Parameter		Value	Excursion
Temperature	(degrees C)	18.5	-
Dissolved Oxygen	(mg/L)	10.6	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	13	-
Suspended Solids	(mg/L)	1	-
Total Solids	(mg/L)	418	-
Dissolved Solids	(mg/L)	411	-
Specific Conductance	(mS/cm)	1.000	-
Turbidity	(NTU)	1.60	-
Ammonia-N	(mg/L)	0.03	-
Phosphorus	(mg/L)	0.18	-
Soluble Phosphorus	(mg/L)	0.17	-
Nitrate-N	(mg/L)	0.30	-
TKN	(mg/L)	0.60	-
Chlorides	(mg/L)	98	-
Sulfates	(mg/L)	79	-
Alkalinity	(mg/L)	108	-
Hardness	(mg/L)	186	-
Nickel	(mg/L)	0.0060	-
Copper	(mg/L)	0.0150	-
Total Chromium	(mg/L)	0.0040	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0500	-
Iron	(mg/L)	0.3300	-
Cadmium	(mg/L)	0.0010	-
Lead	(mg/L)	0.0100	-
Mercury	(ug/L)	<0.2000	-
pH	(s.u.)	7.8	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	3.40	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

BIG CREEK (26) - 08/17/98

Parameter		Value	Excursion
Temperature	(degrees C)	21.0	-
Dissolved Oxygen	(mg/L)	9.4	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	370	-
Dissolved Solids	(mg/L)	340	-
Specific Conductance	(mS/cm)	0.600	-
Turbidity	(NTU)	1.50	-
Ammonia-N	(mg/L)	0.01	-
Phosphorus	(mg/L)	0.12	-
Soluble Phosphorus	(mg/L)	0.12	-
Nitrate-N	(mg/L)	0.40	-
TKN	(mg/L)	0.50	-
Chlorides	(mg/L)	88	-
Sulfates	(mg/L)	71	-
Alkalinity	(mg/L)	123	-
Hardness	(mg/L)	172	-
Nickel	(mg/L)	0.0044	-
Copper	(mg/L)	0.0110	-
Total Chromium	(mg/L)	0.0032	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0350	-
Iron	(mg/L)	0.1060	-
Lead	(mg/L)	0.0046	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	1200	-
pH	(s.u.)	7.5	-
E Coli	(organisms/100ml)	850	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

BIG CREEK (27) - 07/09/96

Parameter		Value	Excursion
Temperature	(degrees C)	21.0	-
Dissolved Oxygen	(mg/L)	10.0	-
BOD-5	(mg/L)	4	-
COD	(mg/L)	21	-
Suspended Solids	(mg/L)	3	-
Total Solids	(mg/L)	915	-
Dissolved Solids	(mg/L)	862	-
Specific Conductance	(mS/cm)	1.700	-
Turbidity	(NTU)	2.70	-
Ammonia-N	(mg/L)	0.05	-
Phosphorus	(mg/L)	0.08	-
Soluble Phosphorus	(mg/L)	0.08	-
Nitrate-N	(mg/L)	0.20	-
TKN	(mg/L)	0.90	-
Chlorides	(mg/L)	300	-
Sulfates	(mg/L)	132	-
Alkalinity	(mg/L)	174	-
Hardness	(mg/L)	311	-
Nickel	(mg/L)	0.0050	-
Copper	(mg/L)	0.0140	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	0.3700	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	400	-
pH	(s.u.)	7.6	-
E Coli	(organisms/100ml)	300	PCU(298)
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	5.10	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

BIG CREEK (27) - 06/10/97

Parameter		Value	Excursion
Temperature	(degrees C)	17.5	-
Dissolved Oxygen	(mg/L)	9.3	-
BOD-5	(mg/L)	4	-
COD	(mg/L)	29	-
Suspended Solids	(mg/L)	12	-
Total Solids	(mg/L)	1024	-
Dissolved Solids	(mg/L)	911	-
Specific Conductance	(mS/cm)	1.800	-
Turbidity	(NTU)	6.70	-
Ammonia-N	(mg/L)	0.20	-
Phosphorus	(mg/L)	0.24	-
Soluble Phosphorus	(mg/L)	0.14	-
Nitrate-N	(mg/L)	0.70	-
TKN	(mg/L)	1.20	-
Chlorides	(mg/L)	360	-
Alkalinity	(mg/L)	330	-
Hardness	(mg/L)	152	-
Nickel	(mg/L)	0.0140	-
Copper	(mg/L)	0.0200	-
Total Chromium	(mg/L)	0.0040	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0900	-
Iron	(mg/L)	1.9000	WHAL(1.0)*
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0090	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	2900	PCU(2000)
pH	(s.u.)	6.5	-
E Coli	(organisms/100ml)	3100	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	5.90	-

NEORSD

WQIS

BIG CREEK (27) - 09/08/97

Parameter		Value	Excursion
Temperature	(degrees C)	18.5	-
Dissolved Oxygen	(mg/L)	6.1	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	23	-
Suspended Solids	(mg/L)	6	-
Total Solids	(mg/L)	570	-
Dissolved Solids	(mg/L)	540	-
Specific Conductance	(mS/cm)	1.200	-
Turbidity	(NTU)	3.60	-
Ammonia-N	(mg/L)	0.40	-
Phosphorus	(mg/L)	0.28	-
Soluble Phosphorus	(mg/L)	0.24	-
Nitrate-N	(mg/L)	0.20	-
TKN	(mg/L)	1.10	-
Chlorides	(mg/L)	206	-
Sulfates	(mg/L)	95	-
Alkalinity	(mg/L)	157	-
Hardness	(mg/L)	222	-
Nickel	(mg/L)	0.0040	-
Copper	(mg/L)	0.0100	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	0.5600	-
Cadmium	(mg/L)	0.0010	-
Lead	(mg/L)	0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	2760	PCU(2000)
pH	(s.u.)	7.3	-
E Coli	(organisms/100ml)	1400	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	4.60	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

BIG CREEK (27) - 08/17/98

Parameter		Value	Excursion
Temperature	(degrees C)	21.0	-
Dissolved Oxygen	(mg/L)	7.0	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	540	-
Dissolved Solids	(mg/L)	520	-
Specific Conductance	(mS/cm)	0.900	-
Turbidity	(NTU)	2.50	-
Ammonia-N	(mg/L)	0.02	-
Phosphorus	(mg/L)	0.12	-
Soluble Phosphorus	(mg/L)	0.11	-
Nitrate-N	(mg/L)	0.24	-
TKN	(mg/L)	0.70	-
Chlorides	(mg/L)	160	-
Sulfates	(mg/L)	85	-
Alkalinity	(mg/L)	146	-
Hardness	(mg/L)	201	-
Nickel	(mg/L)	0.0030	-
Copper	(mg/L)	0.0074	-
Total Chromium	(mg/L)	<0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0650	-
Iron	(mg/L)	0.2930	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0032	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	230	-
pH	(s.u.)	7.1	-
E Coli	(organisms/100ml)	190	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

BIG CREEK (28) - 07/09/96

Parameter		Value	Excursion
Temperature	(degrees C)	23.0	-
Dissolved Oxygen	(mg/L)	12.0	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	12	-
Suspended Solids	(mg/L)	1	-
Total Solids	(mg/L)	504	-
Dissolved Solids	(mg/L)	478	-
Specific Conductance	(mS/cm)	1.900	-
Turbidity	(NTU)	0.50	-
Ammonia-N	(mg/L)	0.04	-
Phosphorus	(mg/L)	0.21	-
Soluble Phosphorus	(mg/L)	0.21	-
Nitrate-N	(mg/L)	0.80	-
TKN	(mg/L)	0.90	-
Chlorides	(mg/L)	146	-
Sulfates	(mg/L)	66	-
Alkalinity	(mg/L)	129	-
Hardness	(mg/L)	190	-
Nickel	(mg/L)	0.0040	-
Copper	(mg/L)	0.0100	-
Total Chromium	(mg/L)	<0.0010	-
Zinc	(mg/L)	0.0100	-
Iron	(mg/L)	0.0400	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	2000	-
pH	(s.u.)	7.8	-
E Coli	(organisms/100ml)	1300	PCU(298)
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	2.80	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

BIG CREEK (28) - 06/10/97

Parameter		Value	Excursion
Temperature	(degrees C)	23.0	-
Dissolved Oxygen	(mg/L)	16.4	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	25	-
Suspended Solids	(mg/L)	11	-
Total Solids	(mg/L)	762	-
Dissolved Solids	(mg/L)	660	-
Specific Conductance	(mS/cm)	1.400	-
Turbidity	(NTU)	5.70	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.14	-
Soluble Phosphorus	(mg/L)	0.08	-
Nitrate-N	(mg/L)	0.70	-
TKN	(mg/L)	1.30	-
Chlorides	(mg/L)	230	-
Sulfates	(mg/L)	94	-
Alkalinity	(mg/L)	166	-
Hardness	(mg/L)	280	-
Nickel	(mg/L)	0.0060	-
Copper	(mg/L)	0.0070	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0500	-
Iron	(mg/L)	0.5500	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0050	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	280	-
pH	(s.u.)	7.5	-
E Coli	(organisms/100ml)	300	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	0.0070	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	5.00	-

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WQIS

BIG CREEK (28) - 09/08/97

Parameter		Value	Excursion
Temperature	(degrees C)	20.0	-
Dissolved Oxygen	(mg/L)	10.0	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	18	-
Suspended Solids	(mg/L)	4	-
Total Solids	(mg/L)	544	-
Dissolved Solids	(mg/L)	531	-
Specific Conductance	(mS/cm)	1.200	-
Turbidity	(NTU)	3.10	-
Ammonia-N	(mg/L)	0.02	-
Phosphorus	(mg/L)	0.19	-
Soluble Phosphorus	(mg/L)	0.13	-
Nitrate-N	(mg/L)	0.40	-
TKN	(mg/L)	0.70	-
Chlorides	(mg/L)	244	-
Sulfates	(mg/L)	74	-
Alkalinity	(mg/L)	136	-
Hardness	(mg/L)	210	-
Nickel	(mg/L)	0.0020	-
Copper	(mg/L)	0.0120	-
Total Chromium	(mg/L)	0.0030	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0500	-
Iron	(mg/L)	0.4800	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0070	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	2200	PCU(2000)
pH	(s.u.)	7.9	-
E Coli	(organisms/100ml)	1233	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	31.80	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

BIG CREEK (28) - 08/17/98

Parameter		Value	Excursion
Temperature	(degrees C)	24.0	-
Dissolved Oxygen	(mg/L)	12.0	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	10	-
Suspended Solids	(mg/L)	4	-
Total Solids	(mg/L)	380	-
Dissolved Solids	(mg/L)	340	-
Specific Conductance	(mS/cm)	0.600	-
Turbidity	(NTU)	4.00	-
Ammonia-N	(mg/L)	0.02	-
Phosphorus	(mg/L)	0.18	-
Soluble Phosphorus	(mg/L)	0.10	-
Nitrate-N	(mg/L)	0.20	-
TKN	(mg/L)	0.90	-
Chlorides	(mg/L)	86	-
Sulfates	(mg/L)	52	-
Alkalinity	(mg/L)	138	-
Hardness	(mg/L)	166	-
Nickel	(mg/L)	0.0040	-
Copper	(mg/L)	0.0099	-
Total Chromium	(mg/L)	0.0022	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0420	-
Iron	(mg/L)	0.3840	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0061	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	330	-
pH	(s.u.)	7.6	-
E Coli	(organisms/100ml)	250	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

BIG CREEK (29) - 07/09/96

Parameter		Value	Excursion
Temperature	(degrees C)	21.0	-
Dissolved Oxygen	(mg/L)	9.5	-
BOD-5	(mg/L)	6	-
COD	(mg/L)	893	-
Suspended Solids	(mg/L)	3	-
Total Solids	(mg/L)	680	-
Dissolved Solids	(mg/L)	604	-
Specific Conductance	(mS/cm)	1.300	-
Turbidity	(NTU)	1.50	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.50	-
Soluble Phosphorus	(mg/L)	0.50	-
Nitrate-N	(mg/L)	0.80	-
TKN	(mg/L)	0.80	-
Chlorides	(mg/L)	178	-
Sulfates	(mg/L)	122	-
Alkalinity	(mg/L)	127	-
Hardness	(mg/L)	266	-
Nickel	(mg/L)	0.0030	-
Copper	(mg/L)	0.0160	-
Total Chromium	(mg/L)	<0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0700	-
Iron	(mg/L)	0.1100	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	29000	PCU(2000)
pH	(s.u.)	7.8	-
E Coli	(organisms/100ml)	15000	PCU(298)
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	0.0090	WHAL(0.0086)
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	3.40	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

BIG CREEK (29) - 06/10/97

Parameter		Value	Excursion
Temperature	(degrees C)	17.0	-
Dissolved Oxygen	(mg/L)	11.0	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	10	-
Suspended Solids	(mg/L)	3	-
Total Solids	(mg/L)	497	-
Dissolved Solids	(mg/L)	400	-
Specific Conductance	(mS/cm)	1.100	-
Turbidity	(NTU)	1.60	-
Ammonia-N	(mg/L)	0.03	-
Phosphorus	(mg/L)	0.14	-
Soluble Phosphorus	(mg/L)	0.13	-
Nitrate-N	(mg/L)	0.50	-
TKN	(mg/L)	1.10	-
Chlorides	(mg/L)	98	-
Sulfates	(mg/L)	85	-
Alkalinity	(mg/L)	118	-
Hardness	(mg/L)	228	-
Nickel	(mg/L)	0.0030	-
Copper	(mg/L)	0.0040	-
Total Chromium	(mg/L)	<0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0500	-
Iron	(mg/L)	0.1400	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	36	-
pH	(s.u.)	7.4	-
E Coli	(organisms/100ml)	4	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	2.80	-

NEORSD

WQIS

BIG CREEK (29) - 09/08/97

Parameter		Value	Excursion
Temperature	(degrees C)	18.0	-
Dissolved Oxygen	(mg/L)	10.0	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	11	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	396	-
Dissolved Solids	(mg/L)	372	-
Specific Conductance	(mS/cm)	0.550	-
Turbidity	(NTU)	103.00	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.21	-
Soluble Phosphorus	(mg/L)	0.16	-
Nitrate-N	(mg/L)	0.40	-
TKN	(mg/L)	0.40	-
Chlorides	(mg/L)	78	-
Sulfates	(mg/L)	71	-
Alkalinity	(mg/L)	115	-
Hardness	(mg/L)	181	-
Nickel	(mg/L)	0.0010	-
Copper	(mg/L)	0.0090	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0900	-
Iron	(mg/L)	0.1100	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	5400	PCU(2000)
pH	(s.u.)	7.8	-
E Coli	(organisms/100ml)	1500	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	2.50	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

BIG CREEK (29) - 08/17/98

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	8.2	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	5	-
Total Solids	(mg/L)	410	-
Dissolved Solids	(mg/L)	370	-
Specific Conductance	(mS/cm)	0.700	-
Turbidity	(NTU)	5.50	-
Ammonia-N	(mg/L)	0.20	-
Phosphorus	(mg/L)	0.18	-
Soluble Phosphorus	(mg/L)	0.17	-
Nitrate-N	(mg/L)	0.30	-
TKN	(mg/L)	0.60	-
Chlorides	(mg/L)	93	-
Sulfates	(mg/L)	79	-
Alkalinity	(mg/L)	124	-
Hardness	(mg/L)	196	-
Nickel	(mg/L)	0.0016	-
Copper	(mg/L)	0.0042	-
Total Chromium	(mg/L)	<0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0670	-
Iron	(mg/L)	0.2580	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	28000	PCU(2000)
pH	(s.u.)	7.7	-
E Coli	(organisms/100ml)	8000	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

BIG CREEK (30) - 07/09/96

Parameter		Value	Excursion
Temperature	(degrees C)	21.0	-
Dissolved Oxygen	(mg/L)	9.0	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	15	-
Suspended Solids	(mg/L)	59	-
Total Solids	(mg/L)	1075	-
Dissolved Solids	(mg/L)	946	-
Specific Conductance	(mS/cm)	1.100	-
Turbidity	(NTU)	16.00	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.28	-
Soluble Phosphorus	(mg/L)	0.10	-
Nitrate-N	(mg/L)	0.10	-
TKN	(mg/L)	1.30	-
Chlorides	(mg/L)	372	-
Sulfates	(mg/L)	111	-
Alkalinity	(mg/L)	186	-
Hardness	(mg/L)	315	-
Nickel	(mg/L)	0.0100	-
Copper	(mg/L)	0.0250	-
Total Chromium	(mg/L)	0.0100	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.1600	-
Iron	(mg/L)	2.0000	WHAL(1.0)*
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0220	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	2300	PCU(2000)
pH	(s.u.)	7.7	-
E Coli	(organisms/100ml)	2400	PCU(298)
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	5.60	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

BIG CREEK (30) - 06/10/97

Parameter		Value	Excursion
Temperature	(degrees C)	16.0	-
Dissolved Oxygen	(mg/L)	10.8	-
BOD-5	(mg/L)	4	-
COD	(mg/L)	18	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	570	-
Dissolved Solids	(mg/L)	475	-
Specific Conductance	(mS/cm)	1.100	-
Turbidity	(NTU)	1.50	-
Ammonia-N	(mg/L)	0.03	-
Phosphorus	(mg/L)	0.15	-
Soluble Phosphorus	(mg/L)	0.14	-
Nitrate-N	(mg/L)	0.10	-
TKN	(mg/L)	0.70	-
Chlorides	(mg/L)	174	-
Sulfates	(mg/L)	80	-
Alkalinity	(mg/L)	153	-
Hardness	(mg/L)	246	-
Nickel	(mg/L)	0.0040	-
Copper	(mg/L)	0.0080	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0200	-
Iron	(mg/L)	0.1500	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	1200	-
pH	(s.u.)	7.3	-
E Coli	(organisms/100ml)	590	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	2.60	-

NEORSD

WQIS

BIG CREEK (30) - 09/08/97

Parameter		Value	Excursion
Temperature	(degrees C)	18.0	-
Dissolved Oxygen	(mg/L)	7.6	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	12	-
Suspended Solids	(mg/L)	1	-
Total Solids	(mg/L)	403	-
Dissolved Solids	(mg/L)	397	-
Specific Conductance	(mS/cm)	1.000	-
Turbidity	(NTU)	1.80	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.26	-
Soluble Phosphorus	(mg/L)	0.25	-
Nitrate-N	(mg/L)	0.30	-
TKN	(mg/L)	0.70	-
Chlorides	(mg/L)	100	-
Sulfates	(mg/L)	58	-
Alkalinity	(mg/L)	124	-
Hardness	(mg/L)	172	-
Nickel	(mg/L)	0.0030	-
Copper	(mg/L)	0.0090	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.3000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	4000	PCU(2000)
pH	(s.u.)	7.4	-
E Coli	(organisms/100ml)	1550	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	3.40	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

BIG CREEK (30) - 08/17/98

Parameter		Value	Excursion
Temperature	(degrees C)	21.0	-
Dissolved Oxygen	(mg/L)	9.2	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	420	-
Dissolved Solids	(mg/L)	400	-
Specific Conductance	(mS/cm)	0.700	-
Turbidity	(NTU)	0.80	-
Ammonia-N	(mg/L)	0.01	-
Phosphorus	(mg/L)	0.23	-
Soluble Phosphorus	(mg/L)	0.23	-
Nitrate-N	(mg/L)	0.90	-
TKN	(mg/L)	0.70	-
Chlorides	(mg/L)	110	-
Sulfates	(mg/L)	67	-
Alkalinity	(mg/L)	126	-
Hardness	(mg/L)	173	-
Nickel	(mg/L)	0.0040	-
Copper	(mg/L)	0.0095	-
Total Chromium	(mg/L)	0.0032	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0260	-
Iron	(mg/L)	0.1210	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	3400	-
pH	(s.u.)	7.6	-
E Coli	(organisms/100ml)	610	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

MILL CREEK (31) - 07/08/96

Parameter		Value	Excursion
Temperature	(degrees C)	23.0	-
Dissolved Oxygen	(mg/L)	7.2	-
BOD-5	(mg/L)	7	-
COD	(mg/L)	32	-
Suspended Solids	(mg/L)	11	-
Total Solids	(mg/L)	943	-
Dissolved Solids	(mg/L)	832	-
Specific Conductance	(mS/cm)	1.700	-
Turbidity	(NTU)	10.00	-
Ammonia-N	(mg/L)	0.40	-
Phosphorus	(mg/L)	0.26	-
Soluble Phosphorus	(mg/L)	0.08	-
Nitrate-N	(mg/L)	1.10	-
TKN	(mg/L)	1.60	-
Chlorides	(mg/L)	262	-
Sulfates	(mg/L)	141	-
Alkalinity	(mg/L)	237	-
Hardness	(mg/L)	406	-
Nickel	(mg/L)	0.0070	-
Copper	(mg/L)	0.0200	-
Total Chromium	(mg/L)	0.0040	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	1.6000	WHAL(1.0)*
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0030	-
Mercury	(ug/L)	0.2000	HHSR(0.012)*
Fecal Coliform	(organisms/100ml)	22000	PCU(2000)
pH	(s.u.)	7.3	-
E Coli	(organisms/100ml)	9000	PCU(298)
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	24.30	-
Cobalt	(mg/L)	0.0010	-

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WQIS

MILL CREEK (31) - 05/28/97

Parameter		Value	Excursion
Temperature	(degrees C)	15.0	-
Dissolved Oxygen	(mg/L)	11.2	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	14	-
Suspended Solids	(mg/L)	12	-
Total Solids	(mg/L)	910	-
Dissolved Solids	(mg/L)	786	-
Specific Conductance	(mS/cm)	1.700	-
Turbidity	(NTU)	13.00	-
Ammonia-N	(mg/L)	0.60	-
Phosphorus	(mg/L)	0.06	-
Soluble Phosphorus	(mg/L)	0.04	-
Nitrate-N	(mg/L)	0.90	-
TKN	(mg/L)	1.10	-
Chlorides	(mg/L)	240	-
Sulfates	(mg/L)	127	-
Alkalinity	(mg/L)	224	-
Hardness	(mg/L)	337	-
Nickel	(mg/L)	0.0090	-
Copper	(mg/L)	0.0170	-
Total Chromium	(mg/L)	0.0030	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0800	-
Iron	(mg/L)	1.8000	WHAL(1.0)*
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0040	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	270	-
pH	(s.u.)	7.0	-
E Coli	(organisms/100ml)	80	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	13.30	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

MILL CREEK (31) - 07/31/97

Parameter		Value	Excursion
Temperature	(degrees C)	23.0	-
Dissolved Oxygen	(mg/L)	9.0	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	21	-
Suspended Solids	(mg/L)	3	-
Total Solids	(mg/L)	882	-
Dissolved Solids	(mg/L)	876	-
Specific Conductance	(mS/cm)	1.500	-
Turbidity	(NTU)	7.30	-
Ammonia-N	(mg/L)	0.20	-
Phosphorus	(mg/L)	0.11	-
Soluble Phosphorus	(mg/L)	0.08	-
Nitrate-N	(mg/L)	7.50	-
TKN	(mg/L)	1.00	-
Chlorides	(mg/L)	228	-
Sulfates	(mg/L)	157	-
Alkalinity	(mg/L)	212	-
Hardness	(mg/L)	346	-
Nickel	(mg/L)	0.0080	-
Copper	(mg/L)	0.0060	-
Total Chromium	(mg/L)	0.0010	-
Zinc	(mg/L)	0.0600	-
Iron	(mg/L)	1.0000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	180	-
pH	(s.u.)	7.1	-
E Coli	(organisms/100ml)	140	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	17.30	-

NEORSD

WQIS

MILL CREEK (31) - 07/28/98

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	7.2	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	19	-
Suspended Solids	(mg/L)	7	-
Total Solids	(mg/L)	800	-
Dissolved Solids	(mg/L)	780	-
Specific Conductance	(mS/cm)	1.300	-
Turbidity	(NTU)	7.00	-
Ammonia-N	(mg/L)	0.50	-
Phosphorus	(mg/L)	0.06	-
Soluble Phosphorus	(mg/L)	0.04	-
Nitrate-N	(mg/L)	1.20	-
TKN	(mg/L)	1.10	-
Chlorides	(mg/L)	210	-
Sulfates	(mg/L)	160	-
Alkalinity	(mg/L)	194	-
Hardness	(mg/L)	352	-
Nickel	(mg/L)	0.0130	-
Copper	(mg/L)	0.0010	-
Total Chromium	(mg/L)	0.0180	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.1100	-
Iron	(mg/L)	1.3940	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	360	-
pH	(s.u.)	7.8	-
E Coli	(organisms/100ml)	230	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

MILL CREEK (32) - 07/08/96

Parameter		Value	Excursion
Temperature	(degrees C)	21.0	-
Dissolved Oxygen	(mg/L)	5.8	-
BOD-5	(mg/L)	4	-
COD	(mg/L)	17	-
Suspended Solids	(mg/L)	1	-
Total Solids	(mg/L)	487	-
Dissolved Solids	(mg/L)	424	-
Specific Conductance	(mS/cm)	1.000	-
Turbidity	(NTU)	2.50	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.09	-
Soluble Phosphorus	(mg/L)	0.09	-
Nitrate-N	(mg/L)	0.60	-
TKN	(mg/L)	0.40	-
Chlorides	(mg/L)	106	-
Sulfates	(mg/L)	99	-
Alkalinity	(mg/L)	180	-
Hardness	(mg/L)	237	-
Nickel	(mg/L)	0.0040	-
Copper	(mg/L)	0.0200	-
Total Chromium	(mg/L)	0.0030	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0200	-
Iron	(mg/L)	0.4200	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0040	-
Mercury	(ug/L)	<0.3000	-
Fecal Coliform	(organisms/100ml)	550	-
pH	(s.u.)	7.4	-
E Coli	(organisms/100ml)	390	PCU(298)
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	6.80	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

MILL CREEK (32) - 05/28/97

Parameter		Value	Excursion
Temperature	(degrees C)	13.5	-
Dissolved Oxygen	(mg/L)	10.0	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	4	-
Total Solids	(mg/L)	603	-
Dissolved Solids	(mg/L)	494	-
Specific Conductance	(mS/cm)	1.200	-
Turbidity	(NTU)	2.60	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.05	-
Soluble Phosphorus	(mg/L)	0.04	-
Nitrate-N	(mg/L)	1.40	-
TKN	(mg/L)	0.60	-
Chlorides	(mg/L)	130	-
Sulfates	(mg/L)	91	-
Alkalinity	(mg/L)	166	-
Hardness	(mg/L)	286	-
Nickel	(mg/L)	0.0090	-
Copper	(mg/L)	0.0130	-
Total Chromium	(mg/L)	0.0060	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.3900	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0040	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	2300	PCU(2000)
pH	(s.u.)	7.2	-
E Coli	(organisms/100ml)	460	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	7.70	-
Cobalt	(mg/L)	<0.0010	-

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MILL CREEK (32) - 07/31/97

Parameter		Value	Excursion
Temperature	(degrees C)	19.0	-
Dissolved Oxygen	(mg/L)	7.7	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	10	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	402	-
Dissolved Solids	(mg/L)	356	-
Specific Conductance	(mS/cm)	0.580	-
Turbidity	(NTU)	1.40	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.15	-
Soluble Phosphorus	(mg/L)	0.14	-
Nitrate-N	(mg/L)	0.94	-
TKN	(mg/L)	0.60	-
Chlorides	(mg/L)	75	-
Sulfates	(mg/L)	74	-
Alkalinity	(mg/L)	148	-
Hardness	(mg/L)	191	-
Nickel	(mg/L)	0.0080	-
Copper	(mg/L)	0.0060	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.2500	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	5400	PCU(2000)
pH	(s.u.)	7.3	-
E Coli	(organisms/100ml)	4000	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	6.90	-

NEORSD

WQIS

MILL CREEK (32) - 07/28/98

Parameter		Value	Excursion
Temperature	(degrees C)	20.0	-
Dissolved Oxygen	(mg/L)	8.2	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	360	-
Dissolved Solids	(mg/L)	350	-
Specific Conductance	(mS/cm)	0.600	-
Turbidity	(NTU)	2.50	-
Ammonia-N	(mg/L)	0.02	-
Phosphorus	(mg/L)	0.08	-
Soluble Phosphorus	(mg/L)	0.07	-
Nitrate-N	(mg/L)	1.10	-
TKN	(mg/L)	0.30	-
Chlorides	(mg/L)	68	-
Sulfates	(mg/L)	66	-
Alkalinity	(mg/L)	136	-
Hardness	(mg/L)	192	-
Nickel	(mg/L)	0.0066	-
Copper	(mg/L)	0.0071	-
Total Chromium	(mg/L)	0.0200	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0650	-
Iron	(mg/L)	0.2320	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	310	-
pH	(s.u.)	8.3	-
E Coli	(organisms/100ml)	260	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

MILL CREEK (33) - 07/08/96

Parameter		Value	Excursion
Temperature	(degrees C)	21.0	-
Dissolved Oxygen	(mg/L)	7.3	-
BOD-5	(mg/L)	4	-
COD	(mg/L)	15	-
Suspended Solids	(mg/L)	<1	-
Total Solids	(mg/L)	1025	-
Dissolved Solids	(mg/L)	887	-
Specific Conductance	(mS/cm)	1.800	-
Turbidity	(NTU)	1.80	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.10	-
Soluble Phosphorus	(mg/L)	0.11	-
Nitrate-N	(mg/L)	1.40	-
TKN	(mg/L)	1.10	-
Chlorides	(mg/L)	298	-
Sulfates	(mg/L)	178	-
Alkalinity	(mg/L)	175	-
Hardness	(mg/L)	356	-
Nickel	(mg/L)	0.0050	-
Copper	(mg/L)	0.0260	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	0.2600	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	0.2000	HHSR(0.012)*
Fecal Coliform	(organisms/100ml)	1900	-
pH	(s.u.)	7.2	-
E Coli	(organisms/100ml)	11000	PCU(298)
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	5.90	-
Cobalt	(mg/L)	<0.0010	-

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MILL CREEK (33) - 05/28/97

Parameter		Value	Excursion
Temperature	(degrees C)	13.5	-
Dissolved Oxygen	(mg/L)	10.6	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	14	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	920	-
Dissolved Solids	(mg/L)	828	-
Specific Conductance	(mS/cm)	1.800	-
Turbidity	(NTU)	2.40	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.06	-
Soluble Phosphorus	(mg/L)	0.06	-
Nitrate-N	(mg/L)	1.40	-
TKN	(mg/L)	0.80	-
Chlorides	(mg/L)	204	-
Sulfates	(mg/L)	119	-
Alkalinity	(mg/L)	282	-
Hardness	(mg/L)	334	-
Nickel	(mg/L)	0.0070	-
Copper	(mg/L)	0.0140	-
Total Chromium	(mg/L)	0.0040	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.3900	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	1000	-
pH	(s.u.)	7.1	-
E Coli	(organisms/100ml)	560	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

MILL CREEK (33) - 07/31/97

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	8.0	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	21	-
Suspended Solids	(mg/L)	<1	-
Total Solids	(mg/L)	601	-
Dissolved Solids	(mg/L)	582	-
Specific Conductance	(mS/cm)	1.400	-
Turbidity	(NTU)	3.60	-
Ammonia-N	(mg/L)	0.20	-
Phosphorus	(mg/L)	0.21	-
Soluble Phosphorus	(mg/L)	0.20	-
Nitrate-N	(mg/L)	0.30	-
TKN	(mg/L)	1.00	-
Chlorides	(mg/L)	184	-
Sulfates	(mg/L)	115	-
Alkalinity	(mg/L)	143	-
Hardness	(mg/L)	238	-
Nickel	(mg/L)	0.0060	-
Copper	(mg/L)	0.0100	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0200	-
Iron	(mg/L)	0.4900	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	140	-
pH	(s.u.)	7.0	-
E Coli	(organisms/100ml)	61	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	5.30	-

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WQIS

MILL CREEK (33) - 07/28/98

Parameter		Value	Excursion
Temperature	(degrees C)	20.0	-
Dissolved Oxygen	(mg/L)	7.2	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	680	-
Dissolved Solids	(mg/L)	660	-
Specific Conductance	(mS/cm)	1.200	-
Turbidity	(NTU)	2.00	-
Ammonia-N	(mg/L)	0.03	-
Phosphorus	(mg/L)	0.19	-
Soluble Phosphorus	(mg/L)	0.15	-
Nitrate-N	(mg/L)	1.50	-
TKN	(mg/L)	0.60	-
Chlorides	(mg/L)	200	-
Sulfates	(mg/L)	130	-
Alkalinity	(mg/L)	140	-
Hardness	(mg/L)	207	-
Nickel	(mg/L)	0.0045	-
Copper	(mg/L)	0.0078	-
Total Chromium	(mg/L)	0.0210	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0720	-
Iron	(mg/L)	0.3520	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	580	-
pH	(s.u.)	8.4	-
E Coli	(organisms/100ml)	500	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

MILL CREEK (33.5) - 07/08/96

Parameter		Value	Excursion
Temperature	(degrees C)	21.0	-
Dissolved Oxygen	(mg/L)	2.5	WHAL(4.0)
BOD-5	(mg/L)	8	-
COD	(mg/L)	29	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	706	-
Dissolved Solids	(mg/L)	654	-
Specific Conductance	(mS/cm)	1.400	-
Turbidity	(NTU)	4.00	-
Ammonia-N	(mg/L)	0.80	-
Phosphorus	(mg/L)	0.32	-
Soluble Phosphorus	(mg/L)	0.30	-
Nitrate-N	(mg/L)	0.20	-
TKN	(mg/L)	2.20	-
Chlorides	(mg/L)	220	-
Sulfates	(mg/L)	90	-
Alkalinity	(mg/L)	208	-
Hardness	(mg/L)	272	-
Nickel	(mg/L)	0.0050	-
Copper	(mg/L)	0.0120	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0010	-
Zinc	(mg/L)	0.0200	-
Iron	(mg/L)	0.5700	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	2300	PCU(2000)
pH	(s.u.)	7.0	-
E Coli	(organisms/100ml)	1400	PCU(298)
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	5.70	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

MILL CREEK (33.5) - 05/28/97

Parameter		Value	Excursion
Temperature	(degrees C)	13.0	-
Dissolved Oxygen	(mg/L)	7.0	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	20	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	670	-
Dissolved Solids	(mg/L)	597	-
Specific Conductance	(mS/cm)	1.400	-
Turbidity	(NTU)	4.20	-
Ammonia-N	(mg/L)	0.60	-
Phosphorus	(mg/L)	0.15	-
Soluble Phosphorus	(mg/L)	0.14	-
Nitrate-N	(mg/L)	1.10	-
TKN	(mg/L)	1.40	-
Chlorides	(mg/L)	164	-
Sulfates	(mg/L)	93	-
Alkalinity	(mg/L)	213	-
Hardness	(mg/L)	214	-
Nickel	(mg/L)	0.0050	-
Copper	(mg/L)	0.0090	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.4700	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	5900	PCU(2000)
pH	(s.u.)	6.9	-
E Coli	(organisms/100ml)	1100	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	5.60	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

MILL CREEK (33.5) - 07/31/97

Parameter		Value	Excursion
Temperature	(degrees C)	19.5	-
Dissolved Oxygen	(mg/L)	7.3	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	18	-
Suspended Solids	(mg/L)	<1	-
Total Solids	(mg/L)	544	-
Dissolved Solids	(mg/L)	507	-
Specific Conductance	(mS/cm)	1.200	-
Turbidity	(NTU)	2.31	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.24	-
Soluble Phosphorus	(mg/L)	0.23	-
Nitrate-N	(mg/L)	0.01	-
TKN	(mg/L)	0.70	-
Chlorides	(mg/L)	144	-
Sulfates	(mg/L)	67	-
Alkalinity	(mg/L)	149	-
Hardness	(mg/L)	214	-
Nickel	(mg/L)	0.0030	-
Copper	(mg/L)	0.0080	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0100	-
Iron	(mg/L)	0.2300	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	320	-
pH	(s.u.)	7.3	-
E Coli	(organisms/100ml)	330	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	5.30	-

NEORSD

WQIS

MILL CREEK (33.5) - 07/28/98

Parameter		Value	Excursion
Temperature	(degrees C)	21.0	-
Dissolved Oxygen	(mg/L)	6.8	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	10	-
Suspended Solids	(mg/L)	4	-
Total Solids	(mg/L)	400	-
Dissolved Solids	(mg/L)	370	-
Specific Conductance	(mS/cm)	0.700	-
Turbidity	(NTU)	3.80	-
Ammonia-N	(mg/L)	0.20	-
Phosphorus	(mg/L)	0.28	-
Soluble Phosphorus	(mg/L)	0.28	-
Nitrate-N	(mg/L)	1.00	-
TKN	(mg/L)	0.50	-
Chlorides	(mg/L)	100	-
Sulfates	(mg/L)	54	-
Alkalinity	(mg/L)	126	-
Hardness	(mg/L)	187	-
Nickel	(mg/L)	0.0056	-
Copper	(mg/L)	0.0069	-
Total Chromium	(mg/L)	0.0180	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0290	-
Iron	(mg/L)	0.3050	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	9700	PCU(2000)
pH	(s.u.)	8.4	-
E Coli	(organisms/100ml)	3900	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

MILL CREEK (34) - 07/08/96

Parameter		Value	Excursion
Temperature	(degrees C)	21.0	-
Dissolved Oxygen	(mg/L)	6.4	-
BOD-5	(mg/L)	10	-
COD	(mg/L)	65	-
Suspended Solids	(mg/L)	13	-
Total Solids	(mg/L)	594	-
Dissolved Solids	(mg/L)	518	-
Specific Conductance	(mS/cm)	1.300	-
Turbidity	(NTU)	6.30	-
Ammonia-N	(mg/L)	4.70	-
Phosphorus	(mg/L)	0.92	-
Soluble Phosphorus	(mg/L)	0.76	-
Nitrate-N	(mg/L)	0.70	-
TKN	(mg/L)	6.90	-
Chlorides	(mg/L)	204	-
Sulfates	(mg/L)	67	-
Alkalinity	(mg/L)	149	-
Hardness	(mg/L)	192	-
Nickel	(mg/L)	0.0040	-
Copper	(mg/L)	0.0400	WHAL(0.0342)
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0200	-
Iron	(mg/L)	0.3000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	25000	PCU(2000)
pH	(s.u.)	7.4	-
E Coli	(organisms/100ml)	13000	PCU(298)
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	4.10	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

MILL CREEK (34) - 05/28/97

Parameter		Value	Excursion
Temperature	(degrees C)	13.0	-
Dissolved Oxygen	(mg/L)	12.5	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	785	-
Dissolved Solids	(mg/L)	728	-
Specific Conductance	(mS/cm)	1.600	-
Turbidity	(NTU)	2.00	-
Ammonia-N	(mg/L)	0.04	-
Phosphorus	(mg/L)	0.08	-
Soluble Phosphorus	(mg/L)	0.08	-
Nitrate-N	(mg/L)	0.20	-
TKN	(mg/L)	0.70	-
Chlorides	(mg/L)	268	-
Sulfates	(mg/L)	38	-
Alkalinity	(mg/L)	182	-
Hardness	(mg/L)	242	-
Nickel	(mg/L)	0.0060	-
Copper	(mg/L)	0.0090	-
Total Chromium	(mg/L)	0.0030	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0150	-
Iron	(mg/L)	0.2500	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	860	-
pH	(s.u.)	7.7	-
E Coli	(organisms/100ml)	260	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	3.30	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

MILL CREEK (34) - 07/31/97

Parameter		Value	Excursion
Temperature	(degrees C)	20.0	-
Dissolved Oxygen	(mg/L)	9.3	-
BOD-5	(mg/L)	4	-
COD	(mg/L)	17	-
Suspended Solids	(mg/L)	<1	-
Total Solids	(mg/L)	570	-
Dissolved Solids	(mg/L)	506	-
Specific Conductance	(mS/cm)	1.300	-
Turbidity	(NTU)	1.60	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.27	-
Soluble Phosphorus	(mg/L)	0.26	-
Nitrate-N	(mg/L)	0.40	-
TKN	(mg/L)	0.80	-
Chlorides	(mg/L)	178	-
Sulfates	(mg/L)	61	-
Alkalinity	(mg/L)	149	-
Hardness	(mg/L)	212	-
Nickel	(mg/L)	0.0020	-
Copper	(mg/L)	0.0080	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.1800	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	750	-
pH	(s.u.)	7.5	-
E Coli	(organisms/100ml)	760	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	3.90	-

NEORSD

WQIS

MILL CREEK (34) - 07/28/98

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	10.0	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	15	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	540	-
Dissolved Solids	(mg/L)	520	-
Specific Conductance	(mS/cm)	1.000	-
Turbidity	(NTU)	1.70	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.27	-
Soluble Phosphorus	(mg/L)	0.27	-
Nitrate-N	(mg/L)	0.50	-
TKN	(mg/L)	0.70	-
Chlorides	(mg/L)	170	-
Sulfates	(mg/L)	68	-
Alkalinity	(mg/L)	140	-
Hardness	(mg/L)	786	-
Nickel	(mg/L)	0.0071	-
Copper	(mg/L)	0.0084	-
Total Chromium	(mg/L)	0.0140	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0690	-
Iron	(mg/L)	0.2320	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	53000	PCU(2000)
pH	(s.u.)	8.4	-
E Coli	(organisms/100ml)	8000	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

MILL CREEK (35) - 07/08/96

Parameter		Value	Excursion
Temperature	(degrees C)	21.0	-
Dissolved Oxygen	(mg/L)	7.0	-
BOD-5	(mg/L)	4	-
COD	(mg/L)	27	-
Suspended Solids	(mg/L)	7	-
Total Solids	(mg/L)	999	-
Dissolved Solids	(mg/L)	882	-
Specific Conductance	(mS/cm)	1.800	-
Turbidity	(NTU)	3.50	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.05	-
Soluble Phosphorus	(mg/L)	0.03	-
Nitrate-N	(mg/L)	0.40	-
TKN	(mg/L)	1.00	-
Chlorides	(mg/L)	336	-
Sulfates	(mg/L)	112	-
Alkalinity	(mg/L)	197	-
Hardness	(mg/L)	336	-
Nickel	(mg/L)	0.0030	-
Copper	(mg/L)	0.0110	-
Total Chromium	(mg/L)	0.0030	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0100	-
Iron	(mg/L)	0.2600	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	3400	PCU(2000)
pH	(s.u.)	7.4	-
E Coli	(organisms/100ml)	2600	PCU(298)
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	4.70	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

MILL CREEK (35) - 05/28/97

Parameter		Value	Excursion
Temperature	(degrees C)	13.0	-
Dissolved Oxygen	(mg/L)	11.4	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	19	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	725	-
Dissolved Solids	(mg/L)	658	-
Specific Conductance	(mS/cm)	1.500	-
Turbidity	(NTU)	2.30	-
Ammonia-N	(mg/L)	0.01	-
Phosphorus	(mg/L)	0.05	-
Soluble Phosphorus	(mg/L)	0.03	-
Nitrate-N	(mg/L)	0.10	-
TKN	(mg/L)	0.60	-
Chlorides	(mg/L)	236	-
Sulfates	(mg/L)	72	-
Alkalinity	(mg/L)	186	-
Hardness	(mg/L)	190	-
Nickel	(mg/L)	0.0060	-
Copper	(mg/L)	0.0080	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.2100	WHAL(0.2008)
Iron	(mg/L)	0.3300	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	120	-
pH	(s.u.)	7.4	-
E Coli	(organisms/100ml)	15	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	3.80	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

MILL CREEK (35) - 07/31/97

Parameter		Value	Excursion
Temperature	(degrees C)	20.0	-
Dissolved Oxygen	(mg/L)	8.4	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	13	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	525	-
Dissolved Solids	(mg/L)	496	-
Specific Conductance	(mS/cm)	1.200	-
Turbidity	(NTU)	3.00	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.05	-
Soluble Phosphorus	(mg/L)	0.05	-
Nitrate-N	(mg/L)	0.20	-
TKN	(mg/L)	0.50	-
Chlorides	(mg/L)	160	-
Sulfates	(mg/L)	61	-
Alkalinity	(mg/L)	149	-
Hardness	(mg/L)	215	-
Nickel	(mg/L)	0.0020	-
Copper	(mg/L)	0.0060	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0100	-
Iron	(mg/L)	<0.3500	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	1000	-
pH	(s.u.)	7.5	-
E Coli	(organisms/100ml)	700	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	3.40	-

NEORSD

WQIS

MILL CREEK (35) - 07/28/98

Parameter		Value	Excursion
Temperature	(degrees C)	21.0	-
Dissolved Oxygen	(mg/L)	7.7	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	780	-
Dissolved Solids	(mg/L)	730	-
Specific Conductance	(mS/cm)	1.400	-
Turbidity	(NTU)	2.50	-
Ammonia-N	(mg/L)	0.02	-
Phosphorus	(mg/L)	0.16	-
Soluble Phosphorus	(mg/L)	0.16	-
Nitrate-N	(mg/L)	0.10	-
TKN	(mg/L)	0.70	-
Chlorides	(mg/L)	290	-
Sulfates	(mg/L)	88	-
Alkalinity	(mg/L)	142	-
Hardness	(mg/L)	275	-
Nickel	(mg/L)	0.0052	-
Copper	(mg/L)	0.0140	-
Total Chromium	(mg/L)	0.0140	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0390	-
Iron	(mg/L)	0.2550	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	330	-
pH	(s.u.)	8.6	-
E Coli	(organisms/100ml)	330	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

WEST CREEK (36) - 07/30/96

Parameter		Value	Excursion
Temperature	(degrees C)	20.5	-
Dissolved Oxygen	(mg/L)	9.7	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	19	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	693	-
Dissolved Solids	(mg/L)	621	-
Specific Conductance	(mS/cm)	1.300	-
Turbidity	(NTU)	1.30	-
Ammonia-N	(mg/L)	0.20	-
Phosphorus	(mg/L)	0.06	-
Soluble Phosphorus	(mg/L)	0.04	-
Nitrate-N	(mg/L)	0.60	-
TKN	(mg/L)	0.40	-
Chlorides	(mg/L)	242	-
Sulfates	(mg/L)	222	-
Hardness	(mg/L)	118	-
Nickel	(mg/L)	0.0080	-
Copper	(mg/L)	0.0040	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0020	-
Iron	(mg/L)	0.0900	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	2100	PCU(2000)
pH	(s.u.)	7.9	-
E Coli	(organisms/100ml)	820	PCU(298)
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	6.20	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

WEST CREEK (36) - 07/24/97

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	12.0	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	17	-
Suspended Solids	(mg/L)	4	-
Total Solids	(mg/L)	733	-
Dissolved Solids	(mg/L)	681	-
Specific Conductance	(mS/cm)	1.400	-
Turbidity	(NTU)	1.30	-
Ammonia-N	(mg/L)	0.02	-
Phosphorus	(mg/L)	0.16	-
Soluble Phosphorus	(mg/L)	0.08	-
Nitrate-N	(mg/L)	0.20	-
TKN	(mg/L)	0.60	-
Chlorides	(mg/L)	254	-
Sulfates	(mg/L)	136	-
Alkalinity	(mg/L)	116	-
Hardness	(mg/L)	439	-
Nickel	(mg/L)	0.0100	-
Copper	(mg/L)	0.0100	-
Total Chromium	(mg/L)	0.0030	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.1700	-
Iron	(mg/L)	0.6200	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0260	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	130	-
pH	(s.u.)	8.0	-
E Coli	(organisms/100ml)	100	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	0.0160	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	6.10	-

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WQIS

WEST CREEK (36) - 09/08/97

Parameter		Value	Excursion
Temperature	(degrees C)	21.0	-
Dissolved Oxygen	(mg/L)	12.2	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	16	-
Suspended Solids	(mg/L)	3	-
Total Solids	(mg/L)	710	-
Dissolved Solids	(mg/L)	702	-
Specific Conductance	(mS/cm)	1.400	-
Turbidity	(NTU)	1.50	-
Ammonia-N	(mg/L)	0.03	-
Phosphorus	(mg/L)	0.08	-
Soluble Phosphorus	(mg/L)	0.04	-
Nitrate-N	(mg/L)	0.10	-
TKN	(mg/L)	0.50	-
Chlorides	(mg/L)	206	-
Sulfates	(mg/L)	134	-
Alkalinity	(mg/L)	106	-
Hardness	(mg/L)	231	-
Nickel	(mg/L)	0.0020	-
Copper	(mg/L)	0.0130	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	0.1800	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0060	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	70	-
pH	(s.u.)	8.2	-
E Coli	(organisms/100ml)	65	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	7.30	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

WEST CREEK (36) - 09/16/98

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	6.8	-
BOD-5	(mg/L)	4	-
COD	(mg/L)	35	-
Suspended Solids	(mg/L)	3	-
Total Solids	(mg/L)	600	-
Dissolved Solids	(mg/L)	550	-
Specific Conductance	(mS/cm)	1.000	-
Turbidity	(NTU)	1.20	-
Ammonia-N	(mg/L)	0.02	-
Phosphorus	(mg/L)	0.06	-
Soluble Phosphorus	(mg/L)	0.06	-
Nitrate-N	(mg/L)	0.25	-
TKN	(mg/L)	0.50	-
Chlorides	(mg/L)	160	-
Sulfates	(mg/L)	140	-
Alkalinity	(mg/L)	131	-
Hardness	(mg/L)	218	-
Nickel	(mg/L)	0.0027	-
Copper	(mg/L)	0.0065	-
Total Chromium	(mg/L)	0.0066	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0560	-
Iron	(mg/L)	0.1280	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Fecal Coliform	(organisms/100ml)	210	-
pH	(s.u.)	7.3	-
E Coli	(organisms/100ml)	92	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

WEST CREEK (37) - 07/30/96

Parameter		Value	Excursion
Temperature	(degrees C)	21.0	-
Dissolved Oxygen	(mg/L)	10.2	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	14	-
Suspended Solids	(mg/L)	4	-
Total Solids	(mg/L)	545	-
Dissolved Solids	(mg/L)	487	-
Specific Conductance	(mS/cm)	1.000	-
Turbidity	(NTU)	1.50	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.10	-
Soluble Phosphorus	(mg/L)	0.09	-
Nitrate-N	(mg/L)	0.80	-
TKN	(mg/L)	0.60	-
Chlorides	(mg/L)	168	-
Sulfates	(mg/L)	85	-
Alkalinity	(mg/L)	111	-
Hardness	(mg/L)	206	-
Nickel	(mg/L)	0.0080	-
Copper	(mg/L)	0.0040	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0200	-
Iron	(mg/L)	0.1200	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	9400	PCU(2000)
pH	(s.u.)	8.0	-
E Coli	(organisms/100ml)	5300	PCU(298)
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	3.20	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

WEST CREEK (37) - 07/24/97

Parameter		Value	Excursion
Temperature	(degrees C)	23.0	-
Dissolved Oxygen	(mg/L)	9.4	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	14	-
Suspended Solids	(mg/L)	1	-
Total Solids	(mg/L)	622	-
Dissolved Solids	(mg/L)	588	-
Specific Conductance	(mS/cm)	1.200	-
Turbidity	(NTU)	0.89	-
Ammonia-N	(mg/L)	0.02	-
Phosphorus	(mg/L)	0.10	-
Soluble Phosphorus	(mg/L)	0.08	-
Nitrate-N	(mg/L)	0.80	-
TKN	(mg/L)	0.40	-
Chlorides	(mg/L)	188	-
Sulfates	(mg/L)	145	-
Alkalinity	(mg/L)	123	-
Hardness	(mg/L)	261	-
Nickel	(mg/L)	0.0060	-
Copper	(mg/L)	0.0080	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0200	-
Iron	(mg/L)	0.0600	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	860	-
pH	(s.u.)	8.2	-
E Coli	(organisms/100ml)	170	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	4.00	-

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WQIS

WEST CREEK (37) - 09/08/97

Parameter		Value	Excursion
Temperature	(degrees C)	19.0	-
Dissolved Oxygen	(mg/L)	13.4	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	18	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	624	-
Dissolved Solids	(mg/L)	581	-
Specific Conductance	(mS/cm)	1.200	-
Turbidity	(NTU)	1.30	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.10	-
Soluble Phosphorus	(mg/L)	0.08	-
Nitrate-N	(mg/L)	0.80	-
TKN	(mg/L)	0.60	-
Chlorides	(mg/L)	164	-
Sulfates	(mg/L)	139	-
Alkalinity	(mg/L)	110	-
Hardness	(mg/L)	242	-
Nickel	(mg/L)	0.0030	-
Copper	(mg/L)	0.0140	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.0700	-
Cadmium	(mg/L)	0.0010	-
Lead	(mg/L)	0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	1650	-
pH	(s.u.)	8.4	-
E Coli	(organisms/100ml)	1100	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	4.70	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

WEST CREEK (37) - 09/16/98

Parameter		Value	Excursion
Temperature	(degrees C)	21.0	-
Dissolved Oxygen	(mg/L)	8.4	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	3	-
Total Solids	(mg/L)	580	-
Dissolved Solids	(mg/L)	530	-
Specific Conductance	(mS/cm)	0.900	-
Turbidity	(NTU)	0.70	-
Ammonia-N	(mg/L)	0.02	-
Phosphorus	(mg/L)	0.10	-
Soluble Phosphorus	(mg/L)	0.08	-
Nitrate-N	(mg/L)	1.10	-
TKN	(mg/L)	0.70	-
Chlorides	(mg/L)	170	-
Sulfates	(mg/L)	150	-
Alkalinity	(mg/L)	134	-
Hardness	(mg/L)	212	-
Nickel	(mg/L)	0.0034	-
Copper	(mg/L)	0.0180	-
Total Chromium	(mg/L)	0.0082	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0630	-
Iron	(mg/L)	0.1060	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	6800	PCU(2000)
pH	(s.u.)	7.6	-
E Coli	(organisms/100ml)	1100	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

WEST CREEK (38) - 07/30/96

Parameter		Value	Excursion
Temperature	(degrees C)	20.0	-
Dissolved Oxygen	(mg/L)	9.5	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	15	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	834	-
Dissolved Solids	(mg/L)	753	-
Specific Conductance	(mS/cm)	1.500	-
Turbidity	(NTU)	1.00	-
Ammonia-N	(mg/L)	0.30	-
Phosphorus	(mg/L)	0.06	-
Soluble Phosphorus	(mg/L)	0.05	-
Nitrate-N	(mg/L)	1.90	-
TKN	(mg/L)	0.70	-
Chlorides	(mg/L)	242	-
Sulfates	(mg/L)	154	-
Alkalinity	(mg/L)	132	-
Hardness	(mg/L)	328	-
Nickel	(mg/L)	0.0080	-
Copper	(mg/L)	0.0030	-
Total Chromium	(mg/L)	0.0040	-
Hexavalent Chromium	(mg/L)	0.0100	-
Zinc	(mg/L)	0.0100	-
Iron	(mg/L)	0.1300	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	1000	-
pH	(s.u.)	7.8	-
E Coli	(organisms/100ml)	580	PCU(298)
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	5.30	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

WEST CREEK (38) - 07/24/97

Parameter		Value	Excursion
Temperature	(degrees C)	22.5	-
Dissolved Oxygen	(mg/L)	12.0	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	15	-
Suspended Solids	(mg/L)	6	-
Total Solids	(mg/L)	783	-
Dissolved Solids	(mg/L)	723	-
Specific Conductance	(mS/cm)	1.400	-
Turbidity	(NTU)	1.80	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.07	-
Soluble Phosphorus	(mg/L)	0.06	-
Nitrate-N	(mg/L)	0.10	-
TKN	(mg/L)	0.60	-
Chlorides	(mg/L)	224	-
Sulfates	(mg/L)	190	-
Alkalinity	(mg/L)	145	-
Hardness	(mg/L)	450	-
Nickel	(mg/L)	0.0070	-
Copper	(mg/L)	0.0150	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.5200	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0040	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	210	-
pH	(s.u.)	8.1	-
E Coli	(organisms/100ml)	80	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	5.60	-

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WQIS

WEST CREEK (38) - 09/08/97

Parameter		Value	Excursion
Temperature	(degrees C)	18.0	-
Dissolved Oxygen	(mg/L)	10.1	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	14	-
Suspended Solids	(mg/L)	3	-
Total Solids	(mg/L)	693	-
Dissolved Solids	(mg/L)	636	-
Specific Conductance	(mS/cm)	1.300	-
Turbidity	(NTU)	1.40	-
Ammonia-N	(mg/L)	0.30	-
Phosphorus	(mg/L)	0.16	-
Soluble Phosphorus	(mg/L)	0.11	-
Nitrate-N	(mg/L)	1.60	-
TKN	(mg/L)	0.70	-
Chlorides	(mg/L)	140	-
Sulfates	(mg/L)	157	-
Alkalinity	(mg/L)	134	-
Hardness	(mg/L)	180	-
Nickel	(mg/L)	0.0030	-
Copper	(mg/L)	0.0110	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.1200	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0040	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	320	-
pH	(s.u.)	8.1	-
E Coli	(organisms/100ml)	98	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	5.40	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

WEST CREEK (38) - 09/16/98

Parameter		Value	Excursion
Temperature	(degrees C)	21.0	-
Dissolved Oxygen	(mg/L)	7.2	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	23	-
Suspended Solids	(mg/L)	3	-
Total Solids	(mg/L)	790	-
Dissolved Solids	(mg/L)	610	-
Specific Conductance	(mS/cm)	1.000	-
Turbidity	(NTU)	0.85	-
Ammonia-N	(mg/L)	0.48	-
Phosphorus	(mg/L)	0.15	-
Soluble Phosphorus	(mg/L)	0.11	-
Nitrate-N	(mg/L)	1.30	-
TKN	(mg/L)	1.00	-
Chlorides	(mg/L)	160	-
Sulfates	(mg/L)	110	-
Alkalinity	(mg/L)	158	-
Hardness	(mg/L)	295	-
Nickel	(mg/L)	0.0029	-
Copper	(mg/L)	0.0110	-
Total Chromium	(mg/L)	0.0077	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0390	-
Iron	(mg/L)	0.1310	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	8600	PCU(2000)
pH	(s.u.)	7.6	-
E Coli	(organisms/100ml)	7900	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

TINKERS CREEK (39) - 07/29/96

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	10.6	-
BOD-5	(mg/L)	4	-
COD	(mg/L)	28	-
Suspended Solids	(mg/L)	6	-
Total Solids	(mg/L)	743	-
Dissolved Solids	(mg/L)	623	-
Specific Conductance	(mS/cm)	1.400	-
Turbidity	(NTU)	3.60	-
Ammonia-N	(mg/L)	0.04	-
Nitrate-N	(mg/L)	5.10	-
TKN	(mg/L)	1.10	-
Chlorides	(mg/L)	242	-
Sulfates	(mg/L)	93	-
Alkalinity	(mg/L)	144	-
Hardness	(mg/L)	255	-
Nickel	(mg/L)	0.0100	-
Copper	(mg/L)	0.0060	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0800	-
Iron	(mg/L)	0.2300	-
Cadmium	(mg/L)	0.0010	-
Lead	(mg/L)	0.0060	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	1400	-
pH	(s.u.)	7.8	-
E Coli	(organisms/100ml)	950	PCU(298)
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	7.00	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

TINKERS CREEK (39) - 06/09/97

Parameter		Value	Excursion
Temperature	(degrees C)	16.0	-
Dissolved Oxygen	(mg/L)	9.5	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	36	-
Suspended Solids	(mg/L)	6	-
Dissolved Solids	(mg/L)	474	-
Specific Conductance	(mS/cm)	1.100	-
Turbidity	(NTU)	4.20	-
Ammonia-N	(mg/L)	0.03	-
Phosphorus	(mg/L)	0.08	-
Soluble Phosphorus	(mg/L)	0.07	-
Nitrate-N	(mg/L)	1.80	-
TKN	(mg/L)	1.00	-
Chlorides	(mg/L)	134	-
Sulfates	(mg/L)	82	-
Alkalinity	(mg/L)	151	-
Hardness	(mg/L)	220	-
Nickel	(mg/L)	0.0040	-
Copper	(mg/L)	0.0080	-
Total Chromium	(mg/L)	<0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0200	-
Iron	(mg/L)	0.4000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	220	-
pH	(s.u.)	7.0	-
E Coli	(organisms/100ml)	100	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	4.61	-

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TINKERS CREEK (39) - 09/09/97

Parameter		Value	Excursion
Temperature	(degrees C)	19.0	-
Dissolved Oxygen	(mg/L)	8.5	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	32	-
Suspended Solids	(mg/L)	4	-
Total Solids	(mg/L)	753	-
Dissolved Solids	(mg/L)	587	-
Specific Conductance	(mS/cm)	0.880	-
Turbidity	(NTU)	2.90	-
Ammonia-N	(mg/L)	0.02	-
Phosphorus	(mg/L)	0.13	-
Soluble Phosphorus	(mg/L)	0.08	-
Nitrate-N	(mg/L)	7.20	-
TKN	(mg/L)	1.00	-
Chlorides	(mg/L)	158	-
Sulfates	(mg/L)	92	-
Alkalinity	(mg/L)	142	-
Hardness	(mg/L)	235	-
Nickel	(mg/L)	0.0050	-
Copper	(mg/L)	0.0100	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.2500	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0040	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	200	-
pH	(s.u.)	7.8	-
E Coli	(organisms/100ml)	90	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	7.20	-

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WQIS

TINKERS CREEK (39) - 06/05/98

Parameter		Value	Excursion
Temperature	(degrees C)	16.0	-
Dissolved Oxygen	(mg/L)	9.4	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	11	-
Suspended Solids	(mg/L)	3	-
Total Solids	(mg/L)	740	-
Dissolved Solids	(mg/L)	680	-
Specific Conductance	(mS/cm)	1.200	-
Turbidity	(NTU)	3.20	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.19	-
Soluble Phosphorus	(mg/L)	0.18	-
Nitrate-N	(mg/L)	6.40	-
TKN	(mg/L)	1.60	-
Chlorides	(mg/L)	240	-
Sulfates	(mg/L)	97	-
Alkalinity	(mg/L)	146	-
Hardness	(mg/L)	269	-
Nickel	(mg/L)	0.0063	-
Copper	(mg/L)	0.0150	-
Total Chromium	(mg/L)	0.0022	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0370	-
Iron	(mg/L)	0.2100	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	200	-
pH	(s.u.)	7.3	-
E Coli	(organisms/100ml)	200	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

TINKERS CREEK (40) - 07/29/96

Parameter		Value	Excursion
Temperature	(degrees C)	23.0	-
Dissolved Oxygen	(mg/L)	10.8	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	25	-
Suspended Solids	(mg/L)	12	-
Total Solids	(mg/L)	760	-
Dissolved Solids	(mg/L)	633	-
Specific Conductance	(mS/cm)	1.400	-
Turbidity	(NTU)	8.00	-
Ammonia-N	(mg/L)	0.03	-
Phosphorus	(mg/L)	0.22	-
Soluble Phosphorus	(mg/L)	0.22	-
Nitrate-N	(mg/L)	6.60	-
TKN	(mg/L)	1.20	-
Chlorides	(mg/L)	224	-
Sulfates	(mg/L)	86	-
Alkalinity	(mg/L)	156	-
Hardness	(mg/L)	239	-
Nickel	(mg/L)	0.0110	-
Copper	(mg/L)	0.0050	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0700	-
Iron	(mg/L)	0.4900	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0050	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	310	-
pH	(s.u.)	7.9	-
E Coli	(organisms/100ml)	190	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	7.50	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

TINKERS CREEK (40) - 06/09/97

Parameter		Value	Excursion
Temperature	(degrees C)	18.0	-
Dissolved Oxygen	(mg/L)	11.2	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	30	-
Suspended Solids	(mg/L)	5	-
Dissolved Solids	(mg/L)	490	-
Specific Conductance	(mS/cm)	1.100	-
Turbidity	(NTU)	4.80	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.13	-
Soluble Phosphorus	(mg/L)	0.12	-
Nitrate-N	(mg/L)	2.20	-
TKN	(mg/L)	1.30	-
Chlorides	(mg/L)	152	-
Sulfates	(mg/L)	70	-
Alkalinity	(mg/L)	145	-
Hardness	(mg/L)	218	-
Nickel	(mg/L)	0.0080	-
Copper	(mg/L)	0.0080	-
Total Chromium	(mg/L)	<0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.5800	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	200	-
pH	(s.u.)	7.3	-
E Coli	(organisms/100ml)	150	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	4.22	-

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WQIS

TINKERS CREEK (40) - 09/09/97

Parameter		Value	Excursion
Temperature	(degrees C)	19.0	-
Dissolved Oxygen	(mg/L)	10.0	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	34	-
Suspended Solids	(mg/L)	4	-
Total Solids	(mg/L)	652	-
Dissolved Solids	(mg/L)	602	-
Specific Conductance	(mS/cm)	0.910	-
Turbidity	(NTU)	3.20	-
Ammonia-N	(mg/L)	0.02	-
Phosphorus	(mg/L)	0.16	-
Soluble Phosphorus	(mg/L)	0.14	-
Nitrate-N	(mg/L)	8.40	-
TKN	(mg/L)	0.90	-
Chlorides	(mg/L)	164	-
Sulfates	(mg/L)	99	-
Alkalinity	(mg/L)	144	-
Hardness	(mg/L)	236	-
Nickel	(mg/L)	0.0060	-
Copper	(mg/L)	0.0080	-
Total Chromium	(mg/L)	0.0030	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.2500	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	760	-
pH	(s.u.)	8.2	-
E Coli	(organisms/100ml)	140	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	5.80	-

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WQIS

TINKERS CREEK (40) - 06/05/98

Parameter		Value	Excursion
Temperature	(degrees C)	17.0	-
Dissolved Oxygen	(mg/L)	10.0	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	15	-
Suspended Solids	(mg/L)	6	-
Total Solids	(mg/L)	760	-
Dissolved Solids	(mg/L)	680	-
Specific Conductance	(mS/cm)	1.300	-
Turbidity	(NTU)	5.50	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.27	-
Soluble Phosphorus	(mg/L)	0.26	-
Nitrate-N	(mg/L)	7.00	-
TKN	(mg/L)	1.60	-
Chlorides	(mg/L)	220	-
Sulfates	(mg/L)	96	-
Alkalinity	(mg/L)	150	-
Hardness	(mg/L)	264	-
Nickel	(mg/L)	0.0096	-
Copper	(mg/L)	0.0230	-
Total Chromium	(mg/L)	0.0027	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0430	-
Iron	(mg/L)	0.3000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0032	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	640	-
pH	(s.u.)	8.2	-
E Coli	(organisms/100ml)	420	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

TINKERS CREEK (41) - 07/29/96

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	8.7	-
BOD-5	(mg/L)	4	-
COD	(mg/L)	29	-
Suspended Solids	(mg/L)	43	-
Total Solids	(mg/L)	726	-
Dissolved Solids	(mg/L)	600	-
Specific Conductance	(mS/cm)	1.300	-
Turbidity	(NTU)	20.00	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.23	-
Soluble Phosphorus	(mg/L)	0.17	-
Nitrate-N	(mg/L)	6.70	-
TKN	(mg/L)	1.20	-
Chlorides	(mg/L)	201	-
Sulfates	(mg/L)	86	-
Alkalinity	(mg/L)	143	-
Hardness	(mg/L)	250	-
Nickel	(mg/L)	0.0080	-
Copper	(mg/L)	0.0020	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.1100	-
Iron	(mg/L)	1.8000	WHAL(1.0)*
Cadmium	(mg/L)	0.0010	-
Lead	(mg/L)	0.0040	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	560	-
pH	(s.u.)	7.6	-
E Coli	(organisms/100ml)	330	PCU(298)
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	6.70	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

TINKERS CREEK (41) - 06/09/97

Parameter		Value	Excursion
Temperature	(degrees C)	17.0	-
Dissolved Oxygen	(mg/L)	8.5	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	39	-
Suspended Solids	(mg/L)	25	-
Dissolved Solids	(mg/L)	438	-
Specific Conductance	(mS/cm)	1.100	-
Turbidity	(NTU)	12.00	-
Ammonia-N	(mg/L)	0.20	-
Phosphorus	(mg/L)	0.26	-
Soluble Phosphorus	(mg/L)	0.18	-
Nitrate-N	(mg/L)	1.90	-
TKN	(mg/L)	1.60	-
Chlorides	(mg/L)	132	-
Sulfates	(mg/L)	61	-
Alkalinity	(mg/L)	141	-
Hardness	(mg/L)	211	-
Nickel	(mg/L)	0.0100	-
Copper	(mg/L)	0.0090	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	1.3000	WHAL(1.0)*
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0050	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	340	-
pH	(s.u.)	6.9	-
E Coli	(organisms/100ml)	250	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	3.69	-

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TINKERS CREEK (41) - 09/09/97

Parameter		Value	Excursion
Temperature	(degrees C)	19.5	-
Dissolved Oxygen	(mg/L)	9.8	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	89	-
Suspended Solids	(mg/L)	32	-
Total Solids	(mg/L)	588	-
Dissolved Solids	(mg/L)	520	-
Specific Conductance	(mS/cm)	1.200	-
Turbidity	(NTU)	24.00	-
Ammonia-N	(mg/L)	0.20	-
Phosphorus	(mg/L)	0.26	-
Soluble Phosphorus	(mg/L)	0.24	-
Nitrate-N	(mg/L)	6.60	-
TKN	(mg/L)	1.00	-
Chlorides	(mg/L)	132	-
Sulfates	(mg/L)	94	-
Alkalinity	(mg/L)	160	-
Hardness	(mg/L)	216	-
Nickel	(mg/L)	0.0080	-
Copper	(mg/L)	0.0090	-
Total Chromium	(mg/L)	0.0030	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	1.7000	WHAL(1.0)*
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0050	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	3300	PCU(2000)
pH	(s.u.)	8.0	-
E Coli	(organisms/100ml)	120	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	0.0060	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	8.20	-

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WQIS

TINKERS CREEK (41) - 06/05/98

Parameter		Value	Excursion
Temperature	(degrees C)	17.0	-
Dissolved Oxygen	(mg/L)	7.3	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	19	-
Total Solids	(mg/L)	810	-
Dissolved Solids	(mg/L)	740	-
Specific Conductance	(mS/cm)	1.300	-
Turbidity	(NTU)	11.00	-
Ammonia-N	(mg/L)	0.20	-
Phosphorus	(mg/L)	0.28	-
Soluble Phosphorus	(mg/L)	0.28	-
Nitrate-N	(mg/L)	7.30	-
TKN	(mg/L)	1.90	-
Chlorides	(mg/L)	240	-
Sulfates	(mg/L)	92	-
Alkalinity	(mg/L)	153	-
Hardness	(mg/L)	279	-
Nickel	(mg/L)	0.0020	-
Copper	(mg/L)	0.0130	-
Total Chromium	(mg/L)	0.0042	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.1200	-
Iron	(mg/L)	0.6600	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	440	-
pH	(s.u.)	8.0	-
E Coli	(organisms/100ml)	360	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	0.0020	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

TINKERS CREEK (42) - 07/29/96

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	9.4	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	15	-
Suspended Solids	(mg/L)	19	-
Total Solids	(mg/L)	689	-
Dissolved Solids	(mg/L)	595	-
Specific Conductance	(mS/cm)	0.900	-
Turbidity	(NTU)	11.00	-
Ammonia-N	(mg/L)	0.20	-
Phosphorus	(mg/L)	0.22	-
Soluble Phosphorus	(mg/L)	0.19	-
Nitrate-N	(mg/L)	7.40	-
TKN	(mg/L)	1.30	-
Chlorides	(mg/L)	184	-
Sulfates	(mg/L)	83	-
Alkalinity	(mg/L)	154	-
Hardness	(mg/L)	264	-
Nickel	(mg/L)	0.0080	-
Copper	(mg/L)	0.0020	-
Total Chromium	(mg/L)	0.0030	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0900	-
Iron	(mg/L)	0.7500	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0040	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	440	-
pH	(s.u.)	7.5	-
E Coli	(organisms/100ml)	200	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	5.80	-
Cobalt	(mg/L)	<0.0010	-

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TINKERS CREEK (42) - 06/09/97

Parameter		Value	Excursion
Temperature	(degrees C)	17.0	-
Dissolved Oxygen	(mg/L)	8.2	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	25	-
Suspended Solids	(mg/L)	35	-
Dissolved Solids	(mg/L)	406	-
Specific Conductance	(mS/cm)	1.000	-
Turbidity	(NTU)	16.00	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.26	-
Soluble Phosphorus	(mg/L)	0.15	-
Nitrate-N	(mg/L)	1.70	-
TKN	(mg/L)	1.20	-
Chlorides	(mg/L)	112	-
Sulfates	(mg/L)	60	-
Alkalinity	(mg/L)	163	-
Hardness	(mg/L)	201	-
Nickel	(mg/L)	0.0110	-
Copper	(mg/L)	0.0070	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	1.6000	WHAL(1.0)*
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	220	-
pH	(s.u.)	7.0	-
E Coli	(organisms/100ml)	170	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	0.0060	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	3.02	-

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TINKERS CREEK (42) - 09/09/97

Parameter		Value	Excursion
Temperature	(degrees C)	19.0	-
Dissolved Oxygen	(mg/L)	9.8	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	73	-
Suspended Solids	(mg/L)	17	-
Total Solids	(mg/L)	596	-
Dissolved Solids	(mg/L)	546	-
Specific Conductance	(mS/cm)	1.300	-
Turbidity	(NTU)	12.00	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.27	-
Soluble Phosphorus	(mg/L)	0.20	-
Nitrate-N	(mg/L)	9.20	-
TKN	(mg/L)	0.90	-
Chlorides	(mg/L)	138	-
Sulfates	(mg/L)	92	-
Alkalinity	(mg/L)	144	-
Hardness	(mg/L)	245	-
Nickel	(mg/L)	0.0060	-
Copper	(mg/L)	0.0080	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.8600	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	400	-
pH	(s.u.)	8.0	-
E Coli	(organisms/100ml)	120	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	7.20	-

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WQIS

TINKERS CREEK (42) - 06/05/98

Parameter		Value	Excursion
Temperature	(degrees C)	17.0	-
Dissolved Oxygen	(mg/L)	6.3	-
BOD-5	(mg/L)	4	-
COD	(mg/L)	11	-
Suspended Solids	(mg/L)	11	-
Total Solids	(mg/L)	890	-
Dissolved Solids	(mg/L)	750	-
Specific Conductance	(mS/cm)	1.500	-
Turbidity	(NTU)	7.00	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.32	-
Soluble Phosphorus	(mg/L)	0.30	-
Nitrate-N	(mg/L)	7.80	-
TKN	(mg/L)	1.60	-
Chlorides	(mg/L)	270	-
Sulfates	(mg/L)	83	-
Alkalinity	(mg/L)	155	-
Hardness	(mg/L)	311	-
Nickel	(mg/L)	0.0073	-
Copper	(mg/L)	0.0100	-
Total Chromium	(mg/L)	0.0044	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.1700	-
Iron	(mg/L)	0.4500	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	180	-
pH	(s.u.)	8.2	-
E Coli	(organisms/100ml)	160	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

CHIPPEWA CREEK (43) - 07/30/96

Parameter		Value	Excursion
Temperature	(degrees C)	21.0	-
Dissolved Oxygen	(mg/L)	10.8	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	13	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	759	-
Dissolved Solids	(mg/L)	685	-
Specific Conductance	(mS/cm)	1.300	-
Turbidity	(NTU)	0.65	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.03	-
Soluble Phosphorus	(mg/L)	0.02	-
Nitrate-N	(mg/L)	0.20	-
TKN	(mg/L)	0.50	-
Chlorides	(mg/L)	160	-
Sulfates	(mg/L)	189	-
Alkalinity	(mg/L)	146	-
Hardness	(mg/L)	344	-
Nickel	(mg/L)	0.0030	-
Copper	(mg/L)	0.0040	-
Total Chromium	(mg/L)	0.0040	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0200	-
Iron	(mg/L)	0.0500	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	140	-
pH	(s.u.)	7.9	-
E Coli	(organisms/100ml)	100	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	3.20	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

CHIPPEWA CREEK (43) - 06/09/97

Parameter		Value	Excursion
Temperature	(degrees C)	19.0	-
Dissolved Oxygen	(mg/L)	10.2	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	16	-
Suspended Solids	(mg/L)	4	-
Dissolved Solids	(mg/L)	542	-
Specific Conductance	(mS/cm)	1.200	-
Turbidity	(NTU)	2.80	-
Ammonia-N	(mg/L)	0.04	-
Phosphorus	(mg/L)	0.03	-
Soluble Phosphorus	(mg/L)	0.03	-
Nitrate-N	(mg/L)	0.10	-
TKN	(mg/L)	0.50	-
Chlorides	(mg/L)	126	-
Sulfates	(mg/L)	146	-
Alkalinity *	(mg/L)	161	-
Hardness	(mg/L)	282	-
Nickel	(mg/L)	0.0050	-
Copper	(mg/L)	0.0060	-
Total Chromium	(mg/L)	<0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0200	-
Iron	(mg/L)	0.0700	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	60	-
pH	(s.u.)	7.5	-
E Coli	(organisms/100ml)	28	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	2.91	-

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WQIS

CHIPPEWA CREEK (43) - 09/09/97

Parameter		Value	Excursion
Temperature	(degrees C)	19.5	-
Dissolved Oxygen	(mg/L)	12.2	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	51	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	649	-
Dissolved Solids	(mg/L)	645	-
Specific Conductance	(mS/cm)	1.300	-
Turbidity	(NTU)	0.53	-
Ammonia-N	(mg/L)	<0.01	-
Phosphorus	(mg/L)	0.02	-
Soluble Phosphorus	(mg/L)	<0.01	-
Nitrate-N	(mg/L)	0.10	-
TKN	(mg/L)	0.30	-
Chlorides	(mg/L)	112	-
Alkalinity	(mg/L)	125	-
Hardness	(mg/L)	238	-
Nickel	(mg/L)	0.0020	-
Copper	(mg/L)	0.0070	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0700	-
Iron	(mg/L)	0.0400	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	170	-
pH	(s.u.)	8.5	-
E Coli	(organisms/100ml)	85	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	3.70	-

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WQIS

CHIPPEWA CREEK (43) - 07/13/98

Parameter		Value	Excursion
Temperature	(degrees C)	20.0	-
Dissolved Oxygen	(mg/L)	8.3	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	3	-
Total Solids	(mg/L)	700	-
Dissolved Solids	(mg/L)	680	-
Specific Conductance	(mS/cm)	1.050	-
Turbidity	(NTU)	0.50	-
Ammonia-N	(mg/L)	0.03	-
Phosphorus	(mg/L)	0.05	-
Soluble Phosphorus	(mg/L)	0.02	-
Nitrate-N	(mg/L)	0.03	-
TKN	(mg/L)	0.40	-
Chlorides	(mg/L)	120	-
Sulfates	(mg/L)	210	-
Alkalinity	(mg/L)	155	-
Hardness	(mg/L)	362	-
Nickel	(mg/L)	<0.0010	-
Copper	(mg/L)	0.0075	-
Total Chromium	(mg/L)	<0.0100	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0370	-
Iron	(mg/L)	0.0780	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	84	-
pH	(s.u.)	7.4	-
E Coli	(organisms/100ml)	72	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

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CHIPPEWA CREEK (43.5) - 07/30/96

Parameter		Value	Excursion
Temperature	(degrees C)	18.0	-
Dissolved Oxygen	(mg/L)	9.4	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	1251	-
Dissolved Solids	(mg/L)	1118	-
Specific Conductance	(mS/cm)	1.800	-
Turbidity	(NTU)	0.55	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.03	-
Soluble Phosphorus	(mg/L)	0.03	-
Nitrate-N	(mg/L)	0.30	-
TKN	(mg/L)	0.50	-
Chlorides	(mg/L)	144	-
Sulfates	(mg/L)	394	-
Alkalinity	(mg/L)	277	-
Hardness	(mg/L)	692	-
Nickel	(mg/L)	0.0040	-
Copper	(mg/L)	0.0020	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.1500	-
Iron	(mg/L)	0.0800	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	140	-
pH	(s.u.)	7.8	-
E Coli	(organisms/100ml)	88	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	2.60	-
Cobalt	(mg/L)	<0.0010	-

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CHIPPEWA CREEK (43.5) - 06/09/97

Parameter		Value	Excursion
Temperature	(degrees C)	15.0	-
Dissolved Oxygen	(mg/L)	10.2	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	14	-
Suspended Solids	(mg/L)	4	-
Dissolved Solids	(mg/L)	762	-
Specific Conductance	(mS/cm)	0.900	-
Turbidity	(NTU)	1.10	-
Ammonia-N	(mg/L)	0.02	-
Phosphorus	(mg/L)	0.04	-
Soluble Phosphorus	(mg/L)	0.04	-
Nitrate-N	(mg/L)	0.20	-
TKN	(mg/L)	0.50	-
Chlorides	(mg/L)	110	-
Sulfates	(mg/L)	133	-
Alkalinity	(mg/L)	223	-
Hardness	(mg/L)	454	-
Nickel	(mg/L)	0.0040	-
Copper	(mg/L)	0.0040	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0200	-
Iron	(mg/L)	0.1300	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	40	-
pH	(s.u.)	7.6	-
E Coli	(organisms/100ml)	48	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	2.41	-

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CHIPPEWA CREEK (43.5) - 09/09/97

Parameter		Value	Excursion
Temperature	(degrees C)	16.0	-
Dissolved Oxygen	(mg/L)	11.4	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	47	-
Suspended Solids	(mg/L)	<1	-
Total Solids	(mg/L)	1141	-
Dissolved Solids	(mg/L)	1095	-
Specific Conductance	(mS/cm)	1.800	-
Turbidity	(NTU)	0.52	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.04	-
Soluble Phosphorus	(mg/L)	0.01	-
Nitrate-N	(mg/L)	0.10	-
TKN	(mg/L)	0.20	-
Chlorides	(mg/L)	102	-
Sulfates	(mg/L)	232	-
Alkalinity	(mg/L)	262	-
Hardness	(mg/L)	656	-
Nickel	(mg/L)	0.0020	-
Copper	(mg/L)	0.0050	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0200	-
Iron	(mg/L)	0.0600	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	140	-
pH	(s.u.)	8.3	-
E Coli	(organisms/100ml)	65	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	32.10	-

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CHIPPEWA CREEK (43.5) - 07/13/98

Parameter		Value	Excursion
Temperature	(degrees C)	15.0	-
Dissolved Oxygen	(mg/L)	9.3	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	1100	-
Dissolved Solids	(mg/L)	1100	-
Specific Conductance	(mS/cm)	1.330	-
Turbidity	(NTU)	0.90	-
Ammonia-N	(mg/L)	<0.01	-
Phosphorus	(mg/L)	0.02	-
Soluble Phosphorus	(mg/L)	0.02	-
Nitrate-N	(mg/L)	0.20	-
TKN	(mg/L)	0.40	-
Chlorides	(mg/L)	92	-
Sulfates	(mg/L)	220	-
Alkalinity	(mg/L)	270	-
Hardness	(mg/L)	669	-
Nickel	(mg/L)	<0.0010	-
Copper	(mg/L)	0.0029	-
Total Chromium	(mg/L)	<0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0340	-
Iron	(mg/L)	0.1100	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	390	-
pH	(s.u.)	8.2	-
E Coli	(organisms/100ml)	320	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

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CHIPPEWA CREEK (44) - 07/30/96

Parameter		Value	Excursion
Temperature	(degrees C)	18.0	-
Dissolved Oxygen	(mg/L)	9.4	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	13	-
Suspended Solids	(mg/L)	3	-
Total Solids	(mg/L)	770	-
Dissolved Solids	(mg/L)	705	-
Specific Conductance	(mS/cm)	1.300	-
Turbidity	(NTU)	2.00	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.04	-
Soluble Phosphorus	(mg/L)	0.03	-
Nitrate-N	(mg/L)	0.10	-
TKN	(mg/L)	0.50	-
Chlorides	(mg/L)	148	-
Sulfates	(mg/L)	200	-
Alkalinity	(mg/L)	229	-
Hardness	(mg/L)	434	-
Nickel	(mg/L)	0.0020	-
Copper	(mg/L)	0.0010	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0100	-
Iron	(mg/L)	0.2400	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	440	-
pH	(s.u.)	7.4	-
E Coli	(organisms/100ml)	400	PCU(298)
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	2.60	-
Cobalt	(mg/L)	<0.0010	-

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CHIPPEWA CREEK (44) - 06/09/97

Parameter		Value	Excursion
Temperature	(degrees C)	16.0	-
Dissolved Oxygen	(mg/L)	12.8	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	18	-
Suspended Solids	(mg/L)	2	-
Dissolved Solids	(mg/L)	520	-
Specific Conductance	(mS/cm)	1.100	-
Turbidity	(NTU)	1.60	-
Ammonia-N	(mg/L)	0.02	-
Phosphorus	(mg/L)	0.05	-
Soluble Phosphorus	(mg/L)	0.03	-
Nitrate-N	(mg/L)	0.10	-
TKN	(mg/L)	0.40	-
Chlorides	(mg/L)	70	-
Sulfates	(mg/L)	146	-
Alkalinity	(mg/L)	192	-
Hardness	(mg/L)	309	-
Nickel	(mg/L)	0.0020	-
Copper	(mg/L)	0.0040	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0100	-
Iron	(mg/L)	0.1900	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	190	-
pH	(s.u.)	7.5	-
E Coli	(organisms/100ml)	76	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	2.37	-

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CHIPPEWA CREEK (44) - 09/09/97

Parameter		Value	Excursion
Temperature	(degrees C)	16.5	-
Dissolved Oxygen	(mg/L)	11.4	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	58	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	951	-
Dissolved Solids	(mg/L)	753	-
Specific Conductance	(mS/cm)	1.300	-
Turbidity	(NTU)	1.80	-
Ammonia-N	(mg/L)	0.04	-
Phosphorus	(mg/L)	0.06	-
Nitrate-N	(mg/L)	0.02	-
TKN	(mg/L)	0.40	-
Chlorides	(mg/L)	64	-
Sulfates	(mg/L)	233	-
Alkalinity	(mg/L)	243	-
Hardness	(mg/L)	772	-
Nickel	(mg/L)	0.0010	-
Copper	(mg/L)	0.0040	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0500	-
Iron	(mg/L)	0.1600	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	120	-
pH	(s.u.)	8.0	-
E Coli	(organisms/100ml)	90	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	3.20	-

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WQIS

CHIPPEWA CREEK (44) - 07/13/98

Parameter		Value	Excursion
Temperature	(degrees C)	16.0	-
Dissolved Oxygen	(mg/L)	7.8	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	710	-
Dissolved Solids	(mg/L)	700	-
Specific Conductance	(mS/cm)	1.060	-
Turbidity	(NTU)	1.50	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.02	-
Soluble Phosphorus	(mg/L)	<0.01	-
Nitrate-N	(mg/L)	0.03	-
TKN	(mg/L)	0.30	-
Chlorides	(mg/L)	57	-
Sulfates	(mg/L)	230	-
Alkalinity	(mg/L)	237	-
Hardness	(mg/L)	460	-
Nickel	(mg/L)	<0.0010	-
Copper	(mg/L)	0.0030	-
Total Chromium	(mg/L)	<0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0290	-
Iron	(mg/L)	0.2600	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	540	-
pH	(s.u.)	7.6	-
E Coli	(organisms/100ml)	390	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

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KINGSBURY RUN (46) - 10/14/96

Parameter		Value	Excursion
Temperature	(degrees C)	16.0	-
Dissolved Oxygen	(mg/L)	6.4	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	17	-
Suspended Solids	(mg/L)	7	-
Total Solids	(mg/L)	604	-
Dissolved Solids	(mg/L)	582	-
Specific Conductance	(mS/cm)	0.820	-
Turbidity	(NTU)	8.00	-
Ammonia-N	(mg/L)	0.40	-
Phosphorus	(mg/L)	0.17	-
Soluble Phosphorus	(mg/L)	0.14	-
Nitrate-N	(mg/L)	5.80	-
TKN	(mg/L)	1.30	-
Chlorides	(mg/L)	144	-
Sulfates	(mg/L)	102	-
Alkalinity	(mg/L)	147	-
Hardness	(mg/L)	217	-
Nickel	(mg/L)	0.0080	-
Copper	(mg/L)	0.0100	-
Total Chromium	(mg/L)	0.0100	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0700	-
Iron	(mg/L)	0.6800	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	0.3000	-
Fecal Coliform	(organisms/100ml)	270	-
pH	(s.u.)	8.8	-
E Coli	(organisms/100ml)	170	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	9.80	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

KINGSBURY RUN (46) - 06/06/97

Parameter		Value	Excursion
Temperature	(degrees C)	17.5	-
Dissolved Oxygen	(mg/L)	7.6	-
BOD-5	(mg/L)	4	-
COD	(mg/L)	22	-
Suspended Solids	(mg/L)	3	-
Dissolved Solids	(mg/L)	302	-
Specific Conductance	(mS/cm)	0.490	-
Turbidity	(NTU)	17.00	-
Ammonia-N	(mg/L)	0.40	-
Phosphorus	(mg/L)	0.25	-
Soluble Phosphorus	(mg/L)	0.22	-
Nitrate-N	(mg/L)	1.30	-
TKN	(mg/L)	1.30	-
Chlorides	(mg/L)	76	-
Sulfates	(mg/L)	54	-
Alkalinity	(mg/L)	108	-
Hardness	(mg/L)	208	-
Nickel	(mg/L)	0.0080	-
Copper	(mg/L)	0.0100	-
Total Chromium	(mg/L)	0.0040	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0600	-
Iron	(mg/L)	1.3000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0040	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	410	-
pH	(s.u.)	7.6	-
E Coli	(organisms/100ml)	340	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-

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KINGSBURY RUN (46) - 09/29/97

Parameter		Value	Excursion
Temperature	(degrees C)	19.5	-
Dissolved Oxygen	(mg/L)	5.3	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	32	-
Suspended Solids	(mg/L)	10	-
Total Solids	(mg/L)	760	-
Dissolved Solids	(mg/L)	750	-
Specific Conductance	(mS/cm)	1.400	-
Turbidity	(NTU)	15.00	-
Ammonia-N	(mg/L)	0.60	-
Phosphorus	(mg/L)	0.09	-
Soluble Phosphorus	(mg/L)	0.07	-
Nitrate-N	(mg/L)	5.00	-
TKN	(mg/L)	1.80	-
Chlorides	(mg/L)	160	-
Sulfates	(mg/L)	140	-
Alkalinity	(mg/L)	185	-
Hardness	(mg/L)	279	-
Nickel	(mg/L)	0.0100	-
Copper	(mg/L)	0.0120	-
Total Chromium	(mg/L)	0.0050	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0600	-
Iron	(mg/L)	0.9200	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0040	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	550	-
pH	(s.u.)	7.6	-
E Coli	(organisms/100ml)	290	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	0.0070	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	13.00	-

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KINGSBURY RUN (46) - 08/03/98

Parameter		Value	Excursion
Temperature	(degrees C)	27.0	-
Dissolved Oxygen	(mg/L)	5.0	-
BOD-5	(mg/L)	14	-
COD	(mg/L)	59	-
Suspended Solids	(mg/L)	55	-
Total Solids	(mg/L)	760	-
Dissolved Solids	(mg/L)	680	-
Specific Conductance	(mS/cm)	1.300	-
Turbidity	(NTU)	16.00	-
Ammonia-N	(mg/L)	0.50	-
Phosphorus	(mg/L)	0.28	-
Soluble Phosphorus	(mg/L)	0.26	-
Nitrate-N	(mg/L)	2.20	-
TKN	(mg/L)	5.30	-
Chlorides	(mg/L)	190	-
Sulfates	(mg/L)	110	-
Alkalinity	(mg/L)	142	-
Hardness	(mg/L)	264	-
Nickel	(mg/L)	0.0200	-
Copper	(mg/L)	0.0180	-
Total Chromium	(mg/L)	0.0091	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.2300	-
Iron	(mg/L)	1.6350	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0170	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	420	-
pH	(s.u.)	7.7	-
E Coli	(organisms/100ml)	200	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	0.0020	-

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KINGSBURY RUN (46.1) - 10/14/96

Parameter		Value	Excursion
Temperature	(degrees C)	15.0	-
Dissolved Oxygen	(mg/L)	8.4	-
BOD-5	(mg/L)	41	-
COD	(mg/L)	57	-
Suspended Solids	(mg/L)	76	-
Total Solids	(mg/L)	1018	-
Dissolved Solids	(mg/L)	921	-
Specific Conductance	(mS/cm)	1.200	-
Turbidity	(NTU)	67.00	-
Ammonia-N	(mg/L)	0.70	-
Phosphorus	(mg/L)	0.07	-
Soluble Phosphorus	(mg/L)	0.06	-
Nitrate-N	(mg/L)	1.30	-
TKN	(mg/L)	2.80	-
Chlorides	(mg/L)	18	-
Sulfates	(mg/L)	181	-
Alkalinity	(mg/L)	372	-
Hardness	(mg/L)	357	-
Nickel	(mg/L)	0.0100	-
Copper	(mg/L)	0.0300	-
Total Chromium	(mg/L)	0.0180	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.2600	-
Iron	(mg/L)	15.3000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0050	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	8400	-
pH	(s.u.)	8.1	-
E Coli	(organisms/100ml)	3500	-
Arsenic	(mg/L)	0.0150	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	15.30	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

KINGSBURY RUN (46.1) - 06/06/97

Parameter		Value	Excursion
Temperature	(degrees C)	13.0	-
Dissolved Oxygen	(mg/L)	9.3	-
BOD-5	(mg/L)	4	-
COD	(mg/L)	16	-
Suspended Solids	(mg/L)	4	-
Dissolved Solids	(mg/L)	870	-
Specific Conductance	(mS/cm)	1.700	-
Turbidity	(NTU)	5.60	-
Ammonia-N	(mg/L)	0.80	-
Phosphorus	(mg/L)	0.12	-
Soluble Phosphorus	(mg/L)	0.07	-
Nitrate-N	(mg/L)	1.10	-
TKN	(mg/L)	1.30	-
Chlorides	(mg/L)	166	-
Sulfates	(mg/L)	212	-
Alkalinity	(mg/L)	318	-
Hardness	(mg/L)	434	-
Nickel	(mg/L)	0.0090	-
Copper	(mg/L)	0.0080	-
Total Chromium	(mg/L)	0.0070	-
Zinc	(mg/L)	0.0100	-
Iron	(mg/L)	1.1000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	1200	-
pH	(s.u.)	7.2	-
E Coli	(organisms/100ml)	760	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-

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WQIS

KINGSBURY RUN (46.1) - 09/29/97

Parameter		Value	Excursion
Temperature	(degrees C)	17.0	-
Dissolved Oxygen	(mg/L)	7.9	-
BOD-5	(mg/L)	40	-
COD	(mg/L)	63	-
Suspended Solids	(mg/L)	113	-
Total Solids	(mg/L)	1023	-
Dissolved Solids	(mg/L)	920	-
Specific Conductance	(mS/cm)	1.700	-
Turbidity	(NTU)	50.00	-
Ammonia-N	(mg/L)	1.00	-
Phosphorus	(mg/L)	1.08	-
Soluble Phosphorus	(mg/L)	0.08	-
Nitrate-N	(mg/L)	1.10	-
TKN	(mg/L)	3.80	-
Chlorides	(mg/L)	166	-
Sulfates	(mg/L)	157	-
Alkalinity	(mg/L)	359	-
Hardness	(mg/L)	425	-
Nickel	(mg/L)	0.0140	-
Copper	(mg/L)	0.0100	-
Total Chromium	(mg/L)	0.0060	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.2800	-
Iron	(mg/L)	27.3000	-
Cadmium	(mg/L)	0.0010	-
Lead	(mg/L)	0.0110	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	8800	-
pH	(s.u.)	7.9	-
E Coli	(organisms/100ml)	3800	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	0.0130	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	14.60	-

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WQIS

KINGSBURY RUN (46.1) - 08/03/98

Parameter		Value	Excursion
Temperature	(degrees C)	17.0	-
Dissolved Oxygen	(mg/L)	7.8	-
BOD-5	(mg/L)	30	-
COD	(mg/L)	60	-
Suspended Solids	(mg/L)	120	-
Total Solids	(mg/L)	990	-
Dissolved Solids	(mg/L)	830	-
Specific Conductance	(mS/cm)	1.430	-
Turbidity	(NTU)	30.00	-
Ammonia-N	(mg/L)	1.10	-
Phosphorus	(mg/L)	0.93	-
Soluble Phosphorus	(mg/L)	0.23	-
Nitrate-N	(mg/L)	1.10	-
TKN	(mg/L)	2.00	-
Chlorides	(mg/L)	210	-
Sulfates	(mg/L)	140	-
Alkalinity	(mg/L)	334	-
Hardness	(mg/L)	474	-
Nickel	(mg/L)	0.0210	-
Copper	(mg/L)	0.0240	-
Total Chromium	(mg/L)	0.0120	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.2100	-
Iron	(mg/L)	7.1110	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0340	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	90000	-
pH	(s.u.)	8.0	-
E Coli	(organisms/100ml)	50000	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

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KINGSBURY RUN (46-A) - 10/14/96

Parameter		Value	Excursion
Temperature	(degrees C)	15.0	-
Dissolved Oxygen	(mg/L)	8.2	-
BOD-5	(mg/L)	5	-
COD	(mg/L)	5	-
Suspended Solids	(mg/L)	30	-
Total Solids	(mg/L)	1155	-
Dissolved Solids	(mg/L)	788	-
Specific Conductance	(mS/cm)	2.000	-
Turbidity	(NTU)	12.00	-
Ammonia-N	(mg/L)	1.40	-
Phosphorus	(mg/L)	0.10	-
Soluble Phosphorus	(mg/L)	0.06	-
Nitrate-N	(mg/L)	0.80	-
TKN	(mg/L)	1.90	-
Chlorides	(mg/L)	20	-
Sulfates	(mg/L)	176	-
Alkalinity	(mg/L)	380	-
Hardness	(mg/L)	410	-
Nickel	(mg/L)	0.0040	-
Copper	(mg/L)	0.0200	-
Total Chromium	(mg/L)	0.1000	-
Hexavalent Chromium	(mg/L)	0.0100	-
Zinc	(mg/L)	0.0800	-
Iron	(mg/L)	1.5000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	240	-
pH	(s.u.)	7.9	-
E Coli	(organisms/100ml)	140	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	9.90	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

KINGSBURY RUN (46-A) - 06/06/97

Parameter		Value	Excursion
Temperature	(degrees C)	13.0	-
Dissolved Oxygen	(mg/L)	8.2	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	13	-
Suspended Solids	(mg/L)	6	-
Dissolved Solids	(mg/L)	1016	-
Specific Conductance	(mS/cm)	1.900	-
Turbidity	(NTU)	5.40	-
Ammonia-N	(mg/L)	0.80	-
Phosphorus	(mg/L)	0.09	-
Soluble Phosphorus	(mg/L)	0.06	-
Nitrate-N	(mg/L)	0.90	-
TKN	(mg/L)	1.50	-
Chlorides	(mg/L)	230	-
Sulfates	(mg/L)	227	-
Alkalinity	(mg/L)	313	-
Hardness	(mg/L)	470	-
Nickel	(mg/L)	0.0090	-
Copper	(mg/L)	0.0140	-
Total Chromium	(mg/L)	0.0200	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0900	-
Iron	(mg/L)	0.9200	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	10000	-
pH	(s.u.)	6.9	-
E Coli	(organisms/100ml)	620	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-

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WQIS

KINGSBURY RUN (46-A) - 09/29/97

Parameter		Value	Excursion
Temperature	(degrees C)	17.0	-
Dissolved Oxygen	(mg/L)	8.0	-
BOD-5	(mg/L)	9	-
COD	(mg/L)	25	-
Suspended Solids	(mg/L)	18	-
Total Solids	(mg/L)	967	-
Dissolved Solids	(mg/L)	969	-
Specific Conductance	(mS/cm)	1.600	-
Turbidity	(NTU)	20.00	-
Ammonia-N	(mg/L)	1.10	-
Phosphorus	(mg/L)	0.28	-
Soluble Phosphorus	(mg/L)	0.09	-
Nitrate-N	(mg/L)	0.80	-
TKN	(mg/L)	1.40	-
Chlorides	(mg/L)	204	-
Sulfates	(mg/L)	151	-
Alkalinity	(mg/L)	304	-
Hardness	(mg/L)	417	-
Nickel	(mg/L)	0.0120	-
Copper	(mg/L)	0.0300	-
Total Chromium	(mg/L)	0.1400	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0900	-
Iron	(mg/L)	2.9000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0070	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	100	-
pH	(s.u.)	7.6	-
E Coli	(organisms/100ml)	20	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	0.0060	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	10.20	-

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KINGSBURY RUN (46-A) - 08/03/98

Parameter		Value	Excursion
Temperature	(degrees C)	21.0	-
Dissolved Oxygen	(mg/L)	7.5	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	6	-
Total Solids	(mg/L)	490	-
Dissolved Solids	(mg/L)	440	-
Specific Conductance	(mS/cm)	0.800	-
Turbidity	(NTU)	4.90	-
Ammonia-N	(mg/L)	0.60	-
Phosphorus	(mg/L)	0.38	-
Soluble Phosphorus	(mg/L)	0.35	-
Nitrate-N	(mg/L)	0.50	-
TKN	(mg/L)	0.80	-
Chlorides	(mg/L)	110	-
Sulfates	(mg/L)	66	-
Alkalinity	(mg/L)	181	-
Hardness	(mg/L)	235	-
Nickel	(mg/L)	0.0043	-
Copper	(mg/L)	0.0440	-
Total Chromium	(mg/L)	0.0220	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0490	-
Iron	(mg/L)	0.5340	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0032	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	16	-
pH	(s.u.)	8.0	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

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KINGSBURY RUN (46-B) - 10/14/96

Parameter		Value	Excursion
Temperature	(degrees C)	14.0	-
Dissolved Oxygen	(mg/L)	7.5	-
BOD-5	(mg/L)	25	-
COD	(mg/L)	124	-
Suspended Solids	(mg/L)	255	-
Total Solids	(mg/L)	1465	-
Dissolved Solids	(mg/L)	1166	-
Specific Conductance	(mS/cm)	2.000	-
Turbidity	(NTU)	70.00	-
Ammonia-N	(mg/L)	0.70	-
Phosphorus	(mg/L)	0.39	-
Soluble Phosphorus	(mg/L)	0.03	-
Nitrate-N	(mg/L)	0.30	-
TKN	(mg/L)	1.90	-
Chlorides	(mg/L)	16	-
Sulfates	(mg/L)	366	-
Alkalinity	(mg/L)	394	-
Hardness	(mg/L)	480	-
Nickel	(mg/L)	0.2300	-
Copper	(mg/L)	0.2200	-
Total Chromium	(mg/L)	0.0400	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.4800	-
Iron	(mg/L)	44.2000	-
Cadmium	(mg/L)	0.0010	-
Lead	(mg/L)	0.1100	-
Mercury	(ug/L)	0.4000	-
Fecal Coliform	(organisms/100ml)	<20	-
pH	(s.u.)	7.6	-
E Coli	(organisms/100ml)	<20	-
Arsenic	(mg/L)	0.0180	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	9.00	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

KINGSBURY RUN (46-B) - 06/06/97

Parameter		Value	Excursion
Temperature	(degrees C)	13.5	-
Dissolved Oxygen	(mg/L)	8.1	-
BOD-5	(mg/L)	4	-
COD	(mg/L)	41	-
Suspended Solids	(mg/L)	5	-
Dissolved Solids	(mg/L)	980	-
Specific Conductance	(mS/cm)	1.700	-
Turbidity	(NTU)	7.90	-
Ammonia-N	(mg/L)	0.60	-
Phosphorus	(mg/L)	0.08	-
Soluble Phosphorus	(mg/L)	0.06	-
Nitrate-N	(mg/L)	0.50	-
TKN	(mg/L)	1.10	-
Chlorides	(mg/L)	116	-
Sulfates	(mg/L)	117	-
Alkalinity	(mg/L)	386	-
Hardness	(mg/L)	520	-
Nickel	(mg/L)	0.0130	-
Copper	(mg/L)	0.0100	-
Total Chromium	(mg/L)	0.0050	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0600	-
Iron	(mg/L)	3.4000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0060	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	5	-
pH	(s.u.)	6.9	-
E Coli	(organisms/100ml)	<5	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-

NEORSD

WQIS

KINGSBURY RUN (46-B) - 09/29/97

Parameter		Value	Excursion
Temperature	(degrees C)	18.0	-
Dissolved Oxygen	(mg/L)	6.4	-
BOD-5	(mg/L)	29	-
COD	(mg/L)	106	-
Suspended Solids	(mg/L)	46	-
Total Solids	(mg/L)	1083	-
Dissolved Solids	(mg/L)	989	-
Specific Conductance	(mS/cm)	1.600	-
Turbidity	(NTU)	27.00	-
Ammonia-N	(mg/L)	0.70	-
Phosphorus	(mg/L)	0.26	-
Soluble Phosphorus	(mg/L)	0.06	-
Nitrate-N	(mg/L)	0.30	-
TKN	(mg/L)	1.80	-
Chlorides	(mg/L)	140	-
Sulfates	(mg/L)	205	-
Alkalinity	(mg/L)	447	-
Hardness	(mg/L)	583	-
Nickel	(mg/L)	0.3000	-
Copper	(mg/L)	0.0370	-
Total Chromium	(mg/L)	0.0140	-
Hexavalent Chromium	(mg/L)	<0.0010	-
Zinc	(mg/L)	0.0600	-
Iron	(mg/L)	7.9000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0190	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	<10	-
pH	(s.u.)	7.3	-
E Coli	(organisms/100ml)	<10	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	0.0110	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	9.30	-

NEORSD

WQIS

KINGSBURY RUN (46-B) - 08/03/98

Parameter		Value	Excursion
Temperature	(degrees C)	15.0	-
Dissolved Oxygen	(mg/L)	5.8	-
BOD-5	(mg/L)	27	-
COD	(mg/L)	63	-
Suspended Solids	(mg/L)	36	-
Total Solids	(mg/L)	1100	-
Dissolved Solids	(mg/L)	990	-
Specific Conductance	(mS/cm)	1.300	-
Turbidity	(NTU)	25.00	-
Ammonia-N	(mg/L)	0.60	-
Phosphorus	(mg/L)	0.35	-
Soluble Phosphorus	(mg/L)	0.15	-
Nitrate-N	(mg/L)	0.50	-
TKN	(mg/L)	0.90	-
Chlorides	(mg/L)	150	-
Sulfates	(mg/L)	200	-
Alkalinity	(mg/L)	440	-
Hardness	(mg/L)	650	-
Nickel	(mg/L)	0.0084	-
Copper	(mg/L)	0.0098	-
Total Chromium	(mg/L)	0.0049	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0430	-
Iron	(mg/L)	7.1420	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0098	-
Mercury	(ug/L)	<0.0020	-
Fecal Coliform	(organisms/100ml)	20	-
pH	(s.u.)	6.9	-
E Coli	(organisms/100ml)	20	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

KINGSBURY RUN (46-C) - 10/14/96

Parameter		Value	Excursion
Temperature	(degrees C)	15.5	-
Dissolved Oxygen	(mg/L)	9.5	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	3	-
Suspended Solids	(mg/L)	12	-
Total Solids	(mg/L)	802	-
Dissolved Solids	(mg/L)	752	-
Specific Conductance	(mS/cm)	1.200	-
Turbidity	(NTU)	5.60	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.10	-
Soluble Phosphorus	(mg/L)	0.07	-
Nitrate-N	(mg/L)	1.10	-
TKN	(mg/L)	0.70	-
Chlorides	(mg/L)	18	-
Sulfates	(mg/L)	118	-
Alkalinity	(mg/L)	398	-
Hardness	(mg/L)	114	-
Nickel	(mg/L)	0.0010	-
Copper	(mg/L)	0.0200	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0500	-
Iron	(mg/L)	0.8900	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	90	-
pH	(s.u.)	8.5	-
E Coli	(organisms/100ml)	50	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	4.70	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

KINGSBURY RUN (46-C) - 06/06/97

Parameter		Value	Excursion
Temperature	(degrees C)	13.0	-
Dissolved Oxygen	(mg/L)	9.5	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	16	-
Suspended Solids	(mg/L)	14	-
Dissolved Solids	(mg/L)	846	-
Specific Conductance	(mS/cm)	1.300	-
Turbidity	(NTU)	7.20	-
Ammonia-N	(mg/L)	0.20	-
Phosphorus	(mg/L)	0.13	-
Soluble Phosphorus	(mg/L)	0.10	-
Nitrate-N	(mg/L)	2.10	-
TKN	(mg/L)	0.80	-
Chlorides	(mg/L)	190	-
Sulfates	(mg/L)	136	-
Alkalinity	(mg/L)	272	-
Hardness	(mg/L)	293	-
Nickel	(mg/L)	0.0160	-
Copper	(mg/L)	0.0080	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0600	-
Iron	(mg/L)	0.8400	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0040	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	4000	-
pH	(s.u.)	8.2	-
E Coli	(organisms/100ml)	2500	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-

NEORSD

WQIS

KINGSBURY RUN (46-C) - 09/29/97

Parameter		Value	Excursion
Temperature	(degrees C)	16.0	-
Dissolved Oxygen	(mg/L)	9.2	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	22	-
Suspended Solids	(mg/L)	90	-
Total Solids	(mg/L)	900	-
Dissolved Solids	(mg/L)	794	-
Specific Conductance	(mS/cm)	1.600	-
Turbidity	(NTU)	17.00	-
Ammonia-N	(mg/L)	0.04	-
Phosphorus	(mg/L)	0.09	-
Soluble Phosphorus	(mg/L)	0.05	-
Nitrate-N	(mg/L)	1.30	-
TKN	(mg/L)	0.80	-
Chlorides	(mg/L)	200	-
Sulfates	(mg/L)	120	-
Alkalinity	(mg/L)	414	-
Hardness	(mg/L)	194	-
Nickel	(mg/L)	0.0090	-
Copper	(mg/L)	0.0130	-
Total Chromium	(mg/L)	0.0040	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	13.3000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0150	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	240	-
pH	(s.u.)	8.1	-
E Coli	(organisms/100ml)	140	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	4.40	-

NEORSD

WQIS

KINGSBURY RUN (46-C) - 08/03/98

Parameter		Value	Excursion
Temperature	(degrees C)	16.0	-
Dissolved Oxygen	(mg/L)	9.0	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	23	-
Suspended Solids	(mg/L)	190	-
Total Solids	(mg/L)	1000	-
Dissolved Solids	(mg/L)	750	-
Specific Conductance	(mS/cm)	1.000	-
Turbidity	(NTU)	55.00	-
Ammonia-N	(mg/L)	0.30	-
Phosphorus	(mg/L)	0.58	-
Soluble Phosphorus	(mg/L)	0.27	-
Nitrate-N	(mg/L)	1.50	-
TKN	(mg/L)	1.00	-
Chlorides	(mg/L)	130	-
Sulfates	(mg/L)	110	-
Alkalinity	(mg/L)	392	-
Hardness	(mg/L)	195	-
Nickel	(mg/L)	0.0320	-
Copper	(mg/L)	0.0680	-
Total Chromium	(mg/L)	0.0110	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.1400	-
Iron	(mg/L)	9.5790	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0250	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	280	-
pH	(s.u.)	8.1	-
E Coli	(organisms/100ml)	240	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	0.0050	-

NEORSD

WQIS

MORGANA RUN (47) - 09/05/96

Parameter		Value	Excursion
Temperature	(degrees C)	20.0	-
Dissolved Oxygen	(mg/L)	7.4	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	23	-
Suspended Solids	(mg/L)	8	-
Total Solids	(mg/L)	1415	-
Dissolved Solids	(mg/L)	1354	-
Specific Conductance	(mS/cm)	2.400	-
Turbidity	(NTU)	0.68	-
Ammonia-N	(mg/L)	5.00	-
Phosphorus	(mg/L)	0.07	-
Soluble Phosphorus	(mg/L)	0.06	-
Nitrate-N	(mg/L)	0.80	-
TKN	(mg/L)	5.40	-
Chlorides	(mg/L)	520	-
Sulfates	(mg/L)	315	-
Alkalinity	(mg/L)	108	-
Hardness	(mg/L)	406	-
Nickel	(mg/L)	0.0070	-
Copper	(mg/L)	0.0150	-
Total Chromium	(mg/L)	0.0040	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.1200	-
Iron	(mg/L)	0.4700	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	11000	-
pH	(s.u.)	8.2	-
E Coli	(organisms/100ml)	60	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	0.0020	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

MORGANA RUN (47) - 07/24/97

Parameter		Value	Excursion
Temperature	(degrees C)	20.0	-
Dissolved Oxygen	(mg/L)	6.7	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	13	-
Suspended Solids	(mg/L)	5	-
Total Solids	(mg/L)	1049	-
Dissolved Solids	(mg/L)	963	-
Specific Conductance	(mS/cm)	1.700	-
Turbidity	(NTU)	2.80	-
Ammonia-N	(mg/L)	0.50	-
Phosphorus	(mg/L)	0.17	-
Soluble Phosphorus	(mg/L)	0.15	-
Nitrate-N	(mg/L)	2.90	-
TKN	(mg/L)	1.60	-
Chlorides	(mg/L)	360	-
Sulfates	(mg/L)	159	-
Alkalinity	(mg/L)	106	-
Hardness	(mg/L)	267	-
Nickel	(mg/L)	0.0060	-
Copper	(mg/L)	0.0080	-
Total Chromium	(mg/L)	0.0050	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	1.0000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	3000	-
pH	(s.u.)	7.8	-
E Coli	(organisms/100ml)	1200	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	15.30	-

NEORSD

WQIS

MORGANA RUN (47) - 09/29/97

Parameter		Value	Excursion
Temperature	(degrees C)	21.5	-
Dissolved Oxygen	(mg/L)	7.5	-
BOD-5	(mg/L)	4	-
COD	(mg/L)	36	-
Suspended Solids	(mg/L)	67	-
Total Solids	(mg/L)	733	-
Dissolved Solids	(mg/L)	645	-
Specific Conductance	(mS/cm)	1.300	-
Turbidity	(NTU)	25.00	-
Ammonia-N	(mg/L)	0.30	-
Phosphorus	(mg/L)	0.30	-
Soluble Phosphorus	(mg/L)	0.16	-
Nitrate-N	(mg/L)	6.70	-
TKN	(mg/L)	1.70	-
Chlorides	(mg/L)	156	-
Sulfates	(mg/L)	119	-
Alkalinity	(mg/L)	141	-
Hardness	(mg/L)	230	-
Nickel	(mg/L)	0.0090	-
Copper	(mg/L)	0.0110	-
Total Chromium	(mg/L)	0.0070	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0600	-
Iron	(mg/L)	2.9000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0080	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	2000	-
pH	(s.u.)	7.4	-
E Coli	(organisms/100ml)	560	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	0.0090	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	14.20	-

NEORSD

WQIS

MORGANA RUN (47) - 08/03/98

Parameter		Value	Excursion
Temperature	(degrees C)	25.0	-
Dissolved Oxygen	(mg/L)	6.1	-
BOD-5	(mg/L)	8	-
COD	(mg/L)	15	-
Suspended Solids	(mg/L)	6	-
Total Solids	(mg/L)	1000	-
Dissolved Solids	(mg/L)	940	-
Specific Conductance	(mS/cm)	0.800	-
Turbidity	(NTU)	1.50	-
Ammonia-N	(mg/L)	1.20	-
Phosphorus	(mg/L)	0.22	-
Soluble Phosphorus	(mg/L)	0.19	-
Nitrate-N	(mg/L)	0.80	-
TKN	(mg/L)	1.80	-
Chlorides	(mg/L)	340	-
Sulfates	(mg/L)	220	-
Alkalinity	(mg/L)	80	-
Hardness	(mg/L)	279	-
Nickel	(mg/L)	0.0014	-
Copper	(mg/L)	0.0120	-
Total Chromium	(mg/L)	0.0060	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0410	-
Iron	(mg/L)	0.2170	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0053	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	41000	-
pH	(s.u.)	8.6	-
E Coli	(organisms/100ml)	2800	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

MORGANA RUN (47-A) - 09/05/96

Parameter		Value	Excursion
Temperature	(degrees C)	28.5	-
Dissolved Oxygen	(mg/L)	6.6	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	26	-
Suspended Solids	(mg/L)	37	-
Total Solids	(mg/L)	720	-
Dissolved Solids	(mg/L)	625	-
Specific Conductance	(mS/cm)	1.300	-
Turbidity	(NTU)	20.00	-
Ammonia-N	(mg/L)	0.40	-
Phosphorus	(mg/L)	0.57	-
Soluble Phosphorus	(mg/L)	0.47	-
Nitrate-N	(mg/L)	11.10	-
TKN	(mg/L)	1.90	-
Chlorides	(mg/L)	174	-
Sulfates	(mg/L)	108	-
Alkalinity	(mg/L)	149	-
Hardness	(mg/L)	254	-
Nickel	(mg/L)	0.0330	-
Copper	(mg/L)	0.0200	-
Total Chromium	(mg/L)	0.0050	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0500	-
Iron	(mg/L)	1.5000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0050	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	170	-
pH	(s.u.)	7.3	-
E Coli	(organisms/100ml)	3100	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	0.0020	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

MORGANA RUN (47-A) - 07/24/97

Parameter		Value	Excursion
Temperature	(degrees C)	26.0	-
Dissolved Oxygen	(mg/L)	6.5	-
BOD-5	(mg/L)	4	-
COD	(mg/L)	23	-
Suspended Solids	(mg/L)	24	-
Total Solids	(mg/L)	730	-
Dissolved Solids	(mg/L)	630	-
Specific Conductance	(mS/cm)	1.400	-
Turbidity	(NTU)	12.00	-
Ammonia-N	(mg/L)	0.30	-
Phosphorus	(mg/L)	0.23	-
Soluble Phosphorus	(mg/L)	0.21	-
Nitrate-N	(mg/L)	8.20	-
TKN	(mg/L)	1.70	-
Chlorides	(mg/L)	200	-
Sulfates	(mg/L)	110	-
Alkalinity	(mg/L)	132	-
Hardness	(mg/L)	230	-
Nickel	(mg/L)	0.0090	-
Copper	(mg/L)	0.0150	-
Total Chromium	(mg/L)	0.0030	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0520	-
Iron	(mg/L)	1.1000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0050	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	380	-
pH	(s.u.)	7.6	-
E Coli	(organisms/100ml)	180	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	15.00	-

NEORSD

WQIS

MORGANA RUN (47-A) - 09/29/97

Parameter		Value	Excursion
Temperature	(degrees C)	18.0	-
Dissolved Oxygen	(mg/L)	7.9	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	23	-
Suspended Solids	(mg/L)	<1	-
Specific Conductance	(mS/cm)	2.300	-
Turbidity	(NTU)	2.90	-
Ammonia-N	(mg/L)	1.00	-
Phosphorus	(mg/L)	0.09	-
Soluble Phosphorus	(mg/L)	0.07	-
Nitrate-N	(mg/L)	0.80	-
TKN	(mg/L)	1.50	-
Chlorides	(mg/L)	454	-
Sulfates	(mg/L)	328	-
Alkalinity	(mg/L)	91	-
Hardness	(mg/L)	357	-
Nickel	(mg/L)	0.0030	-
Copper	(mg/L)	0.0100	-
Total Chromium	(mg/L)	0.0100	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0090	-
Iron	(mg/L)	0.0500	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	20	-
pH	(s.u.)	9.9	-
E Coli	(organisms/100ml)	<5	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	18.20	-

NEORSD

WQIS

MORGANA RUN (47-A) - 08/03/98

Parameter		Value	Excursion
Temperature	(degrees C)	29.0	-
Dissolved Oxygen	(mg/L)	6.7	-
BOD-5	(mg/L)	23	-
COD	(mg/L)	26	-
Suspended Solids	(mg/L)	34	-
Total Solids	(mg/L)	740	-
Dissolved Solids	(mg/L)	650	-
Specific Conductance	(mS/cm)	1.200	-
Turbidity	(NTU)	22.00	-
Ammonia-N	(mg/L)	0.50	-
Phosphorus	(mg/L)	0.37	-
Soluble Phosphorus	(mg/L)	0.28	-
Nitrate-N	(mg/L)	2.30	-
TKN	(mg/L)	1.90	-
Chlorides	(mg/L)	190	-
Sulfates	(mg/L)	120	-
Alkalinity	(mg/L)	133	-
Hardness	(mg/L)	237	-
Nickel	(mg/L)	0.0240	-
Copper	(mg/L)	0.0170	-
Total Chromium	(mg/L)	0.0085	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.1500	-
Iron	(mg/L)	1.7720	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0130	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	220	-
pH	(s.u.)	8.1	-
E Coli	(organisms/100ml)	140	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	0.0020	-

NEORSD

WQIS

BURKE BROOK (48) - 08/09/96

Parameter		Value	Excursion
Temperature	(degrees C)	25.0	-
Dissolved Oxygen	(mg/L)	7.4	-
BOD-5	(mg/L)	6	-
COD	(mg/L)	30	-
Suspended Solids	(mg/L)	30	-
Total Solids	(mg/L)	773	-
Dissolved Solids	(mg/L)	655	-
Specific Conductance	(mS/cm)	1.500	-
Turbidity	(NTU)	18.00	-
Ammonia-N	(mg/L)	0.60	-
Phosphorus	(mg/L)	0.45	-
Soluble Phosphorus	(mg/L)	0.36	-
Nitrate-N	(mg/L)	7.50	-
TKN	(mg/L)	2.50	-
Chlorides	(mg/L)	200	-
Sulfates	(mg/L)	144	-
Alkalinity	(mg/L)	135	-
Hardness	(mg/L)	270	-
Nickel	(mg/L)	0.0400	-
Copper	(mg/L)	0.0140	-
Total Chromium	(mg/L)	0.0040	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0500	-
Iron	(mg/L)	1.3000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0040	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	870	-
pH	(s.u.)	7.5	-
E Coli	(organisms/100ml)	710	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	0.0080	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	16.70	-
Cobalt	(mg/L)	0.0010	-

NEORSD

WQIS

BURKE BROOK (48) - 07/24/97

Parameter		Value	Excursion
Temperature	(degrees C)	24.5	-
Dissolved Oxygen	(mg/L)	6.6	-
BOD-5	(mg/L)	4	-
COD	(mg/L)	28	-
Suspended Solids	(mg/L)	18	-
Total Solids	(mg/L)	743	-
Dissolved Solids	(mg/L)	677	-
Specific Conductance	(mS/cm)	1.400	-
Turbidity	(NTU)	12.00	-
Ammonia-N	(mg/L)	0.80	-
Phosphorus	(mg/L)	0.27	-
Soluble Phosphorus	(mg/L)	0.26	-
Nitrate-N	(mg/L)	8.40	-
TKN	(mg/L)	2.00	-
Chlorides	(mg/L)	340	-
Sulfates	(mg/L)	39	-
Alkalinity	(mg/L)	138	-
Hardness	(mg/L)	267	-
Nickel	(mg/L)	0.0090	-
Copper	(mg/L)	0.0110	-
Total Chromium	(mg/L)	0.0050	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	1.0000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0040	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	5400	-
pH	(s.u.)	7.5	-
E Coli	(organisms/100ml)	3200	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	18.90	-

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WQIS

BURKE BROOK (48) - 10/09/97

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	7.1	-
BOD-5	(mg/L)	4	-
COD	(mg/L)	24	-
Suspended Solids	(mg/L)	20	-
Total Solids	(mg/L)	670	-
Dissolved Solids	(mg/L)	588	-
Specific Conductance	(mS/cm)	1.300	-
Turbidity	(NTU)	9.90	-
Ammonia-N	(mg/L)	0.50	-
Phosphorus	(mg/L)	0.15	-
Soluble Phosphorus	(mg/L)	0.10	-
Nitrate-N	(mg/L)	5.40	-
TKN	(mg/L)	1.60	-
Chlorides	(mg/L)	150	-
Sulfates	(mg/L)	117	-
Alkalinity	(mg/L)	129	-
Hardness	(mg/L)	231	-
Nickel	(mg/L)	0.0130	-
Copper	(mg/L)	0.0100	-
Total Chromium	(mg/L)	0.0060	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	0.6300	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	440	-
pH	(s.u.)	7.5	-
E Coli	(organisms/100ml)	380	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	14.80	-
Cobalt	(mg/L)	0.0010	-

NEORSD

WQIS

BURKE BROOK (48) - 07/28/98

Parameter		Value	Excursion
Temperature	(degrees C)	24.0	-
Dissolved Oxygen	(mg/L)	6.6	-
BOD-5	(mg/L)	4	-
COD	(mg/L)	24	-
Suspended Solids	(mg/L)	28	-
Total Solids	(mg/L)	900	-
Dissolved Solids	(mg/L)	790	-
Specific Conductance	(mS/cm)	0.950	-
Turbidity	(NTU)	18.00	-
Ammonia-N	(mg/L)	1.70	-
Phosphorus	(mg/L)	0.29	-
Soluble Phosphorus	(mg/L)	0.25	-
Nitrate-N	(mg/L)	2.20	-
TKN	(mg/L)	3.00	-
Chlorides	(mg/L)	86	-
Sulfates	(mg/L)	170	-
Alkalinity	(mg/L)	136	-
Hardness	(mg/L)	297	-
Nickel	(mg/L)	0.0290	-
Copper	(mg/L)	0.0280	-
Total Chromium	(mg/L)	0.0040	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0310	-
Iron	(mg/L)	1.4000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	1100	-
pH	(s.u.)	8.1	-
E Coli	(organisms/100ml)	940	-
Antimony	(mg/L)	0.0160	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	0.0010	-

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WQIS

BURKE BROOK (48.1) - 08/09/96

Parameter		Value	Excursion
Temperature	(degrees C)	19.0	-
Dissolved Oxygen	(mg/L)	8.7	-
BOD-5	(mg/L)	4	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	1	-
Total Solids	(mg/L)	957	-
Dissolved Solids	(mg/L)	804	-
Specific Conductance	(mS/cm)	1.900	-
Turbidity	(NTU)	2.00	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.08	-
Soluble Phosphorus	(mg/L)	0.07	-
Nitrate-N	(mg/L)	1.20	-
TKN	(mg/L)	0.80	-
Chlorides	(mg/L)	291	-
Sulfates	(mg/L)	186	-
Alkalinity	(mg/L)	232	-
Hardness	(mg/L)	474	-
Nickel	(mg/L)	0.0160	-
Copper	(mg/L)	0.0100	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	0.2800	-
Cadmium	(mg/L)	0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	310	-
pH	(s.u.)	7.6	-
E Coli	(organisms/100ml)	350	-
Arsenic	(mg/L)	0.0140	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	6.60	-
Cobalt	(mg/L)	0.0010	-

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WQIS

BURKE BROOK (48.1) - 07/24/97

Parameter		Value	Excursion
Temperature	(degrees C)	19.0	-
Dissolved Oxygen	(mg/L)	6.7	-
BOD-5	(mg/L)	14	-
COD	(mg/L)	237	-
Suspended Solids	(mg/L)	6	-
Total Solids	(mg/L)	1200	-
Dissolved Solids	(mg/L)	1074	-
Specific Conductance	(mS/cm)	1.900	-
Turbidity	(NTU)	4.70	-
Ammonia-N	(mg/L)	0.02	-
Phosphorus	(mg/L)	0.19	-
Soluble Phosphorus	(mg/L)	0.18	-
Nitrate-N	(mg/L)	1.00	-
TKN	(mg/L)	2.80	-
Chlorides	(mg/L)	340	-
Sulfates	(mg/L)	159	-
Alkalinity	(mg/L)	256	-
Hardness	(mg/L)	240	-
Nickel	(mg/L)	0.0050	-
Copper	(mg/L)	0.0080	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.1100	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	400	-
pH	(s.u.)	7.6	-
E Coli	(organisms/100ml)	480	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	7.70	-

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WQIS

BURKE BROOK (48.1) - 10/09/97

Parameter		Value	Excursion
Temperature	(degrees C)	20.0	-
Dissolved Oxygen	(mg/L)	7.6	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	19	-
Suspended Solids	(mg/L)	3	-
Total Solids	(mg/L)	1092	-
Dissolved Solids	(mg/L)	1014	-
Specific Conductance	(mS/cm)	1.900	-
Turbidity	(NTU)	1.50	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.06	-
Soluble Phosphorus	(mg/L)	0.04	-
Nitrate-N	(mg/L)	1.00	-
TKN	(mg/L)	0.40	-
Chlorides	(mg/L)	288	-
Sulfates	(mg/L)	183	-
Alkalinity	(mg/L)	243	-
Hardness	(mg/L)	423	-
Nickel	(mg/L)	0.0090	-
Copper	(mg/L)	0.0100	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.2300	-
Cadmium	(mg/L)	0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	100	-
pH	(s.u.)	7.5	-
E Coli	(organisms/100ml)	28	-
Antimony	(mg/L)	0.0860	-
Arsenic	(mg/L)	0.0280	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	8.00	-
Cobalt	(mg/L)	0.0010	-

NEORSD

WQIS

BURKE BROOK (48.1) - 07/28/98

Parameter		Value	Excursion
Temperature	(degrees C)	20.0	-
Dissolved Oxygen	(mg/L)	9.7	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	1000	-
Dissolved Solids	(mg/L)	950	-
Specific Conductance	(mS/cm)	0.979	-
Turbidity	(NTU)	2.00	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.12	-
Soluble Phosphorus	(mg/L)	0.11	-
Nitrate-N	(mg/L)	1.10	-
TKN	(mg/L)	0.40	-
Chlorides	(mg/L)	240	-
Sulfates	(mg/L)	170	-
Alkalinity	(mg/L)	229	-
Hardness	(mg/L)	435	-
Nickel	(mg/L)	0.0068	-
Copper	(mg/L)	0.0200	-
Total Chromium	(mg/L)	0.0017	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0550	-
Iron	(mg/L)	0.3130	-
Cadmium	(mg/L)	0.0011	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	510	-
pH	(s.u.)	8.2	-
E Coli	(organisms/100ml)	460	-
Antimony	(mg/L)	0.0830	-
Arsenic	(mg/L)	0.0170	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

ROCKY RIVER (49) - 07/22/96

Parameter		Value	Excursion
Temperature	(degrees C)	21.0	-
Dissolved Oxygen	(mg/L)	9.5	-
BOD-5	(mg/L)	4	-
COD	(mg/L)	18	-
Suspended Solids	(mg/L)	10	-
Total Solids	(mg/L)	550	-
Dissolved Solids	(mg/L)	472	-
Specific Conductance	(mS/cm)	1.000	-
Turbidity	(NTU)	8.50	-
Ammonia-N	(mg/L)	0.04	-
Phosphorus	(mg/L)	0.11	-
Soluble Phosphorus	(mg/L)	0.08	-
Nitrate-N	(mg/L)	2.90	-
TKN	(mg/L)	0.90	-
Chlorides	(mg/L)	138	-
Sulfates	(mg/L)	93	-
Alkalinity	(mg/L)	132	-
Hardness	(mg/L)	226	-
Nickel	(mg/L)	0.0100	-
Copper	(mg/L)	0.0100	-
Total Chromium	(mg/L)	0.0060	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0600	-
Iron	(mg/L)	0.6000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	4400	PCU(2000)
pH	(s.u.)	7.8	-
E Coli	(organisms/100ml)	1200	PCU(298)
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	4.40	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

ROCKY RIVER (49) - 07/21/97

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	8.4	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	18	-
Suspended Solids	(mg/L)	5	-
Total Solids	(mg/L)	572	-
Dissolved Solids	(mg/L)	493	-
Specific Conductance	(mS/cm)	1.100	-
Turbidity	(NTU)	3.50	-
Ammonia-N	(mg/L)	0.03	-
Phosphorus	(mg/L)	0.15	-
Soluble Phosphorus	(mg/L)	0.15	-
Nitrate-N	(mg/L)	4.00	-
TKN	(mg/L)	0.90	-
Chlorides	(mg/L)	134	-
Sulfates	(mg/L)	120	-
Alkalinity	(mg/L)	151	-
Hardness	(mg/L)	222	-
Nickel	(mg/L)	0.0080	-
Copper	(mg/L)	0.0140	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	0.2300	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	220	-
pH	(s.u.)	7.7	-
E Coli	(organisms/100ml)	130	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	8.50	-

NEORSD

WQIS

ROCKY RIVER (49) - 10/09/97

Parameter		Value	Excursion
Temperature	(degrees C)	19.0	-
Dissolved Oxygen	(mg/L)	8.3	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	22	-
Suspended Solids	(mg/L)	3	-
Total Solids	(mg/L)	497	-
Dissolved Solids	(mg/L)	463	-
Specific Conductance	(mS/cm)	1.100	-
Turbidity	(NTU)	4.50	-
Ammonia-N	(mg/L)	0.02	-
Phosphorus	(mg/L)	0.06	-
Soluble Phosphorus	(mg/L)	0.05	-
Nitrate-N	(mg/L)	4.80	-
TKN	(mg/L)	0.60	-
Chlorides	(mg/L)	96	-
Sulfates	(mg/L)	100	-
Alkalinity	(mg/L)	124	-
Hardness	(mg/L)	215	-
Nickel	(mg/L)	0.0050	-
Copper	(mg/L)	0.0090	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0200	-
Iron	(mg/L)	0.6500	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	500	-
pH	(s.u.)	7.5	-
E Coli	(organisms/100ml)	190	-
Antimony	(mg/L)	<0.0010	-
Arsenic	(mg/L)	<0.0070	-
Selenium	(mg/L)	<0.0010	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.2000	-
Beryllium	(mg/L)	<0.0050	-
Potassium	(mg/L)	6.30	-
Cobalt	(mg/L)	0.0010	-

NEORSD

WQIS

ROCKY RIVER (49) - 07/13/98

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	10.0	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	8	-
Total Solids	(mg/L)	480	-
Dissolved Solids	(mg/L)	430	-
Specific Conductance	(mS/cm)	0.812	-
Turbidity	(NTU)	5.20	-
Ammonia-N	(mg/L)	0.03	-
Phosphorus	(mg/L)	0.08	-
Soluble Phosphorus	(mg/L)	0.04	-
Nitrate-N	(mg/L)	3.50	-
TKN	(mg/L)	0.90	-
Chlorides	(mg/L)	86	-
Sulfates	(mg/L)	84	-
Alkalinity	(mg/L)	119	-
Hardness	(mg/L)	200	-
Nickel	(mg/L)	0.0017	-
Copper	(mg/L)	0.0072	-
Total Chromium	(mg/L)	<0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0680	-
Iron	(mg/L)	0.6200	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	170	-
pH	(s.u.)	8.2	-
E Coli	(organisms/100ml)	88	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

ROCKY RIVER (50) - 07/22/96

Parameter		Value	Excursion
Temperature	(degrees C)	21.0	-
Dissolved Oxygen	(mg/L)	7.5	-
BOD-5	(mg/L)	6	-
COD	(mg/L)	24	-
Suspended Solids	(mg/L)	36	-
Total Solids	(mg/L)	559	-
Dissolved Solids	(mg/L)	470	-
Specific Conductance	(mS/cm)	1.000	-
Turbidity	(NTU)	27.00	-
Ammonia-N	(mg/L)	0.40	-
Phosphorus	(mg/L)	0.22	-
Soluble Phosphorus	(mg/L)	0.14	-
Nitrate-N	(mg/L)	3.30	-
TKN	(mg/L)	1.50	-
Chlorides	(mg/L)	126	-
Sulfates	(mg/L)	90	-
Alkalinity	(mg/L)	128	-
Hardness	(mg/L)	228	-
Nickel	(mg/L)	0.0160	-
Copper	(mg/L)	0.0150	-
Total Chromium	(mg/L)	0.0080	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0600	-
Iron	(mg/L)	1.7000	WHAL(1.0)*
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	120000	PCU(2000)
pH	(s.u.)	7.2	-
E Coli	(organisms/100ml)	80000	PCU(298)
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	4.50	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

ROCKY RIVER (50) - 07/21/97

Parameter		Value	Excursion
Temperature	(degrees C)	23.5	-
Dissolved Oxygen	(mg/L)	7.3	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	14	-
Suspended Solids	(mg/L)	19	-
Total Solids	(mg/L)	526	-
Dissolved Solids	(mg/L)	453	-
Specific Conductance	(mS/cm)	1.000	-
Turbidity	(NTU)	12.00	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.17	-
Soluble Phosphorus	(mg/L)	0.10	-
Nitrate-N	(mg/L)	5.00	-
TKN	(mg/L)	1.10	-
Chlorides	(mg/L)	118	-
Sulfates	(mg/L)	105	-
Alkalinity	(mg/L)	126	-
Hardness	(mg/L)	211	-
Nickel	(mg/L)	0.0130	-
Copper	(mg/L)	0.0120	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0700	-
Iron	(mg/L)	1.1000	WHAL(1.0)*
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0010	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	300	-
pH	(s.u.)	7.2	-
E Coli	(organisms/100ml)	280	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	6.40	-

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WQIS

ROCKY RIVER (50) - 10/09/97

Parameter		Value	Excursion
Temperature	(degrees C)	19.0	-
Dissolved Oxygen	(mg/L)	7.5	-
BOD-5	(mg/L)	9	-
COD	(mg/L)	22	-
Suspended Solids	(mg/L)	16	-
Total Solids	(mg/L)	488	-
Dissolved Solids	(mg/L)	431	-
Specific Conductance	(mS/cm)	1.000	-
Turbidity	(NTU)	11.00	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.11	-
Soluble Phosphorus	(mg/L)	0.07	-
Nitrate-N	(mg/L)	5.00	-
TKN	(mg/L)	1.10	-
Chlorides	(mg/L)	205	-
Alkalinity	(mg/L)	136	-
Hardness	(mg/L)	98	-
Nickel	(mg/L)	0.0070	-
Copper	(mg/L)	0.0100	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	1.5000	WHAL(1.0)*
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	490	-
pH	(s.u.)	7.1	-
E Coli	(organisms/100ml)	310	PCU(298)
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	6.50	-
Cobalt	(mg/L)	0.0010	-

NEORSD

WQIS

ROCKY RIVER (50) - 07/13/98

Parameter		Value	Excursion
Temperature	(degrees C)	21.0	-
Dissolved Oxygen	(mg/L)	7.3	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	25	-
Total Solids	(mg/L)	480	-
Dissolved Solids	(mg/L)	430	-
Specific Conductance	(mS/cm)	0.800	-
Turbidity	(NTU)	16.00	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.11	-
Soluble Phosphorus	(mg/L)	0.06	-
Nitrate-N	(mg/L)	3.90	-
TKN	(mg/L)	1.00	-
Chlorides	(mg/L)	84	-
Sulfates	(mg/L)	85	-
Alkalinity	(mg/L)	112	-
Hardness	(mg/L)	204	-
Nickel	(mg/L)	0.0098	-
Copper	(mg/L)	0.0064	-
Total Chromium	(mg/L)	0.0025	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0720	-
Iron	(mg/L)	1.8000	PHH(0.30)
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0047	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	440	-
pH	(s.u.)	7.8	-
E Coli	(organisms/100ml)	220	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	0.0010	-

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WQIS

ROCKY RIVER (51) - 07/22/96

Parameter		Value	Excursion
Temperature	(degrees C)	20.0	-
Dissolved Oxygen	(mg/L)	8.3	-
BOD-5	(mg/L)	4	-
COD	(mg/L)	13	-
Suspended Solids	(mg/L)	12	-
Total Solids	(mg/L)	525	-
Dissolved Solids	(mg/L)	420	-
Specific Conductance	(mS/cm)	1.000	-
Turbidity	(NTU)	10.00	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.14	-
Soluble Phosphorus	(mg/L)	0.12	-
Nitrate-N	(mg/L)	6.30	-
TKN	(mg/L)	1.30	-
Chlorides	(mg/L)	112	-
Sulfates	(mg/L)	74	-
Alkalinity	(mg/L)	131	-
Hardness	(mg/L)	225	-
Nickel	(mg/L)	0.0070	-
Copper	(mg/L)	0.0160	-
Total Chromium	(mg/L)	0.0060	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0900	-
Iron	(mg/L)	0.6200	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	300	-
pH	(s.u.)	7.5	-
E Coli	(organisms/100ml)	240	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	4.60	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

ROCKY RIVER (51) - 07/21/97

Parameter		Value	Excursion
Temperature	(degrees C)	21.0	-
Dissolved Oxygen	(mg/L)	9.1	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	15	-
Suspended Solids	(mg/L)	7	-
Total Solids	(mg/L)	458	-
Dissolved Solids	(mg/L)	401	-
Specific Conductance	(mS/cm)	0.600	-
Turbidity	(NTU)	4.95	-
Ammonia-N	(mg/L)	0.03	-
Phosphorus	(mg/L)	0.19	-
Soluble Phosphorus	(mg/L)	0.18	-
Nitrate-N	(mg/L)	7.10	-
TKN	(mg/L)	0.90	-
Chlorides	(mg/L)	102	-
Sulfates	(mg/L)	78	-
Alkalinity	(mg/L)	118	-
Hardness	(mg/L)	191	-
Nickel	(mg/L)	0.0070	-
Copper	(mg/L)	0.0130	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0500	-
Iron	(mg/L)	0.3400	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0040	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	140	-
pH	(s.u.)	7.7	-
E Coli	(organisms/100ml)	120	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0070	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	6.30	-

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WQIS

ROCKY RIVER (51) - 10/09/97

Parameter		Value	Excursion
Temperature	(degrees C)	18.0	-
Dissolved Oxygen	(mg/L)	7.0	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	19	-
Suspended Solids	(mg/L)	3	-
Total Solids	(mg/L)	446	-
Dissolved Solids	(mg/L)	415	-
Specific Conductance	(mS/cm)	1.000	-
Turbidity	(NTU)	3.00	-
Ammonia-N	(mg/L)	0.01	-
Phosphorus	(mg/L)	0.14	-
Soluble Phosphorus	(mg/L)	0.13	-
Nitrate-N	(mg/L)	8.80	-
TKN	(mg/L)	0.90	-
Chlorides	(mg/L)	86	-
Sulfates	(mg/L)	78	-
Alkalinity	(mg/L)	116	-
Hardness	(mg/L)	191	-
Nickel	(mg/L)	0.0030	-
Copper	(mg/L)	0.0100	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.2500	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	76	-
pH	(s.u.)	7.3	-
E Coli	(organisms/100ml)	62	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	6.70	-
Cobalt	(mg/L)	0.0010	-

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WQIS

ROCKY RIVER (51) - 07/13/98

Parameter		Value	Excursion
Temperature	(degrees C)	20.0	-
Dissolved Oxygen	(mg/L)	8.2	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	11	-
Total Solids	(mg/L)	420	-
Dissolved Solids	(mg/L)	410	-
Specific Conductance	(mS/cm)	0.726	-
Turbidity	(NTU)	8.00	-
Ammonia-N	(mg/L)	0.04	-
Phosphorus	(mg/L)	0.14	-
Soluble Phosphorus	(mg/L)	0.13	-
Nitrate-N	(mg/L)	6.40	-
TKN	(mg/L)	0.80	-
Chlorides	(mg/L)	74	-
Sulfates	(mg/L)	66	-
Alkalinity	(mg/L)	107	-
Hardness	(mg/L)	184	-
Nickel	(mg/L)	0.0038	-
Copper	(mg/L)	0.0064	-
Total Chromium	(mg/L)	0.0019	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0290	-
Iron	(mg/L)	0.6900	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0031	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	230	-
pH	(s.u.)	7.9	-
E Coli	(organisms/100ml)	92	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

ROCKY RIVER (52) - 07/22/96

Parameter		Value	Excursion
Temperature	(degrees C)	20.5	-
Dissolved Oxygen	(mg/L)	8.3	-
BOD-5	(mg/L)	4	-
COD	(mg/L)	19	-
Suspended Solids	(mg/L)	10	-
Total Solids	(mg/L)	555	-
Dissolved Solids	(mg/L)	485	-
Specific Conductance	(mS/cm)	1.000	-
Turbidity	(NTU)	8.50	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.09	-
Soluble Phosphorus	(mg/L)	0.08	-
Nitrate-N	(mg/L)	2.70	-
TKN	(mg/L)	1.30	-
Chlorides	(mg/L)	110	-
Sulfates	(mg/L)	104	-
Alkalinity	(mg/L)	137	-
Hardness	(mg/L)	228	-
Nickel	(mg/L)	0.0080	-
Copper	(mg/L)	0.0130	-
Total Chromium	(mg/L)	0.0050	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0700	-
Iron	(mg/L)	0.4200	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	540	-
pH	(s.u.)	7.5	-
E Coli	(organisms/100ml)	230	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	13.00	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

ROCKY RIVER (52) - 07/21/97

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	8.8	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	12	-
Suspended Solids	(mg/L)	9	-
Total Solids	(mg/L)	572	-
Dissolved Solids	(mg/L)	507	-
Specific Conductance	(mS/cm)	1.100	-
Turbidity	(NTU)	4.50	-
Ammonia-N	(mg/L)	0.01	-
Phosphorus	(mg/L)	0.09	-
Soluble Phosphorus	(mg/L)	0.08	-
Nitrate-N	(mg/L)	4.60	-
TKN	(mg/L)	0.80	-
Chlorides	(mg/L)	122	-
Sulfates	(mg/L)	110	-
Alkalinity	(mg/L)	123	-
Hardness	(mg/L)	220	-
Nickel	(mg/L)	0.0080	-
Copper	(mg/L)	0.0120	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.3700	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	130	-
pH	(s.u.)	7.8	-
E Coli	(organisms/100ml)	90	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	6.40	-

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WQIS

ROCKY RIVER (52) - 10/09/97

Parameter		Value	Excursion
Temperature	(degrees C)	18.5	-
Dissolved Oxygen	(mg/L)	7.7	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	37	-
Suspended Solids	(mg/L)	3	-
Total Solids	(mg/L)	528	-
Dissolved Solids	(mg/L)	494	-
Specific Conductance	(mS/cm)	1.100	-
Turbidity	(NTU)	2.30	-
Ammonia-N	(mg/L)	0.02	-
Phosphorus	(mg/L)	0.10	-
Soluble Phosphorus	(mg/L)	0.09	-
Nitrate-N	(mg/L)	3.20	-
TKN	(mg/L)	0.90	-
Chlorides	(mg/L)	92	-
Sulfates	(mg/L)	127	-
Alkalinity	(mg/L)	144	-
Hardness	(mg/L)	230	-
Nickel	(mg/L)	0.0060	-
Copper	(mg/L)	0.0120	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0800	-
Iron	(mg/L)	0.1800	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	210	-
pH	(s.u.)	7.3	-
E Coli	(organisms/100ml)	68	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	8.30	-
Cobalt	(mg/L)	0.0010	-

NEORSD

WQIS

ROCKY RIVER (52) - 07/13/98

Parameter		Value	Excursion
Temperature	(degrees C)	21.0	-
Dissolved Oxygen	(mg/L)	8.3	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	6	-
Total Solids	(mg/L)	500	-
Dissolved Solids	(mg/L)	490	-
Specific Conductance	(mS/cm)	0.853	-
Turbidity	(NTU)	4.50	-
Ammonia-N	(mg/L)	0.03	-
Phosphorus	(mg/L)	0.09	-
Soluble Phosphorus	(mg/L)	0.03	-
Nitrate-N	(mg/L)	0.03	-
TKN	(mg/L)	0.70	-
Chlorides	(mg/L)	78	-
Sulfates	(mg/L)	120	-
Alkalinity	(mg/L)	139	-
Hardness	(mg/L)	186	-
Nickel	(mg/L)	0.0060	-
Copper	(mg/L)	0.0180	-
Total Chromium	(mg/L)	0.0023	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.7000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0036	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	220	-
pH	(s.u.)	8.1	-
E Coli	(organisms/100ml)	94	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

ROCKY RIVER (52.5) - 07/22/96

Parameter		Value	Excursion
Temperature	(degrees C)	24.0	-
Dissolved Oxygen	(mg/L)	9.5	-
BOD-5	(mg/L)	4	-
COD	(mg/L)	18	-
Suspended Solids	(mg/L)	14	-
Total Solids	(mg/L)	567	-
Dissolved Solids	(mg/L)	486	-
Specific Conductance	(mS/cm)	1.000	-
Turbidity	(NTU)	11.00	-
Ammonia-N	(mg/L)	0.05	-
Phosphorus	(mg/L)	0.18	-
Soluble Phosphorus	(mg/L)	0.15	-
Nitrate-N	(mg/L)	3.20	-
TKN	(mg/L)	1.20	-
Chlorides	(mg/L)	136	-
Sulfates	(mg/L)	89	-
Alkalinity	(mg/L)	128	-
Hardness	(mg/L)	224	-
Nickel	(mg/L)	0.0100	-
Copper	(mg/L)	0.0150	-
Total Chromium	(mg/L)	0.0040	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0600	-
Iron	(mg/L)	0.5000	-
Cadmium	(mg/L)	0.0010	-
Lead	(mg/L)	0.0040	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	360	-
pH	(s.u.)	7.9	-
E Coli	(organisms/100ml)	80	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	7.20	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

ROCKY RIVER (52.5) - 07/21/97

Parameter		Value	Excursion
Temperature	(degrees C)	25.0	-
Dissolved Oxygen	(mg/L)	9.1	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	20	-
Suspended Solids	(mg/L)	7	-
Total Solids	(mg/L)	561	-
Dissolved Solids	(mg/L)	514	-
Specific Conductance	(mS/cm)	1.100	-
Turbidity	(NTU)	4.60	-
Ammonia-N	(mg/L)	0.03	-
Phosphorus	(mg/L)	0.15	-
Soluble Phosphorus	(mg/L)	0.14	-
Nitrate-N	(mg/L)	5.80	-
TKN	(mg/L)	101.00	-
Chlorides	(mg/L)	140	-
Sulfates	(mg/L)	112	-
Alkalinity	(mg/L)	123	-
Hardness	(mg/L)	220	-
Nickel	(mg/L)	0.0090	-
Copper	(mg/L)	0.0090	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.3600	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	45	-
pH	(s.u.)	7.9	-
E Coli	(organisms/100ml)	40	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	8.20	-

NEORSD

WQIS

ROCKY RIVER (52.5) - 10/09/97

Parameter		Value	Excursion
Temperature	(degrees C)	20.0	-
Dissolved Oxygen	(mg/L)	8.5	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	32	-
Suspended Solids	(mg/L)	3	-
Total Solids	(mg/L)	520	-
Dissolved Solids	(mg/L)	478	-
Specific Conductance	(mS/cm)	1.100	-
Turbidity	(NTU)	2.40	-
Ammonia-N	(mg/L)	0.01	-
Phosphorus	(mg/L)	0.08	-
Soluble Phosphorus	(mg/L)	0.07	-
Nitrate-N	(mg/L)	5.70	-
TKN	(mg/L)	0.80	-
Chlorides	(mg/L)	26	-
Sulfates	(mg/L)	106	-
Alkalinity	(mg/L)	125	-
Hardness	(mg/L)	209	-
Nickel	(mg/L)	0.0050	-
Copper	(mg/L)	0.0110	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.2100	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	130	-
pH	(s.u.)	7.5	-
E Coli	(organisms/100ml)	110	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	6.70	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

ROCKY RIVER (52.5) - 07/13/98

Parameter		Value	Excursion
Temperature	(degrees C)	26.0	-
Dissolved Oxygen	(mg/L)	9.0	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	14	-
Total Solids	(mg/L)	480	-
Dissolved Solids	(mg/L)	420	-
Specific Conductance	(mS/cm)	0.818	-
Turbidity	(NTU)	8.80	-
Ammonia-N	(mg/L)	0.03	-
Phosphorus	(mg/L)	0.09	-
Soluble Phosphorus	(mg/L)	0.07	-
Nitrate-N	(mg/L)	3.70	-
TKN	(mg/L)	1.10	-
Chlorides	(mg/L)	82	-
Sulfates	(mg/L)	100	-
Alkalinity	(mg/L)	114	-
Hardness	(mg/L)	237	-
Nickel	(mg/L)	0.0067	-
Copper	(mg/L)	0.0170	-
Total Chromium	(mg/L)	0.0014	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0340	-
Iron	(mg/L)	0.3800	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0047	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	190	-
pH	(s.u.)	8.4	-
E Coli	(organisms/100ml)	55	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

OHIO CANAL (53) - 08/12/96

Parameter		Value	Excursion
Temperature	(degrees C)	23.0	-
Dissolved Oxygen	(mg/L)	7.9	-
BOD-5	(mg/L)	6	-
COD	(mg/L)	30	-
Suspended Solids	(mg/L)	54	-
Total Solids	(mg/L)	700	-
Dissolved Solids	(mg/L)	598	-
Specific Conductance	(mS/cm)	1.300	-
Turbidity	(NTU)	22.00	-
Ammonia-N	(mg/L)	0.30	-
Phosphorus	(mg/L)	0.24	-
Soluble Phosphorus	(mg/L)	0.11	-
Nitrate-N	(mg/L)	2.20	-
TKN	(mg/L)	1.70	-
Chlorides	(mg/L)	180	-
Sulfates	(mg/L)	128	-
Alkalinity	(mg/L)	153	-
Hardness	(mg/L)	262	-
Nickel	(mg/L)	0.0200	-
Copper	(mg/L)	0.0200	-
Total Chromium	(mg/L)	0.0040	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0500	-
Iron	(mg/L)	1.7000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0070	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	85	-
pH	(s.u.)	7.4	-
E Coli	(organisms/100ml)	80	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	5.80	-
Cobalt	(mg/L)	0.0010	-

NEORSD

WQIS

OHIO CANAL (53) - 06/11/97

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	8.7	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	27	-
Suspended Solids	(mg/L)	57	-
Total Solids	(mg/L)	416	-
Dissolved Solids	(mg/L)	341	-
Specific Conductance	(mS/cm)	0.500	-
Turbidity	(NTU)	18.00	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.14	-
Soluble Phosphorus	(mg/L)	0.10	-
Nitrate-N	(mg/L)	1.20	-
TKN	(mg/L)	1.10	-
Chlorides	(mg/L)	84	-
Sulfates	(mg/L)	57	-
Alkalinity	(mg/L)	122	-
Hardness	(mg/L)	174	-
Nickel	(mg/L)	0.0080	-
Copper	(mg/L)	0.0080	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0800	-
Iron	(mg/L)	2.0000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0080	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	80	-
pH	(s.u.)	7.4	-
E Coli	(organisms/100ml)	30	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	4.16	-

NEORSD

WQIS

OHIO CANAL (54) - 08/12/96

Parameter		Value	Excursion
Temperature	(degrees C)	21.0	-
Dissolved Oxygen	(mg/L)	7.5	-
BOD-5	(mg/L)	4	-
COD	(mg/L)	27	-
Suspended Solids	(mg/L)	54	-
Total Solids	(mg/L)	670	-
Dissolved Solids	(mg/L)	533	-
Specific Conductance	(mS/cm)	1.300	-
Turbidity	(NTU)	25.00	-
Ammonia-N	(mg/L)	0.20	-
Phosphorus	(mg/L)	0.31	-
Soluble Phosphorus	(mg/L)	0.17	-
Nitrate-N	(mg/L)	2.70	-
TKN	(mg/L)	1.50	-
Chlorides	(mg/L)	178	-
Sulfates	(mg/L)	97	-
Alkalinity	(mg/L)	140	-
Hardness	(mg/L)	226	-
Nickel	(mg/L)	0.0180	-
Copper	(mg/L)	0.0150	-
Total Chromium	(mg/L)	0.0030	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0600	-
Iron	(mg/L)	1.9000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0080	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	380	-
pH	(s.u.)	7.5	-
E Coli	(organisms/100ml)	200	-
Arsenic	(mg/L)	0.0060	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	4.20	-
Cobalt	(mg/L)	0.0010	-

NEORSD

WQIS

OHIO CANAL (54) - 06/11/97

Parameter		Value	Excursion
Temperature	(degrees C)	21.0	-
Dissolved Oxygen	(mg/L)	8.0	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	16	-
Suspended Solids	(mg/L)	58	-
Total Solids	(mg/L)	418	-
Dissolved Solids	(mg/L)	325	-
Specific Conductance	(mS/cm)	0.470	-
Turbidity	(NTU)	28.00	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.20	-
Soluble Phosphorus	(mg/L)	0.16	-
Nitrate-N	(mg/L)	1.80	-
TKN	(mg/L)	1.40	-
Chlorides	(mg/L)	80	-
Sulfates	(mg/L)	95	-
Alkalinity	(mg/L)	130	-
Hardness	(mg/L)	176	-
Nickel	(mg/L)	0.0070	-
Copper	(mg/L)	0.0050	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0900	-
Iron	(mg/L)	2.3000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0070	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	130	-
pH	(s.u.)	7.2	-
E Coli	(organisms/100ml)	120	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	0.0060	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	2.88	-

NEORSD

WQIS

OHIO CANAL (55) - 08/12/96

Parameter		Value	Excursion
Temperature	(degrees C)	21.0	-
Dissolved Oxygen	(mg/L)	7.9	-
BOD-5	(mg/L)	4	-
COD	(mg/L)	27	-
Suspended Solids	(mg/L)	46	-
Total Solids	(mg/L)	623	-
Dissolved Solids	(mg/L)	519	-
Specific Conductance	(mS/cm)	1.200	-
Turbidity	(NTU)	23.00	-
Ammonia-N	(mg/L)	0.20	-
Phosphorus	(mg/L)	0.34	-
Soluble Phosphorus	(mg/L)	0.26	-
Nitrate-N	(mg/L)	3.00	-
TKN	(mg/L)	1.30	-
Chlorides	(mg/L)	156	-
Sulfates	(mg/L)	94	-
Alkalinity	(mg/L)	141	-
Hardness	(mg/L)	236	-
Nickel	(mg/L)	0.0150	-
Copper	(mg/L)	0.0200	-
Total Chromium	(mg/L)	0.0030	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.1200	-
Iron	(mg/L)	1.8000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0050	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	940	-
pH	(s.u.)	7.5	-
E Coli	(organisms/100ml)	340	-
Arsenic	(mg/L)	0.0060	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	0.0060	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	4.40	-
Cobalt	(mg/L)	0.0010	-

NEORSD

WQIS

OHIO CANAL (55) - 06/11/97

Parameter		Value	Excursion
Temperature	(degrees C)	20.0	-
Dissolved Oxygen	(mg/L)	8.0	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	26	-
Suspended Solids	(mg/L)	68	-
Total Solids	(mg/L)	415	-
Dissolved Solids	(mg/L)	327	-
Specific Conductance	(mS/cm)	0.480	-
Turbidity	(NTU)	27.00	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.22	-
Soluble Phosphorus	(mg/L)	0.11	-
Nitrate-N	(mg/L)	2.10	-
TKN	(mg/L)	1.10	-
Chlorides	(mg/L)	82	-
Sulfates	(mg/L)	74	-
Alkalinity	(mg/L)	123	-
Hardness	(mg/L)	174	-
Nickel	(mg/L)	0.0120	-
Copper	(mg/L)	0.0050	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	2.5000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0060	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	30	-
pH	(s.u.)	7.3	-
E Coli	(organisms/100ml)	90	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	0.0080	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	2.81	-

NEORSD

WQIS

OHIO CANAL (56) - 08/12/96

Parameter		Value	Excursion
Temperature	(degrees C)	20.0	-
Dissolved Oxygen	(mg/L)	7.9	-
BOD-5	(mg/L)	4	-
COD	(mg/L)	24	-
Suspended Solids	(mg/L)	59	-
Total Solids	(mg/L)	626	-
Dissolved Solids	(mg/L)	503	-
Specific Conductance	(mS/cm)	1.200	-
Turbidity	(NTU)	22.00	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.44	-
Soluble Phosphorus	(mg/L)	0.32	-
Nitrate-N	(mg/L)	5.70	-
TKN	(mg/L)	1.00	-
Chlorides	(mg/L)	156	-
Sulfates	(mg/L)	98	-
Alkalinity	(mg/L)	152	-
Hardness	(mg/L)	245	-
Nickel	(mg/L)	0.0080	-
Copper	(mg/L)	0.0120	-
Total Chromium	(mg/L)	0.0030	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0500	-
Iron	(mg/L)	2.5000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0080	-
Mercury	(ug/L)	0.2000	-
Fecal Coliform	(organisms/100ml)	5400	-
pH	(s.u.)	7.4	-
E Coli	(organisms/100ml)	1800	-
Arsenic	(mg/L)	0.0060	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	4.20	-
Cobalt	(mg/L)	0.0010	-

NEORSD

WQIS

OHIO CANAL (56) - 06/11/97

Parameter		Value	Excursion
Temperature	(degrees C)	18.5	-
Dissolved Oxygen	(mg/L)	8.5	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	28	-
Suspended Solids	(mg/L)	44	-
Total Solids	(mg/L)	404	-
Dissolved Solids	(mg/L)	315	-
Specific Conductance	(mS/cm)	0.500	-
Turbidity	(NTU)	11.00	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.19	-
Soluble Phosphorus	(mg/L)	0.11	-
Nitrate-N	(mg/L)	2.10	-
TKN	(mg/L)	1.10	-
Chlorides	(mg/L)	88	-
Sulfates	(mg/L)	75	-
Alkalinity	(mg/L)	133	-
Hardness	(mg/L)	184	-
Nickel	(mg/L)	0.0070	-
Copper	(mg/L)	0.0120	-
Total Chromium	(mg/L)	<0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	1.8000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0040	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	50	-
pH	(s.u.)	7.1	-
E Coli	(organisms/100ml)	60	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	0.0060	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	2.86	-

NEORSD

WQIS

SAGAMORE CREEK (57) - 07/29/96

Parameter		Value	Excursion
Temperature	(degrees C)	19.0	-
Dissolved Oxygen	(mg/L)	8.5	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	1	-
Total Solids	(mg/L)	569	-
Dissolved Solids	(mg/L)	472	-
Specific Conductance	(mS/cm)	1.100	-
Turbidity	(NTU)	1.50	-
Ammonia-N	(mg/L)	0.03	-
Phosphorus	(mg/L)	0.06	-
Soluble Phosphorus	(mg/L)	0.06	-
Nitrate-N	(mg/L)	0.30	-
TKN	(mg/L)	0.30	-
Chlorides	(mg/L)	152	-
Sulfates	(mg/L)	74	-
Alkalinity	(mg/L)	164	-
Hardness	(mg/L)	247	-
Nickel	(mg/L)	0.0060	-
Copper	(mg/L)	0.0010	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0500	-
Iron	(mg/L)	0.0800	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
pH	(s.u.)	7.5	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	2.50	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

SAGAMORE CREEK (57) - 06/09/97

Parameter		Value	Excursion
Temperature	(degrees C)	14.0	-
Dissolved Oxygen	(mg/L)	9.4	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	20	-
Suspended Solids	(mg/L)	2	-
Dissolved Solids	(mg/L)	424	-
Specific Conductance	(mS/cm)	1.000	-
Turbidity	(NTU)	1.40	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.06	-
Soluble Phosphorus	(mg/L)	0.06	-
Nitrate-N	(mg/L)	0.20	-
TKN	(mg/L)	0.50	-
Chlorides	(mg/L)	112	-
Sulfates	(mg/L)	74	-
Alkalinity	(mg/L)	146	-
Hardness	(mg/L)	212	-
Nickel	(mg/L)	0.0030	-
Copper	(mg/L)	0.0060	-
Total Chromium	(mg/L)	<0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0200	-
Iron	(mg/L)	0.1100	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	52	-
pH	(s.u.)	7.1	-
E Coli	(organisms/100ml)	48	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	1.89	-

NEORSD

WQIS

SAGAMORE CREEK (57) - 10/09/97

Parameter		Value	Excursion
Temperature	(degrees C)	17.0	-
Dissolved Oxygen	(mg/L)	5.2	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	10	-
Suspended Solids	(mg/L)	1	-
Total Solids	(mg/L)	531	-
Dissolved Solids	(mg/L)	521	-
Specific Conductance	(mS/cm)	1.100	-
Turbidity	(NTU)	0.60	-
Ammonia-N	(mg/L)	0.01	-
Phosphorus	(mg/L)	0.04	-
Soluble Phosphorus	(mg/L)	0.04	-
Nitrate-N	(mg/L)	0.04	-
TKN	(mg/L)	0.30	-
Chlorides	(mg/L)	114	-
Sulfates	(mg/L)	89	-
Alkalinity	(mg/L)	166	-
Hardness	(mg/L)	222	-
Nickel	(mg/L)	0.0030	-
Copper	(mg/L)	0.0070	-
Total Chromium	(mg/L)	0.0060	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0070	-
Iron	(mg/L)	0.0400	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	16	-
pH	(s.u.)	6.7	-
E Coli	(organisms/100ml)	14	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	2.90	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

SAGAMORE CREEK (57) - 06/05/98

Parameter		Value	Excursion
Temperature	(degrees C)	15.0	-
Dissolved Oxygen	(mg/L)	6.3	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	1	-
Total Solids	(mg/L)	480	-
Dissolved Solids	(mg/L)	440	-
Specific Conductance	(mS/cm)	0.900	-
Turbidity	(NTU)	0.65	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.14	-
Soluble Phosphorus	(mg/L)	0.13	-
Nitrate-N	(mg/L)	0.24	-
TKN	(mg/L)	0.60	-
Chlorides	(mg/L)	110	-
Sulfates	(mg/L)	64	-
Alkalinity	(mg/L)	153	-
Hardness	(mg/L)	240	-
Nickel	(mg/L)	0.0018	-
Copper	(mg/L)	0.0056	-
Total Chromium	(mg/L)	0.0028	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.1000	-
Iron	(mg/L)	0.1000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	40	-
pH	(s.u.)	6.9	-
E Coli	(organisms/100ml)	40	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	0.0017	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

CHAGRIN RIVER (58) - 07/24/96

Parameter		Value	Excursion
Temperature	(degrees C)	22.5	-
Dissolved Oxygen	(mg/L)	9.3	-
BOD-5	(mg/L)	6	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	12	-
Total Solids	(mg/L)	419	-
Dissolved Solids	(mg/L)	357	-
Specific Conductance	(mS/cm)	0.540	-
Turbidity	(NTU)	6.20	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.08	-
Soluble Phosphorus	(mg/L)	0.07	-
Nitrate-N	(mg/L)	0.20	-
TKN	(mg/L)	0.80	-
Chlorides	(mg/L)	84	-
Sulfates	(mg/L)	55	-
Alkalinity	(mg/L)	146	-
Hardness	(mg/L)	208	-
Nickel	(mg/L)	0.0080	-
Copper	(mg/L)	0.0080	-
Total Chromium	(mg/L)	0.0060	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.1700	-
Iron	(mg/L)	0.5300	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	70	-
pH	(s.u.)	7.9	-
E Coli	(organisms/100ml)	30	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	2.20	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

CHAGRIN RIVER (58) - 05/23/97

Parameter		Value	Excursion
Temperature	(degrees C)	13.5	-
Dissolved Oxygen	(mg/L)	11.0	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	12	-
Suspended Solids	(mg/L)	4	-
Total Solids	(mg/L)	355	-
Dissolved Solids	(mg/L)	351	-
Specific Conductance	(mS/cm)	0.420	-
Turbidity	(NTU)	2.30	-
Ammonia-N	(mg/L)	0.03	-
Phosphorus	(mg/L)	0.03	-
Soluble Phosphorus	(mg/L)	0.01	-
Nitrate-N	(mg/L)	0.30	-
TKN	(mg/L)	0.60	-
Chlorides	(mg/L)	84	-
Sulfates	(mg/L)	34	-
Alkalinity	(mg/L)	126	-
Hardness	(mg/L)	158	-
Nickel	(mg/L)	0.0030	-
Copper	(mg/L)	0.0100	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.4300	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0040	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	76	-
pH	(s.u.)	7.6	-
E Coli	(organisms/100ml)	52	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	1.40	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

CHAGRIN RIVER (58) - 09/14/98

Parameter		Value	Excursion
Temperature	(degrees C)	21.0	-
Dissolved Oxygen	(mg/L)	8.4	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	9	-
Total Solids	(mg/L)	350	-
Dissolved Solids	(mg/L)	320	-
Specific Conductance	(mS/cm)	0.600	-
Turbidity	(NTU)	4.50	-
Ammonia-N	(mg/L)	0.02	-
Phosphorus	(mg/L)	0.06	-
Soluble Phosphorus	(mg/L)	0.04	-
Nitrate-N	(mg/L)	0.60	-
TKN	(mg/L)	0.50	-
Chlorides	(mg/L)	84	-
Sulfates	(mg/L)	70	-
Alkalinity	(mg/L)	159	-
Hardness	(mg/L)	188	-
Nickel	(mg/L)	0.0022	-
Copper	(mg/L)	0.0067	-
Total Chromium	(mg/L)	0.0044	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0320	-
Iron	(mg/L)	0.4200	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	200	-
pH	(s.u.)	7.2	-
E Coli	(organisms/100ml)	160	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

CHAGRIN RIVER (59) - 07/24/96

Parameter		Value	Excursion
Temperature	(degrees C)	23.0	-
Dissolved Oxygen	(mg/L)	10.2	-
BOD-5	(mg/L)	6	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	13	-
Total Solids	(mg/L)	416	-
Dissolved Solids	(mg/L)	345	-
Specific Conductance	(mS/cm)	0.530	-
Turbidity	(NTU)	6.00	-
Ammonia-N	(mg/L)	0.20	-
Nitrate-N	(mg/L)	0.30	-
TKN	(mg/L)	1.10	-
Chlorides	(mg/L)	86	-
Sulfates	(mg/L)	53	-
Alkalinity	(mg/L)	147	-
Hardness	(mg/L)	187	-
Nickel	(mg/L)	0.0060	-
Copper	(mg/L)	0.0030	-
Total Chromium	(mg/L)	0.0060	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0600	-
Iron	(mg/L)	0.3700	-
Cadmium	(mg/L)	0.0010	-
Lead	(mg/L)	0.0040	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	120	-
pH	(s.u.)	8.1	-
E Coli	(organisms/100ml)	10	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	2.60	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

CHAGRIN RIVER (59) - 05/23/97

Parameter		Value	Excursion
Temperature	(degrees C)	13.5	-
Dissolved Oxygen	(mg/L)	11.0	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	4	-
Total Solids	(mg/L)	368	-
Dissolved Solids	(mg/L)	263	-
Specific Conductance	(mS/cm)	0.420	-
Turbidity	(NTU)	2.30	-
Ammonia-N	(mg/L)	0.02	-
Phosphorus	(mg/L)	0.02	-
Soluble Phosphorus	(mg/L)	0.02	-
Nitrate-N	(mg/L)	0.30	-
TKN	(mg/L)	0.50	-
Chlorides	(mg/L)	106	-
Sulfates	(mg/L)	34	-
Alkalinity	(mg/L)	146	-
Hardness	(mg/L)	162	-
Nickel	(mg/L)	0.0040	-
Copper	(mg/L)	0.0080	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0200	-
Iron	(mg/L)	0.4300	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0050	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	110	-
pH	(s.u.)	7.6	-
E Coli	(organisms/100ml)	40	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	1.60	-
Cobalt	(mg/L)	<0.0010	-

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WQIS

CHAGRIN RIVER (59) - 09/14/98

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	10.0	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	8	-
Total Solids	(mg/L)	350	-
Dissolved Solids	(mg/L)	330	-
Specific Conductance	(mS/cm)	0.600	-
Turbidity	(NTU)	3.00	-
Ammonia-N	(mg/L)	0.01	-
Phosphorus	(mg/L)	0.06	-
Soluble Phosphorus	(mg/L)	0.03	-
Nitrate-N	(mg/L)	0.60	-
TKN	(mg/L)	0.50	-
Chlorides	(mg/L)	90	-
Sulfates	(mg/L)	72	-
Alkalinity	(mg/L)	147	-
Hardness	(mg/L)	186	-
Nickel	(mg/L)	0.0077	-
Copper	(mg/L)	0.0120	-
Total Chromium	(mg/L)	0.0045	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0640	-
Iron	(mg/L)	0.3380	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	70	-
pH	(s.u.)	7.0	-
E Coli	(organisms/100ml)	50	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

APPENDIX C
LAKE ERIE CHEMICAL AND BACTERIOLOGICAL DATA,
1996-1998

DATA TABLE KEY

Individual data are presented by sampling date as month/day/year. The sampled water body, with the NEORSD-assigned sample site number and /or letter in parentheses, also appears in the heading. For Lake Erie, data presented are from analyses of surface grab samples, except A-1, B-1, and C-1, which were from analyses of grab samples collected from two feet above the lake bottom.

All chemical and bacteriological parameters analyzed in the sample are listed in the first column, followed by analytical units in parentheses. When a measured value exceeds a State of Ohio water quality criterion, the applicable water use designation, with the exceeded numerical criterion in parentheses, appears in the "Excursion" column. An asterisk appears when no maximum criterion is applicable and the single value only exceeds an average criterion (therefore not necessarily representing an excursion from water quality standards).

Applicable Ohio EPA Water Use Designations

ASW	=	Agricultural Water Supply
BW	=	Bathing Waters Recreational Use
EWH	=	Exceptional Warmwater Habitat Aquatic Life Use
HHSR	=	Human Health (Single-Route Exposure)
LRW	=	Limited Resource Water
PCU	=	Primary Contact Recreational Use
PWS	=	Public Water Supply
SCU	=	Secondary Contact Recreational Use
SSH	=	Seasonal Salmonid Habitat Aquatic Life Use
WHAL	=	Warmwater Habitat Aquatic Life Use
PHH	=	Protection of Human Health (Dual-Route Exposure)
WL	=	Protection of Wildlife

Other Acronyms and Abbreviations

BOD-5	=	Biochemical Oxygen Demand (5-day test)
COD	=	Chemical Oxygen Demand
E coli	=	Escherichia coli
N	=	Nitrogen
TKN	=	Total Kjeldahl Nitrogen
mg/L	=	milligrams per liter
mS/cm	=	millisiemens per centimeter
ug/L	=	micrograms per liter

s.u.	=	standard units
NTU	=	Nephelometric Turbidity Units

Lake Erie samples were collected from boatside by direct immersion of the sample bottle below the water surface. Samples collected from near the lake bottom were obtained using Kemmerer-type Vertical Sampling Bottle.

Closed and labeled plastic containers were used to transport samples, on ice for preservation, to NEORSD Analytical Services. All bottles used to transport samples for bacteriological analysis had been sterilized prior to sampling.

Field measurements for water temperature and dissolved oxygen concentration were obtained at the time of sampling using a calibrated YSI Model 57 or 51B Oxygen Meter. Specific conductance was measured in-field using an Orion Model 128 conductivity meter. An Orion Model 260 pH meter was used to measure pH. Water transparency was measured at each Lake Erie site using a Secchi disk.

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LAKE ERIE (A) - 10/17/96

Parameter		Value	Excursion
Temperature	(degrees C)	16.5	-
Dissolved Oxygen	(mg/L)	10.0	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	8	-
Suspended Solids	(mg/L)	3	-
Total Solids	(mg/L)	220	-
Dissolved Solids	(mg/L)	164	-
Specific Conductance	(mS/cm)	0.250	-
Turbidity	(NTU)	2.00	-
Ammonia-N	(mg/L)	0.04	-
Phosphorus	(mg/L)	0.04	-
Soluble Phosphorus	(mg/L)	0.03	-
Nitrate-N	(mg/L)	0.40	-
TKN	(mg/L)	0.50	-
Chlorides	(mg/L)	40	-
Sulfates	(mg/L)	30	-
Alkalinity	(mg/L)	84	-
Hardness	(mg/L)	122	-
Nickel	(mg/L)	0.0010	-
Copper	(mg/L)	0.0050	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	0.0800	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
pH	(s.u.)	8.3	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	1.40	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (A) - 08/01/97

Parameter		Value	Excursion
Temperature	(degrees C)	24.0	-
Dissolved Oxygen	(mg/L)	8.4	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	7	-
Suspended Solids	(mg/L)	<1	-
Total Solids	(mg/L)	215	-
Dissolved Solids	(mg/L)	141	-
Specific Conductance	(mS/cm)	0.260	-
Turbidity	(NTU)	7.00	-
Ammonia-N	(mg/L)	0.01	-
Phosphorus	(mg/L)	0.05	-
Soluble Phosphorus	(mg/L)	0.05	-
Nitrate-N	(mg/L)	0.30	-
TKN	(mg/L)	0.50	-
Chlorides	(mg/L)	24	-
Sulfates	(mg/L)	36	-
Alkalinity	(mg/L)	87	-
Hardness	(mg/L)	107	-
Nickel	(mg/L)	0.0060	-
Copper	(mg/L)	0.0100	-
Total Chromium	(mg/L)	<0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0100	-
Iron	(mg/L)	<0.0150	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
pH	(s.u.)	7.8	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	1.10	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (A) - 08/28/97

Parameter		Value	Excursion
Temperature	(degrees C)	21.5	-
Dissolved Oxygen	(mg/L)	10.4	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	27	-
Suspended Solids	(mg/L)	1	-
Total Solids	(mg/L)	158	-
Dissolved Solids	(mg/L)	152	-
Specific Conductance	(mS/cm)	0.250	-
Turbidity	(NTU)	1.00	-
Ammonia-N	(mg/L)	<0.01	-
Phosphorus	(mg/L)	0.04	-
Soluble Phosphorus	(mg/L)	0.04	-
Nitrate-N	(mg/L)	0.20	-
TKN	(mg/L)	0.60	-
Chlorides	(mg/L)	28	-
Sulfates	(mg/L)	17	-
Alkalinity	(mg/L)	96	-
Hardness	(mg/L)	111	-
Nickel	(mg/L)	0.0050	-
Copper	(mg/L)	0.0070	-
Total Chromium	(mg/L)	0.0030	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	0.0500	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	<4	-
pH	(s.u.)	8.4	-
E Coli	(organisms/100ml)	<4	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	<1.00	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (A) - 10/08/97

Parameter		Value	Excursion
Temperature	(degrees C)	20.0	-
Dissolved Oxygen	(mg/L)	11.0	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	23	-
Suspended Solids	(mg/L)	3	-
Total Solids	(mg/L)	168	-
Dissolved Solids	(mg/L)	158	-
Specific Conductance	(mS/cm)	0.250	-
Turbidity	(NTU)	3.50	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.02	-
Soluble Phosphorus	(mg/L)	0.01	-
Nitrate-N	(mg/L)	0.20	-
TKN	(mg/L)	0.50	-
Chlorides	(mg/L)	10	-
Sulfates	(mg/L)	20	-
Alkalinity	(mg/L)	89	-
Hardness	(mg/L)	107	-
Nickel	(mg/L)	0.0030	-
Copper	(mg/L)	0.0040	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0200	-
Iron	(mg/L)	0.0300	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
pH	(s.u.)	7.9	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	1.40	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (A) - 09/21/98

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	8.7	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	19	-
Suspended Solids	(mg/L)	3	-
Total Solids	(mg/L)	180	-
Dissolved Solids	(mg/L)	160	-
Specific Conductance	(mS/cm)	0.300	-
Turbidity	(NTU)	0.75	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.04	-
Soluble Phosphorus	(mg/L)	0.03	-
Nitrate-N	(mg/L)	0.30	-
TKN	(mg/L)	0.60	-
Chlorides	(mg/L)	18	-
Sulfates	(mg/L)	28	-
Alkalinity	(mg/L)	92	-
Hardness	(mg/L)	110	-
Nickel	(mg/L)	0.0024	-
Copper	(mg/L)	0.0077	-
Total Chromium	(mg/L)	<0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0310	-
Iron	(mg/L)	0.0630	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	6	-
pH	(s.u.)	8.0	-
E Coli	(organisms/100ml)	4	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Transparency	(ft.)	11.00	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (A-1) - 10/17/96

Parameter		Value	Excursion
Temperature	(degrees C)	16.0	-
Dissolved Oxygen	(mg/L)	9.4	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	10	-
Suspended Solids	(mg/L)	4	-
Total Solids	(mg/L)	220	-
Dissolved Solids	(mg/L)	162	-
Specific Conductance	(mS/cm)	0.250	-
Turbidity	(NTU)	2.40	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.04	-
Soluble Phosphorus	(mg/L)	0.04	-
Nitrate-N	(mg/L)	0.50	-
TKN	(mg/L)	0.50	-
Chlorides	(mg/L)	32	-
Sulfates	(mg/L)	31	-
Alkalinity	(mg/L)	84	-
Hardness	(mg/L)	126	-
Nickel	(mg/L)	0.0010	-
Copper	(mg/L)	0.0040	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.1200	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
pH	(s.u.)	7.6	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	1.30	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (A-1) - 08/01/97

Parameter		Value	Excursion
Temperature	(degrees C)	17.5	-
Dissolved Oxygen	(mg/L)	2.0	EWH(6.0)
BOD-5	(mg/L)	2	-
COD	(mg/L)	7	-
Suspended Solids	(mg/L)	1	-
Total Solids	(mg/L)	164	-
Dissolved Solids	(mg/L)	154	-
Specific Conductance	(mS/cm)	0.260	-
Turbidity	(NTU)	2.00	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.06	-
Soluble Phosphorus	(mg/L)	0.06	-
Nitrate-N	(mg/L)	0.20	-
TKN	(mg/L)	0.60	-
Sulfates	(mg/L)	38	-
Alkalinity	(mg/L)	88	-
Hardness	(mg/L)	108	-
Nickel	(mg/L)	0.0020	-
Copper	(mg/L)	0.0110	-
Total Chromium	(mg/L)	<0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	<0.0050	-
Iron	(mg/L)	0.0600	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
pH	(s.u.)	6.9	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	1.20	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (A-1) - 08/28/97

Parameter		Value	Excursion
Temperature	(degrees C)	21.0	-
Dissolved Oxygen	(mg/L)	9.4	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	33	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	168	-
Dissolved Solids	(mg/L)	158	-
Specific Conductance	(mS/cm)	0.250	-
Turbidity	(NTU)	1.30	-
Ammonia-N	(mg/L)	0.04	-
Phosphorus	(mg/L)	0.04	-
Soluble Phosphorus	(mg/L)	0.02	-
Nitrate-N	(mg/L)	0.30	-
TKN	(mg/L)	0.30	-
Chlorides	(mg/L)	30	-
Sulfates	(mg/L)	18	-
Alkalinity	(mg/L)	106	-
Hardness	(mg/L)	109	-
Nickel	(mg/L)	0.0010	-
Copper	(mg/L)	0.0040	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.0600	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
pH	(s.u.)	8.1	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	<1.00	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (A-1) - 10/08/97

Parameter		Value	Excursion
Temperature	(degrees C)	18.0	-
Dissolved Oxygen	(mg/L)	8.0	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	12	-
Suspended Solids	(mg/L)	7	-
Total Solids	(mg/L)	168	-
Dissolved Solids	(mg/L)	146	-
Specific Conductance	(mS/cm)	0.250	-
Turbidity	(NTU)	3.50	-
Ammonia-N	(mg/L)	0.02	-
Phosphorus	(mg/L)	0.04	-
Soluble Phosphorus	(mg/L)	0.03	-
Nitrate-N	(mg/L)	0.20	-
TKN	(mg/L)	0.40	-
Chlorides	(mg/L)	16	-
Sulfates	(mg/L)	19	-
Alkalinity	(mg/L)	87	-
Hardness	(mg/L)	112	-
Nickel	(mg/L)	0.0040	-
Copper	(mg/L)	0.0060	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0500	-
Iron	(mg/L)	0.1200	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
pH	(s.u.)	7.5	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	1.70	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (A-1) - 09/21/98

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	8.7	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	17	-
Suspended Solids	(mg/L)	6	-
Total Solids	(mg/L)	190	-
Dissolved Solids	(mg/L)	160	-
Specific Conductance	(mS/cm)	0.300	-
Turbidity	(NTU)	2.50	-
Ammonia-N	(mg/L)	0.20	-
Phosphorus	(mg/L)	0.06	-
Soluble Phosphorus	(mg/L)	0.04	-
Nitrate-N	(mg/L)	0.10	-
TKN	(mg/L)	0.70	-
Chlorides	(mg/L)	16	-
Sulfates	(mg/L)	27	-
Alkalinity	(mg/L)	95	-
Hardness	(mg/L)	113	-
Nickel	(mg/L)	0.0022	-
Copper	(mg/L)	0.0064	-
Total Chromium	(mg/L)	<0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0630	-
Iron	(mg/L)	0.1000	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	0.3000	PHH(0.0031)* WL(0.0013)*
pH	(s.u.)	8.0	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Transparency	(ft.)	12.00	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (B) - 10/17/96

Parameter		Value	Excursion
Temperature	(degrees C)	16.0	-
Dissolved Oxygen	(mg/L)	9.8	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	12	-
Suspended Solids	(mg/L)	3	-
Total Solids	(mg/L)	223	-
Dissolved Solids	(mg/L)	170	-
Specific Conductance	(mS/cm)	0.260	-
Turbidity	(NTU)	2.30	-
Ammonia-N	(mg/L)	0.02	-
Phosphorus	(mg/L)	0.05	-
Soluble Phosphorus	(mg/L)	0.03	-
Nitrate-N	(mg/L)	0.50	-
TKN	(mg/L)	0.40	-
Chlorides	(mg/L)	30	-
Sulfates	(mg/L)	32	-
Alkslinity	(mg/L)	88	-
Hardness	(mg/L)	124	-
Nickel	(mg/L)	0.0010	-
Copper	(mg/L)	0.0040	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0500	-
Iron	(mg/L)	0.0900	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
pH	(s.u.)	8.2	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	1.60	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (B) - 08/01/97

Parameter		Value	Excursion
Temperature	(degrees C)	22.5	-
Dissolved Oxygen	(mg/L)	8.4	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	9	-
Suspended Solids	(mg/L)	<1	-
Total Solids	(mg/L)	200	-
Dissolved Solids	(mg/L)	170	-
Specific Conductance	(mS/cm)	0.250	-
Turbidity	(NTU)	0.50	-
Ammonia-N	(mg/L)	0.03	-
Phosphorus	(mg/L)	0.05	-
Soluble Phosphorus	(mg/L)	0.05	-
Nitrate-N	(mg/L)	0.30	-
TKN	(mg/L)	0.80	-
Chlorides	(mg/L)	22	-
Sulfates	(mg/L)	36	-
Alkalinity	(mg/L)	86	-
Hardness	(mg/L)	110	-
Nickel	(mg/L)	0.0020	-
Copper	(mg/L)	0.0110	-
Total Chromium	(mg/L)	<0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	<0.0050	-
Iron	(mg/L)	<0.0150	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
pH	(s.u.)	7.7	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	1.40	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (B) - 08/28/97

Parameter		Value	Excursion
Temperature	(degrees C)	21.0	-
Dissolved Oxygen	(mg/L)	10.0	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	62	-
Suspended Solids	(mg/L)	<1	-
Total Solids	(mg/L)	165	-
Dissolved Solids	(mg/L)	157	-
Specific Conductance	(mS/cm)	0.250	-
Turbidity	(NTU)	1.00	-
Ammonia-N	(mg/L)	0.02	-
Phosphorus	(mg/L)	0.03	-
Soluble Phosphorus	(mg/L)	0.03	-
Nitrate-N	(mg/L)	0.30	-
TKN	(mg/L)	0.40	-
Chlorides	(mg/L)	32	-
Sulfates	(mg/L)	17	-
Alkalinity	(mg/L)	90	-
Hardness	(mg/L)	105	-
Nickel	(mg/L)	0.0020	-
Copper	(mg/L)	0.0050	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.0400	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	2	-
pH	(s.u.)	8.4	-
E Coli	(organisms/100ml)	<2	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	0.0020	EWH(0.0017)
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	1.00	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (B) - 10/08/97

Parameter		Value	Excursion
Temperature	(degrees C)	19.0	-
Dissolved Oxygen	(mg/L)	10.2	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	11	-
Suspended Solids	(mg/L)	<1	-
Total Solids	(mg/L)	170	-
Dissolved Solids	(mg/L)	155	-
Specific Conductance	(mS/cm)	0.250	-
Turbidity	(NTU)	1.50	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.02	-
Soluble Phosphorus	(mg/L)	0.02	-
Nitrate-N	(mg/L)	0.20	-
TKN	(mg/L)	0.40	-
Chlorides	(mg/L)	18	-
Sulfates	(mg/L)	18	-
Alkalinity	(mg/L)	88	-
Hardness	(mg/L)	109	-
Nickel	(mg/L)	0.0020	-
Copper	(mg/L)	0.0050	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.0400	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
pH	(s.u.)	8.0	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	1.50	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (B) - 09/21/98

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	8.7	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	1	-
Total Solids	(mg/L)	220	-
Dissolved Solids	(mg/L)	200	-
Specific Conductance	(mS/cm)	0.300	-
Turbidity	(NTU)	1.20	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.04	-
Soluble Phosphorus	(mg/L)	0.04	-
Nitrate-N	(mg/L)	0.20	-
TKN	(mg/L)	0.50	-
Chlorides	(mg/L)	30	-
Sulfates	(mg/L)	32	-
Alkalinity	(mg/L)	93	-
Hardness	(mg/L)	106	-
Nickel	(mg/L)	0.0021	-
Copper	(mg/L)	0.0039	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0150	-
Iron	(mg/L)	0.0370	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	10	-
pH	(s.u.)	8.4	-
E Coli	(organisms/100ml)	4	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Transparency	(ft.)	12.00	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (B-1) - 10/17/96

Parameter		Value	Excursion
Temperature	(degrees C)	16.0	-
Dissolved Oxygen	(mg/L)	9.3	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	12	-
Suspended Solids	(mg/L)	4	-
Total Solids	(mg/L)	206	-
Dissolved Solids	(mg/L)	167	-
Specific Conductance	(mS/cm)	0.260	-
Turbidity	(NTU)	2.80	-
Ammonia-N	(mg/L)	0.03	-
Phosphorus	(mg/L)	0.04	-
Soluble Phosphorus	(mg/L)	0.02	-
Nitrate-N	(mg/L)	0.50	-
TKN	(mg/L)	0.60	-
Chlorides	(mg/L)	28	-
Sulfates	(mg/L)	31	-
Alkalinity	(mg/L)	95	-
Hardness	(mg/L)	122	-
Nickel	(mg/L)	0.0020	-
Copper	(mg/L)	0.0030	-
Total Chromium	(mg/L)	0.0120	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0200	-
Iron	(mg/L)	0.1000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	0.2000	PWS(0.012)* HHSR(0.012)*
pH	(s.u.)	7.5	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	1.20	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (B-1) - 08/01/97

Parameter		Value	Excursion
Temperature	(degrees C)	22.5	-
Dissolved Oxygen	(mg/L)	8.0	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	3	-
Suspended Solids	(mg/L)	<1	-
Total Solids	(mg/L)	160	-
Dissolved Solids	(mg/L)	150	-
Specific Conductance	(mS/cm)	0.260	-
Turbidity	(NTU)	0.70	-
Ammonia-N	(mg/L)	0.03	-
Phosphorus	(mg/L)	0.05	-
Soluble Phosphorus	(mg/L)	0.05	-
Nitrate-N	(mg/L)	0.30	-
TKN	(mg/L)	0.40	-
Chlorides	(mg/L)	26	-
Sulfates	(mg/L)	36	-
Alkalinity	(mg/L)	86	-
Hardness	(mg/L)	110	-
Nickel	(mg/L)	0.0030	-
Copper	(mg/L)	0.0080	-
Total Chromium	(mg/L)	<0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	<0.0050	-
Iron	(mg/L)	<0.0150	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
pH	(s.u.)	7.6	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	1.20	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (B-1) - 08/28/97

Parameter		Value	Excursion
Temperature	(degrees C)	21.0	-
Dissolved Oxygen	(mg/L)	9.2	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	49	-
Suspended Solids	(mg/L)	1	-
Total Solids	(mg/L)	162	-
Dissolved Solids	(mg/L)	150	-
Specific Conductance	(mS/cm)	0.260	-
Turbidity	(NTU)	1.30	-
Ammonia-N	(mg/L)	0.02	-
Phosphorus	(mg/L)	0.03	-
Soluble Phosphorus	(mg/L)	0.03	-
Nitrate-N	(mg/L)	0.30	-
TKN	(mg/L)	0.30	-
Chlorides	(mg/L)	40	-
Sulfates	(mg/L)	37	-
Alkalinity	(mg/L)	89	-
Hardness	(mg/L)	106	-
Nickel	(mg/L)	0.0020	-
Copper	(mg/L)	0.0060	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0200	-
Iron	(mg/L)	0.0600	-
Cadmium	(mg/L)	0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
pH	(s.u.)	8.1	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	<1.00	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (B-1) - 10/08/97

Parameter		Value	Excursion
Temperature	(degrees C)	18.0	-
Dissolved Oxygen	(mg/L)	7.9	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	10	-
Suspended Solids	(mg/L)	4	-
Total Solids	(mg/L)	176	-
Dissolved Solids	(mg/L)	136	-
Specific Conductance	(mS/cm)	0.270	-
Turbidity	(NTU)	2.20	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.02	-
Soluble Phosphorus	(mg/L)	0.01	-
Nitrate-N	(mg/L)	0.30	-
TKN	(mg/L)	0.40	-
Chlorides	(mg/L)	16	-
Sulfates	(mg/L)	21	-
Alkalinity	(mg/L)	91	-
Hardness	(mg/L)	108	-
Nickel	(mg/L)	0.0020	-
Copper	(mg/L)	0.0040	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0500	-
Iron	(mg/L)	0.1100	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
pH	(s.u.)	7.3	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	1.80	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (B-1) - 09/21/98

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	8.0	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	1	-
Total Solids	(mg/L)	200	-
Dissolved Solids	(mg/L)	180	-
Specific Conductance	(mS/cm)	0.300	-
Turbidity	(NTU)	1.00	-
Ammonia-N	(mg/L)	0.09	-
Phosphorus	(mg/L)	0.06	-
Soluble Phosphorus	(mg/L)	0.05	-
Nitrate-N	(mg/L)	0.33	-
TKN	(mg/L)	0.50	-
Chlorides	(mg/L)	22	-
Sulfates	(mg/L)	28	-
Alkalinity	(mg/L)	91	-
Hardness	(mg/L)	108	-
Nickel	(mg/L)	0.0018	-
Copper	(mg/L)	0.0046	-
Total Chromium	(mg/L)	0.0022	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0280	-
Iron	(mg/L)	0.0700	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
pH	(s.u.)	7.8	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Transparency	(ft.)	12.00	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (C) - 10/17/96

Parameter		Value	Excursion
Temperature	(degrees C)	16.0	-
Dissolved Oxygen	(mg/L)	10.0	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	14	-
Suspended Solids	(mg/L)	3	-
Total Solids	(mg/L)	213	-
Dissolved Solids	(mg/L)	183	-
Specific Conductance	(mS/cm)	0.260	-
Turbidity	(NTU)	1.70	-
Ammonia-N	(mg/L)	0.03	-
Phosphorus	(mg/L)	0.03	-
Soluble Phosphorus	(mg/L)	0.03	-
Nitrate-N	(mg/L)	0.40	-
TKN	(mg/L)	0.50	-
Chlorides	(mg/L)	40	-
Sulfates	(mg/L)	31	-
Alkalinity	(mg/L)	85	-
Hardness	(mg/L)	126	-
Nickel	(mg/L)	0.0010	-
Copper	(mg/L)	0.0080	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0900	-
Iron	(mg/L)	0.0600	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
pH	(s.u.)	7.4	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	1.20	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (C) - 08/01/97

Parameter		Value	Excursion
Temperature	(degrees C)	23.0	-
Dissolved Oxygen	(mg/L)	8.8	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	8	-
Suspended Solids	(mg/L)	<1	-
Total Solids	(mg/L)	185	-
Dissolved Solids	(mg/L)	173	-
Specific Conductance	(mS/cm)	0.250	-
Turbidity	(NTU)	0.50	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.04	-
Soluble Phosphorus	(mg/L)	0.04	-
Nitrate-N	(mg/L)	0.70	-
TKN	(mg/L)	0.40	-
Chlorides	(mg/L)	21	-
Sulfates	(mg/L)	36	-
Alkalinity	(mg/L)	82	-
Hardness	(mg/L)	109	-
Nickel	(mg/L)	0.0020	-
Copper	(mg/L)	0.0040	-
Total Chromium	(mg/L)	<0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	<0.0050	-
Iron	(mg/L)	<0.0150	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
pH	(s.u.)	7.6	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	1.10	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (C) - 08/28/97

Parameter		Value	Excursion
Temperature	(degrees C)	21.0	-
Dissolved Oxygen	(mg/L)	10.0	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	23	-
Suspended Solids	(mg/L)	<1	-
Total Solids	(mg/L)	163	-
Dissolved Solids	(mg/L)	157	-
Specific Conductance	(mS/cm)	0.250	-
Turbidity	(NTU)	0.82	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.03	-
Soluble Phosphorus	(mg/L)	0.02	-
Nitrate-N	(mg/L)	0.20	-
TKN	(mg/L)	0.30	-
Chlorides	(mg/L)	34	-
Sulfates	(mg/L)	22	-
Alkalinity	(mg/L)	88	-
Hardness	(mg/L)	105	-
Nickel	(mg/L)	0.0040	-
Copper	(mg/L)	0.0120	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0200	-
Iron	(mg/L)	0.0500	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	<2	-
pH	(s.u.)	8.3	-
E Coli	(organisms/100ml)	<2	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	<1.00	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (C) - 10/08/97

Parameter		Value	Excursion
Temperature	(degrees C)	20.0	-
Dissolved Oxygen	(mg/L)	11.5	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	10	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	180	-
Dissolved Solids	(mg/L)	146	-
Specific Conductance	(mS/cm)	0.250	-
Turbidity	(NTU)	1.20	-
Ammonia-N	(mg/L)	0.01	-
Phosphorus	(mg/L)	0.01	-
Soluble Phosphorus	(mg/L)	<0.01	-
Nitrate-N	(mg/L)	0.20	-
TKN	(mg/L)	0.40	-
Chlorides	(mg/L)	22	-
Sulfates	(mg/L)	23	-
Alkalinity	(mg/L)	88	-
Hardness	(mg/L)	112	-
Nickel	(mg/L)	0.0070	-
Copper	(mg/L)	0.0120	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0600	-
Iron	(mg/L)	0.0400	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.0200	-
pH	(s.u.)	7.9	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	1.70	-
Cobalt	(mg/L)	<0.0070	-

NEORSD

WQIS

LAKE ERIE (C) - 09/21/98

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	8.6	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	1	-
Total Solids	(mg/L)	180	-
Dissolved Solids	(mg/L)	150	-
Specific Conductance	(mS/cm)	0.300	-
Turbidity	(NTU)	0.70	-
Ammonia-N	(mg/L)	0.02	-
Phosphorus	(mg/L)	0.04	-
Soluble Phosphorus	(mg/L)	0.03	-
Nitrate-N	(mg/L)	0.20	-
TKN	(mg/L)	0.40	-
Chlorides	(mg/L)	20	-
Sulfates	(mg/L)	27	-
Alkalinity	(mg/L)	93	-
Hardness	(mg/L)	109	-
Nickel	(mg/L)	0.0016	-
Copper	(mg/L)	0.0046	-
Total Chromium	(mg/L)	0.0016	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0380	-
Iron	(mg/L)	0.0450	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	4	-
pH	(s.u.)	8.3	-
E Coli	(organisms/100ml)	2	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Transparency	(ft.)	12.00	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (C-1) - 10/17/96

Parameter		Value	Excursion
Temperature	(degrees C)	16.0	-
Dissolved Oxygen	(mg/L)	9.0	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	7	-
Suspended Solids	(mg/L)	4	-
Total Solids	(mg/L)	222	-
Dissolved Solids	(mg/L)	176	-
Specific Conductance	(mS/cm)	0.270	-
Turbidity	(NTU)	3.00	-
Ammonia-N	(mg/L)	0.04	-
Phosphorus	(mg/L)	0.04	-
Soluble Phosphorus	(mg/L)	0.02	-
Nitrate-N	(mg/L)	0.30	-
TKN	(mg/L)	1.50	-
Chlorides	(mg/L)	32	-
Sulfates	(mg/L)	33	-
Alkalinity	(mg/L)	86	-
Hardness	(mg/L)	114	-
Nickel	(mg/L)	0.0010	-
Copper	(mg/L)	0.0130	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0500	-
Iron	(mg/L)	0.0900	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0070	-
Mercury	(ug/L)	0.3000	PWS(0.012)* HHSR(0.012)*
pH	(s.u.)	7.2	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	1.20	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (C-1) - 08/01/97

Parameter		Value	Excursion
Temperature	(degrees C)	13.5	-
Dissolved Oxygen	(mg/L)	3.3	EWH(6.0)
BOD-5	(mg/L)	2	-
COD	(mg/L)	9	-
Suspended Solids	(mg/L)	<1	-
Total Solids	(mg/L)	167	-
Dissolved Solids	(mg/L)	131	-
Specific Conductance	(mS/cm)	0.250	-
Turbidity	(NTU)	1.00	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.05	-
Soluble Phosphorus	(mg/L)	0.04	-
TKN	(mg/L)	0.40	-
Chlorides	(mg/L)	28	-
Sulfates	(mg/L)	36	-
Alkalinity	(mg/L)	86	-
Hardness	(mg/L)	110	-
Nickel	(mg/L)	0.0020	-
Copper	(mg/L)	0.0050	-
Total Chromium	(mg/L)	<0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	<0.0050	-
Iron	(mg/L)	0.0100	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
pH	(s.u.)	7.6	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	1.10	-
Cobalt	(mg/L)	<0.0100	-

NEORSD

WQIS

LAKE ERIE (C-1) - 08/28/97

Parameter		Value	Excursion
Temperature	(degrees C)	21.0	-
Dissolved Oxygen	(mg/L)	9.2	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	20	-
Suspended Solids	(mg/L)	<1	-
Total Solids	(mg/L)	170	-
Dissolved Solids	(mg/L)	168	-
Specific Conductance	(mS/cm)	0.250	-
Turbidity	(NTU)	0.96	-
Ammonia-N	(mg/L)	0.03	-
Phosphorus	(mg/L)	0.02	-
Soluble Phosphorus	(mg/L)	0.02	-
Nitrate-N	(mg/L)	0.30	-
TKN	(mg/L)	0.30	-
Chlorides	(mg/L)	40	-
Sulfates	(mg/L)	22	-
Alkalinity	(mg/L)	88	-
Hardness	(mg/L)	100	-
Nickel	(mg/L)	0.0010	-
Copper	(mg/L)	0.0030	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0100	-
Iron	(mg/L)	0.0400	-
Cadmium	(mg/L)	0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
pH	(s.u.)	8.3	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	<1.00	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (C-1) - 10/08/97

Parameter		Value	Excursion
Temperature	(degrees C)	18.0	-
Dissolved Oxygen	(mg/L)	8.0	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	195	-
Dissolved Solids	(mg/L)	173	-
Specific Conductance	(mS/cm)	0.270	-
Turbidity	(NTU)	1.50	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.02	-
Soluble Phosphorus	(mg/L)	0.02	-
Nitrate-N	(mg/L)	0.40	-
TKN	(mg/L)	0.30	-
Chlorides	(mg/L)	20	-
Sulfates	(mg/L)	25	-
Alkalinity	(mg/L)	87	-
Hardness	(mg/L)	114	-
Nickel	(mg/L)	0.0020	-
Copper	(mg/L)	0.0040	-
Total Chromium	(mg/L)	<0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0700	-
Iron	(mg/L)	0.0900	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
pH	(s.u.)	7.4	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	2.10	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (C-1) - 09/21/98

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	8.2	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	320	-
Dissolved Solids	(mg/L)	290	-
Specific Conductance	(mS/cm)	0.300	-
Turbidity	(NTU)	1.20	-
Ammonia-N	(mg/L)	0.02	-
Phosphorus	(mg/L)	0.06	-
Soluble Phosphorus	(mg/L)	0.04	-
Nitrate-N	(mg/L)	0.19	-
TKN	(mg/L)	0.60	-
Chlorides	(mg/L)	26	-
Sulfates	(mg/L)	28	-
Alkalinity	(mg/L)	93	-
Hardness	(mg/L)	109	-
Nickel	(mg/L)	0.0027	-
Copper	(mg/L)	0.0072	-
Total Chromium	(mg/L)	0.0029	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0340	-
Iron	(mg/L)	0.0510	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	0.3100	PHH(0.0031)* WL(0.0013)*
pH	(s.u.)	8.1	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Transparency	(ft.)	12.00	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (D) - 10/17/96

Parameter		Value	Excursion
Temperature	(degrees C)	16.5	-
Dissolved Oxygen	(mg/L)	10.2	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	12	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	217	-
Dissolved Solids	(mg/L)	180	-
Specific Conductance	(mS/cm)	0.270	-
Turbidity	(NTU)	2.10	-
Ammonia-N	(mg/L)	0.02	-
Phosphorus	(mg/L)	0.05	-
Soluble Phosphorus	(mg/L)	0.04	-
Nitrate-N	(mg/L)	0.50	-
TKN	(mg/L)	0.80	-
Chlorides	(mg/L)	40	-
Sulfates	(mg/L)	38	-
Alkalinity	(mg/L)	91	-
Hardness	(mg/L)	122	-
Nickel	(mg/L)	0.0010	-
Copper	(mg/L)	0.0040	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.1100	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
pH	(s.u.)	8.0	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	0.0020	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	1.80	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (D) - 08/01/97

Parameter		Value	Excursion
Temperature	(degrees C)	23.0	-
Dissolved Oxygen	(mg/L)	7.6	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	8	-
Suspended Solids	(mg/L)	<1	-
Total Solids	(mg/L)	195	-
Dissolved Solids	(mg/L)	158	-
Specific Conductance	(mS/cm)	0.270	-
Turbidity	(NTU)	1.00	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.06	-
Soluble Phosphorus	(mg/L)	0.06	-
Nitrate-N	(mg/L)	0.40	-
TKN	(mg/L)	0.40	-
Chlorides	(mg/L)	20	-
Sulfates	(mg/L)	40	-
Alkalinity	(mg/L)	86	-
Hardness	(mg/L)	113	-
Nickel	(mg/L)	0.0050	-
Copper	(mg/L)	0.0130	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0100	-
Iron	(mg/L)	0.0400	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
pH	(s.u.)	7.3	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	1.80	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (D) - 08/28/97

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	10.0	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	26	-
Suspended Solids	(mg/L)	5	-
Total Solids	(mg/L)	190	-
Dissolved Solids	(mg/L)	173	-
Specific Conductance	(mS/cm)	0.280	-
Turbidity	(NTU)	2.80	-
Ammonia-N	(mg/L)	0.03	-
Phosphorus	(mg/L)	0.06	-
Soluble Phosphorus	(mg/L)	0.04	-
Nitrate-N	(mg/L)	0.40	-
TKN	(mg/L)	0.40	-
Chlorides	(mg/L)	44	-
Sulfates	(mg/L)	25	-
Alkalinity	(mg/L)	90	-
Hardness	(mg/L)	105	-
Nickel	(mg/L)	0.0020	-
Copper	(mg/L)	0.0030	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0100	-
Iron	(mg/L)	0.1800	-
Cadmium	(mg/L)	0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	38	-
pH	(s.u.)	8.1	-
E Coli	(organisms/100ml)	34	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	<1.00	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (D) - 10/08/97

Parameter		Value	Excursion
Temperature	(degrees C)	19.0	-
Dissolved Oxygen	(mg/L)	9.2	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	1	-
Total Solids	(mg/L)	168	-
Dissolved Solids	(mg/L)	152	-
Specific Conductance	(mS/cm)	0.260	-
Turbidity	(NTU)	0.80	-
Ammonia-N	(mg/L)	0.02	-
Phosphorus	(mg/L)	0.02	-
Soluble Phosphorus	(mg/L)	0.01	-
Nitrate-N	(mg/L)	0.30	-
TKN	(mg/L)	0.40	-
Chlorides	(mg/L)	18	-
Sulfates	(mg/L)	21	-
Alkalinity	(mg/L)	86	-
Hardness	(mg/L)	109	-
Nickel	(mg/L)	0.0020	-
Copper	(mg/L)	0.0040	-
Total Chromium	(mg/L)	<0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	0.0500	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
pH	(s.u.)	7.5	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0010	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	1.60	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (D) - 09/21/98

Parameter		Value	Excursion
Temperature	(degrees C)	23.0	-
Dissolved Oxygen	(mg/L)	8.0	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	21	-
Suspended Solids	(mg/L)	6	-
Total Solids	(mg/L)	180	-
Dissolved Solids	(mg/L)	180	-
Specific Conductance	(mS/cm)	0.300	-
Turbidity	(NTU)	1.50	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.05	-
Soluble Phosphorus	(mg/L)	0.04	-
Nitrate-N	(mg/L)	0.40	-
TKN	(mg/L)	0.60	-
Chlorides	(mg/L)	20	-
Sulfates	(mg/L)	42	-
Alkalinity	(mg/L)	95	-
Hardness	(mg/L)	115	-
Nickel	(mg/L)	0.0020	-
Copper	(mg/L)	0.0060	-
Total Chromium	(mg/L)	<0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0250	-
Iron	(mg/L)	0.0530	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	8	-
pH	(s.u.)	7.8	-
E Coli	(organisms/100ml)	4	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Transparency	(ft.)	7.00	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (E) - 10/17/96

Parameter		Value	Excursion
Temperature	(degrees C)	16.0	-
Dissolved Oxygen	(mg/L)	8.9	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	9	-
Suspended Solids	(mg/L)	3	-
Total Solids	(mg/L)	215	-
Dissolved Solids	(mg/L)	162	-
Specific Conductance	(mS/cm)	0.260	-
Turbidity	(NTU)	1.80	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.05	-
Soluble Phosphorus	(mg/L)	0.05	-
Nitrate-N	(mg/L)	0.50	-
TKN	(mg/L)	0.50	-
Chlorides	(mg/L)	16	-
Sulfates	(mg/L)	28	-
Alkalinity	(mg/L)	82	-
Hardness	(mg/L)	132	-
Nickel	(mg/L)	0.0010	-
Copper	(mg/L)	0.0060	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0700	-
Iron	(mg/L)	0.0900	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	10	-
pH	(s.u.)	7.9	-
E Coli	(organisms/100ml)	2	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	1.30	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (E) - 08/01/97

Parameter		Value	Excursion
Temperature	(degrees C)	24.0	-
Dissolved Oxygen	(mg/L)	8.2	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	9	-
Suspended Solids	(mg/L)	<1	-
Total Solids	(mg/L)	213	-
Dissolved Solids	(mg/L)	180	-
Specific Conductance	(mS/cm)	0.290	-
Turbidity	(NTU)	1.30	-
Ammonia-N	(mg/L)	0.03	-
Phosphorus	(mg/L)	0.06	-
Soluble Phosphorus	(mg/L)	0.05	-
Nitrate-N	(mg/L)	0.70	-
TKN	(mg/L)	0.50	-
Chlorides	(mg/L)	26	-
Sulfates	(mg/L)	43	-
Alkalinity	(mg/L)	86	-
Hardness	(mg/L)	112	-
Nickel	(mg/L)	0.0040	-
Copper	(mg/L)	0.0150	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0100	-
Iron	(mg/L)	0.0300	-
Cadmium	(mg/L)	<0.0030	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
pH	(s.u.)	7.5	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	1.60	-
Cobalt	(mg/L)	<0.0070	-

NEORSD

WQIS

LAKE ERIE (E) - 10/08/97

Parameter		Value	Excursion
Temperature	(degrees C)	19.0	-
Dissolved Oxygen	(mg/L)	9.2	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	11	-
Suspended Solids	(mg/L)	<1	-
Total Solids	(mg/L)	189	-
Dissolved Solids	(mg/L)	154	-
Specific Conductance	(mS/cm)	0.260	-
Turbidity	(NTU)	1.00	-
Ammonia-N	(mg/L)	0.02	-
Phosphorus	(mg/L)	<0.01	-
Soluble Phosphorus	(mg/L)	<0.01	-
Nitrate-N	(mg/L)	0.30	-
TKN	(mg/L)	0.40	-
Chlorides	(mg/L)	16	-
Sulfates	(mg/L)	20	-
Alkalinity	(mg/L)	88	-
Hardness	(mg/L)	112	-
Nickel	(mg/L)	0.0010	-
Copper	(mg/L)	0.0050	-
Total Chromium	(mg/L)	<0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	0.0700	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0050	-
Mercury	(ug/L)	<2.0000	-
pH	(s.u.)	7.5	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	1.80	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (E) - 08/28/97

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	9.2	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	23	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	182	-
Dissolved Solids	(mg/L)	176	-
Specific Conductance	(mS/cm)	0.260	-
Turbidity	(NTU)	1.30	-
Ammonia-N	(mg/L)	0.03	-
Phosphorus	(mg/L)	0.05	-
Soluble Phosphorus	(mg/L)	0.05	-
Nitrate-N	(mg/L)	0.30	-
TKN	(mg/L)	0.30	-
Chlorides	(mg/L)	50	-
Sulfates	(mg/L)	26	-
Alkalinity	(mg/L)	92	-
Hardness	(mg/L)	103	-
Nickel	(mg/L)	0.0020	-
Copper	(mg/L)	0.0050	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.1200	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	4	-
pH	(s.u.)	7.9	-
E Coli	(organisms/100ml)	16	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	<1.00	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (E) - 09/21/98

Parameter		Value	Excursion
Temperature	(degrees C)	23.0	-
Dissolved Oxygen	(mg/L)	8.8	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	22	-
Suspended Solids	(mg/L)	5	-
Total Solids	(mg/L)	200	-
Dissolved Solids	(mg/L)	190	-
Specific Conductance	(mS/cm)	0.300	-
Turbidity	(NTU)	2.50	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.15	-
Soluble Phosphorus	(mg/L)	0.04	-
Nitrate-N	(mg/L)	0.50	-
TKN	(mg/L)	0.70	-
Chlorides	(mg/L)	28	-
Sulfates	(mg/L)	30	-
Alkalinity	(mg/L)	95	-
Hardness	(mg/L)	119	-
Nickel	(mg/L)	0.0028	-
Copper	(mg/L)	0.0071	-
Total Chromium	(mg/L)	0.0016	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0350	-
Iron	(mg/L)	0.1320	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	32	-
pH	(s.u.)	7.8	-
E Coli	(organisms/100ml)	24	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	0.0018	-
Beryllium	(mg/L)	<0.0010	-
Transparency	(ft.)	7.00	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (F) - 10/17/96

Parameter		Value	Excursion
Temperature	(degrees C)	16.5	-
Dissolved Oxygen	(mg/L)	8.8	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	15	-
Suspended Solids	(mg/L)	4	-
Total Solids	(mg/L)	241	-
Dissolved Solids	(mg/L)	192	-
Specific Conductance	(mS/cm)	0.320	-
Turbidity	(NTU)	2.30	-
Ammonia-N	(mg/L)	0.40	-
Phosphorus	(mg/L)	0.10	-
Soluble Phosphorus	(mg/L)	0.10	-
Nitrate-N	(mg/L)	0.60	-
TKN	(mg/L)	0.90	-
Chlorides	(mg/L)	40	-
Sulfates	(mg/L)	52	-
Alkalinity	(mg/L)	92	-
Hardness	(mg/L)	140	-
Nickel	(mg/L)	0.0020	-
Copper	(mg/L)	0.0070	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.1000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	0.3000	HHSR(0.012)*
Fecal Coliform	(organisms/100ml)	20	-
pH	(s.u.)	7.8	-
E Coli	(organisms/100ml)	16	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	1.90	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (F) - 08/01/97

Parameter		Value	Excursion
Temperature	(degrees C)	24.0	-
Dissolved Oxygen	(mg/L)	8.8	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	9	-
Suspended Solids	(mg/L)	<1	-
Total Solids	(mg/L)	192	-
Dissolved Solids	(mg/L)	170	-
Specific Conductance	(mS/cm)	0.300	-
Turbidity	(NTU)	1.50	-
Ammonia-N	(mg/L)	0.03	-
Phosphorus	(mg/L)	0.06	-
Soluble Phosphorus	(mg/L)	0.05	-
Nitrate-N	(mg/L)	0.60	-
TKN	(mg/L)	0.40	-
Chlorides	(mg/L)	24	-
Sulfates	(mg/L)	43	-
Alkalinity	(mg/L)	88	-
Hardness	(mg/L)	114	-
Nickel	(mg/L)	0.0030	-
Copper	(mg/L)	0.0040	-
Total Chromium	(mg/L)	<0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.0400	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
pH	(s.u.)	7.6	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (F) - 08/28/97

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	10.4	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	21	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	169	-
Dissolved Solids	(mg/L)	160	-
Specific Conductance	(mS/cm)	0.260	-
Turbidity	(NTU)	1.60	-
Ammonia-N	(mg/L)	0.02	-
Phosphorus	(mg/L)	0.04	-
Soluble Phosphorus	(mg/L)	0.04	-
Nitrate-N	(mg/L)	0.30	-
TKN	(mg/L)	0.40	-
Chlorides	(mg/L)	52	-
Sulfates	(mg/L)	23	-
Alkalinity	(mg/L)	96	-
Hardness	(mg/L)	103	-
Nickel	(mg/L)	0.0020	-
Copper	(mg/L)	0.0140	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	0.0600	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0040	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	16	-
pH	(s.u.)	7.5	-
E Coli	(organisms/100ml)	2	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0050	-
Potassium	(mg/L)	<1.00	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (F) - 10/08/97

Parameter		Value	Excursion
Temperature	(degrees C)	19.0	-
Dissolved Oxygen	(mg/L)	9.0	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	10	-
Suspended Solids	(mg/L)	1	-
Total Solids	(mg/L)	168	-
Dissolved Solids	(mg/L)	158	-
Specific Conductance	(mS/cm)	0.400	-
Turbidity	(NTU)	1.50	-
Ammonia-N	(mg/L)	0.01	-
Phosphorus	(mg/L)	0.03	-
Soluble Phosphorus	(mg/L)	0.02	-
Nitrate-N	(mg/L)	0.30	-
TKN	(mg/L)	0.40	-
Chlorides	(mg/L)	22	-
Sulfates	(mg/L)	21	-
Alkalinity	(mg/L)	85	-
Hardness	(mg/L)	110	-
Nickel	(mg/L)	0.0020	-
Copper	(mg/L)	0.0060	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0200	-
Iron	(mg/L)	0.0700	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0030	-
Mercury	(ug/L)	<0.2000	-
pH	(s.u.)	7.2	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	1.70	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (F) - 09/21/98

Parameter		Value	Excursion
Temperature	(degrees C)	23.0	-
Dissolved Oxygen	(mg/L)	8.3	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	23	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	220	-
Dissolved Solids	(mg/L)	210	-
Specific Conductance	(mS/cm)	0.300	-
Turbidity	(NTU)	1.50	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.09	-
Soluble Phosphorus	(mg/L)	0.06	-
Nitrate-N	(mg/L)	0.90	-
TKN	(mg/L)	0.60	-
Chlorides	(mg/L)	30	-
Sulfates	(mg/L)	39	-
Alkalinity	(mg/L)	94	-
Hardness	(mg/L)	119	-
Nickel	(mg/L)	0.0038	-
Copper	(mg/L)	0.0086	-
Total Chromium	(mg/L)	<0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0410	-
Iron	(mg/L)	0.0770	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	22	-
pH	(s.u.)	7.6	-
E Coli	(organisms/100ml)	6	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Transparency	(ft.)	6.00	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (G) - 10/17/96

Parameter		Value	Excursion
Temperature	(degrees C)	16.0	-
Dissolved Oxygen	(mg/L)	8.5	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	13	-
Suspended Solids	(mg/L)	4	-
Total Solids	(mg/L)	255	-
Dissolved Solids	(mg/L)	201	-
Specific Conductance	(mS/cm)	0.340	-
Turbidity	(NTU)	3.50	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.09	-
Soluble Phosphorus	(mg/L)	0.09	-
Nitrate-N	(mg/L)	1.00	-
TKN	(mg/L)	0.60	-
Chlorides	(mg/L)	48	-
Sulfates	(mg/L)	37	-
Alkalinity	(mg/L)	88	-
Hardness	(mg/L)	130	-
Nickel	(mg/L)	0.0020	-
Copper	(mg/L)	0.0060	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	0.1700	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	0.3000	HHSR(0.012)*
pH	(s.u.)	7.9	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	2.30	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (G) - 08/28/97

Parameter		Value	Excursion
Temperature	(degrees C)	22.5	-
Dissolved Oxygen	(mg/L)	9.3	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	30	-
Suspended Solids	(mg/L)	4	-
Total Solids	(mg/L)	219	-
Dissolved Solids	(mg/L)	207	-
Specific Conductance	(mS/cm)	0.290	-
Turbidity	(NTU)	3.30	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.05	-
Soluble Phosphorus	(mg/L)	0.05	-
Nitrate-N	(mg/L)	0.70	-
TKN	(mg/L)	0.40	-
Chlorides	(mg/L)	64	-
Sulfates	(mg/L)	28	-
Alkalinity	(mg/L)	94	-
Hardness	(mg/L)	109	-
Nickel	(mg/L)	0.0030	-
Copper	(mg/L)	0.0040	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0200	-
Iron	(mg/L)	0.1700	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
pH	(s.u.)	8.1	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	1.10	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (G) - 10/08/97

Parameter		Value	Excursion
Temperature	(degrees C)	19.0	-
Dissolved Oxygen	(mg/L)	8.8	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	13	-
Suspended Solids	(mg/L)	1	-
Total Solids	(mg/L)	241	-
Dissolved Solids	(mg/L)	210	-
Specific Conductance	(mS/cm)	0.340	-
Turbidity	(NTU)	1.50	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.03	-
Soluble Phosphorus	(mg/L)	0.02	-
Nitrate-N	(mg/L)	1.00	-
TKN	(mg/L)	0.50	-
Chlorides	(mg/L)	34	-
Sulfates	(mg/L)	30	-
Alkalinity	(mg/L)	93	-
Hardness	(mg/L)	123	-
Nickel	(mg/L)	0.0040	-
Copper	(mg/L)	0.0130	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.0900	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	28	-
pH	(s.u.)	7.5	-
E Coli	(organisms/100ml)	20	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	3.00	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (G) - 09/21/98

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	6.8	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	17	-
Suspended Solids	(mg/L)	4	-
Total Solids	(mg/L)	240	-
Dissolved Solids	(mg/L)	160	-
Specific Conductance	(mS/cm)	0.359	-
Turbidity	(NTU)	4.00	-
Ammonia-N	(mg/L)	0.20	-
Phosphorus	(mg/L)	0.06	-
Soluble Phosphorus	(mg/L)	0.05	-
Nitrate-N	(mg/L)	1.20	-
TKN	(mg/L)	0.60	-
Chlorides	(mg/L)	40	-
Sulfates	(mg/L)	37	-
Alkalinity	(mg/L)	97	-
Hardness	(mg/L)	125	-
Nickel	(mg/L)	0.0028	-
Copper	(mg/L)	0.0075	-
Total Chromium	(mg/L)	0.0014	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0190	-
Iron	(mg/L)	0.2110	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	22	-
pH	(s.u.)	7.6	-
E Coli	(organisms/100ml)	12	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Transparency	(ft.)	3.00	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (H) - 10/17/96

Parameter		Value	Excursion
Temperature	(degrees C)	18.0	-
Dissolved Oxygen	(mg/L)	6.2	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	22	-
Suspended Solids	(mg/L)	16	-
Total Solids	(mg/L)	555	-
Dissolved Solids	(mg/L)	502	-
Specific Conductance	(mS/cm)	1.100	-
Turbidity	(NTU)	1.70	-
Ammonia-N	(mg/L)	0.40	-
Phosphorus	(mg/L)	0.20	-
Soluble Phosphorus	(mg/L)	0.16	-
Nitrate-N	(mg/L)	4.70	-
TKN	(mg/L)	1.40	-
Chlorides	(mg/L)	140	-
Sulfates	(mg/L)	92	-
Alkalinity	(mg/L)	120	-
Hardness	(mg/L)	212	-
Nickel	(mg/L)	0.0080	-
Copper	(mg/L)	0.0120	-
Total Chromium	(mg/L)	0.0060	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0600	-
Iron	(mg/L)	0.7000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	16	-
pH	(s.u.)	7.7	-
E Coli	(organisms/100ml)	4	-
Arsenic	(mg/L)	0.0060	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	9.10	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (H) - 08/28/97

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	9.5	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	30	-
Suspended Solids	(mg/L)	9	-
Total Solids	(mg/L)	288	-
Dissolved Solids	(mg/L)	270	-
Specific Conductance	(mS/cm)	0.370	-
Turbidity	(NTU)	4.90	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.07	-
Soluble Phosphorus	(mg/L)	0.05	-
Nitrate-N	(mg/L)	1.20	-
TKN	(mg/L)	0.40	-
Chlorides	(mg/L)	80	-
Sulfates	(mg/L)	37	-
Alkalinity	(mg/L)	93	-
Hardness	(mg/L)	118	-
Nickel	(mg/L)	0.0060	-
Copper	(mg/L)	0.0060	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0200	-
Iron	(mg/L)	0.1700	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
pH	(s.u.)	8.1	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	1.90	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (H) - 10/08/97

Parameter		Value	Excursion
Temperature	(degrees C)	21.5	-
Dissolved Oxygen	(mg/L)	4.7	EWH(5.0)
BOD-5	(mg/L)	<2	-
COD	(mg/L)	29	-
Suspended Solids	(mg/L)	23	-
Total Solids	(mg/L)	607	-
Dissolved Solids	(mg/L)	551	-
Specific Conductance	(mS/cm)	1.200	-
Turbidity	(NTU)	13.00	-
Ammonia-N	(mg/L)	0.40	-
Phosphorus	(mg/L)	0.15	-
Soluble Phosphorus	(mg/L)	0.11	-
Nitrate-N	(mg/L)	6.20	-
TKN	(mg/L)	1.20	-
Chlorides	(mg/L)	126	-
Sulfates	(mg/L)	15	-
Alkalinity	(mg/L)	124	-
Hardness	(mg/L)	204	-
Nickel	(mg/L)	0.0090	-
Copper	(mg/L)	0.0090	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0700	-
Iron	(mg/L)	0.9300	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0040	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	65	-
pH	(s.u.)	7.0	-
E Coli	(organisms/100ml)	40	-
Antimony	(mg/L)	<0.0050	-
Arsenic	(mg/L)	0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	12.90	-
Cobalt	(mg/L)	0.0010	-

NEORSD

WQIS

LAKE ERIE (H) - 09/21/98

Parameter		Value	Excursion
Temperature	(degrees C)	24.0	-
Dissolved Oxygen	(mg/L)	5.2	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	15	-
Total Solids	(mg/L)	400	-
Dissolved Solids	(mg/L)	340	-
Specific Conductance	(mS/cm)	0.600	-
Turbidity	(NTU)	5.80	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.12	-
Soluble Phosphorus	(mg/L)	0.11	-
Nitrate-N	(mg/L)	1.60	-
TKN	(mg/L)	1.00	-
Chlorides	(mg/L)	96	-
Sulfates	(mg/L)	64	-
Alkalinity	(mg/L)	108	-
Hardness	(mg/L)	154	-
Nickel	(mg/L)	0.0062	-
Copper	(mg/L)	0.0074	-
Total Chromium	(mg/L)	0.0029	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0380	-
Iron	(mg/L)	0.6930	-
Lead	(mg/L)	0.0032	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	42	-
pH	(s.u.)	7.0	-
E Coli	(organisms/100ml)	16	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Transparency	(ft.)	2.00	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (I) - 10/17/96

Parameter		Value	Excursion
Temperature	(degrees C)	16.0	-
Dissolved Oxygen	(mg/L)	8.5	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	15	-
Suspended Solids	(mg/L)	3	-
Total Solids	(mg/L)	280	-
Dissolved Solids	(mg/L)	250	-
Specific Conductance	(mS/cm)	0.360	-
Turbidity	(NTU)	2.50	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.07	-
Soluble Phosphorus	(mg/L)	0.06	-
Nitrate-N	(mg/L)	1.30	-
TKN	(mg/L)	0.70	-
Chlorides	(mg/L)	58	-
Sulfates	(mg/L)	40	-
Alkalinity	(mg/L)	94	-
Hardness	(mg/L)	137	-
Nickel	(mg/L)	0.0020	-
Copper	(mg/L)	0.0080	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.1200	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
pH	(s.u.)	7.9	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	2.80	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (I) - 08/28/97

Parameter		Value	Excursion
Temperature	(degrees C)	22.5	-
Dissolved Oxygen	(mg/L)	10.2	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	30	-
Suspended Solids	(mg/L)	4	-
Total Solids	(mg/L)	207	-
Dissolved Solids	(mg/L)	193	-
Specific Conductance	(mS/cm)	0.310	-
Turbidity	(NTU)	1.60	-
Ammonia-N	(mg/L)	0.02	-
Phosphorus	(mg/L)	0.06	-
Soluble Phosphorus	(mg/L)	0.05	-
Nitrate-N	(mg/L)	0.70	-
TKN	(mg/L)	0.30	-
Chlorides	(mg/L)	32	-
Sulfates	(mg/L)	29	-
Alkalinity	(mg/L)	91	-
Hardness	(mg/L)	114	-
Nickel	(mg/L)	0.0030	-
Copper	(mg/L)	0.0040	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	0.1100	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
pH	(s.u.)	8.3	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	1.70	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (I) - 10/08/97

Parameter		Value	Excursion
Temperature	(degrees C)	19.0	-
Dissolved Oxygen	(mg/L)	8.6	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	11	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	238	-
Dissolved Solids	(mg/L)	193	-
Specific Conductance	(mS/cm)	0.370	-
Turbidity	(NTU)	3.00	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.04	-
Soluble Phosphorus	(mg/L)	0.03	-
Nitrate-N	(mg/L)	1.10	-
TKN	(mg/L)	0.50	-
Chlorides	(mg/L)	40	-
Sulfates	(mg/L)	21	-
Alkalinity	(mg/L)	96	-
Hardness	(mg/L)	128	-
Nickel	(mg/L)	0.0050	-
Copper	(mg/L)	0.0040	-
Total Chromium	(mg/L)	<0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0200	-
Iron	(mg/L)	0.1700	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.0200	-
Fecal Coliform	(organisms/100ml)	32	-
pH	(s.u.)	7.3	-
E Coli	(organisms/100ml)	28	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	27.00	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (I) - 09/21/98

Parameter		Value	Excursion
Temperature	(degrees C)	23.0	-
Dissolved Oxygen	(mg/L)	7.1	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	1	-
Total Solids	(mg/L)	310	-
Dissolved Solids	(mg/L)	260	-
Specific Conductance	(mS/cm)	0.400	-
Turbidity	(NTU)	2.50	-
Ammonia-N	(mg/L)	0.30	-
Phosphorus	(mg/L)	0.06	-
Soluble Phosphorus	(mg/L)	0.06	-
Nitrate-N	(mg/L)	2.50	-
TKN	(mg/L)	0.70	-
Chlorides	(mg/L)	64	-
Sulfates	(mg/L)	43	-
Alkalinity	(mg/L)	96	-
Hardness	(mg/L)	127	-
Nickel	(mg/L)	0.0042	-
Copper	(mg/L)	0.0060	-
Total Chromium	(mg/L)	0.0052	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0220	-
Iron	(mg/L)	0.1990	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	20	-
pH	(s.u.)	7.2	-
E Coli	(organisms/100ml)	14	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Transparency	(ft.)	4.00	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (J) - 10/17/96

Parameter		Value	Excursion
Temperature	(degrees C)	16.0	-
Dissolved Oxygen	(mg/L)	9.3	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	16	-
Suspended Solids	(mg/L)	4	-
Total Solids	(mg/L)	222	-
Dissolved Solids	(mg/L)	192	-
Specific Conductance	(mS/cm)	0.230	-
Turbidity	(NTU)	2.30	-
Ammonia-N	(mg/L)	0.02	-
Phosphorus	(mg/L)	0.05	-
Soluble Phosphorus	(mg/L)	0.05	-
Nitrate-N	(mg/L)	0.50	-
TKN	(mg/L)	0.50	-
Chlorides	(mg/L)	40	-
Sulfates	(mg/L)	32	-
Alkalinity	(mg/L)	85	-
Hardness	(mg/L)	126	-
Nickel	(mg/L)	0.0020	-
Copper	(mg/L)	0.0160	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0200	-
Iron	(mg/L)	0.1100	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	8	-
pH	(s.u.)	8.0	-
E Coli	(organisms/100ml)	4	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	1.40	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (J) - 08/28/97

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	11.0	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	19	-
Suspended Solids	(mg/L)	3	-
Total Solids	(mg/L)	177	-
Dissolved Solids	(mg/L)	170	-
Specific Conductance	(mS/cm)	0.270	-
Turbidity	(NTU)	1.70	-
Ammonia-N	(mg/L)	0.02	-
Phosphorus	(mg/L)	0.04	-
Soluble Phosphorus	(mg/L)	0.04	-
Nitrate-N	(mg/L)	0.40	-
TKN	(mg/L)	0.50	-
Chlorides	(mg/L)	30	-
Sulfates	(mg/L)	28	-
Alkalinity	(mg/L)	88	-
Hardness	(mg/L)	109	-
Nickel	(mg/L)	0.0020	-
Copper	(mg/L)	0.0080	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	0.2100	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
pH	(s.u.)	8.6	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	1.30	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (J) - 10/08/97

Parameter		Value	Excursion
Temperature	(degrees C)	19.0	-
Dissolved Oxygen	(mg/L)	9.8	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	10	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	200	-
Dissolved Solids	(mg/L)	193	-
Specific Conductance	(mS/cm)	0.310	-
Turbidity	(NTU)	1.70	-
Ammonia-N	(mg/L)	0.02	-
Phosphorus	(mg/L)	0.02	-
Soluble Phosphorus	(mg/L)	0.02	-
Nitrate-N	(mg/L)	0.70	-
TKN	(mg/L)	0.40	-
Chlorides	(mg/L)	26	-
Sulfates	(mg/L)	23	-
Alkalinity	(mg/L)	98	-
Hardness	(mg/L)	120	-
Nickel	(mg/L)	0.0030	-
Copper	(mg/L)	0.0050	-
Total Chromium	(mg/L)	<0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0200	-
Iron	(mg/L)	0.0800	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	18	-
pH	(s.u.)	7.5	-
E Coli	(organisms/100ml)	4	-
Antimony	(mg/L)	<0.0030	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	1.70	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (J) - 09/21/98

Parameter		Value	Excursion
Temperature	(degrees C)	23.0	-
Dissolved Oxygen	(mg/L)	8.0	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	1	-
Total Solids	(mg/L)	260	-
Dissolved Solids	(mg/L)	220	-
Specific Conductance	(mS/cm)	0.300	-
Turbidity	(NTU)	1.20	-
Ammonia-N	(mg/L)	0.01	-
Phosphorus	(mg/L)	0.04	-
Soluble Phosphorus	(mg/L)	0.04	-
Nitrate-N	(mg/L)	0.51	-
TKN	(mg/L)	0.50	-
Chlorides	(mg/L)	30	-
Sulfates	(mg/L)	31	-
Alkalinity	(mg/L)	93	-
Hardness	(mg/L)	110	-
Nickel	(mg/L)	0.0036	-
Copper	(mg/L)	0.0084	-
Total Chromium	(mg/L)	0.0044	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0490	-
Iron	(mg/L)	0.0780	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	10	-
pH	(s.u.)	7.3	-
E Coli	(organisms/100ml)	6	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Transparency	(ft.)	7.00	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (K) - 10/17/96

Parameter		Value	Excursion
Temperature	(degrees C)	16.0	-
Dissolved Oxygen	(mg/L)	9.6	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	12	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	230	-
Dissolved Solids	(mg/L)	167	-
Specific Conductance	(mS/cm)	0.270	-
Turbidity	(NTU)	2.60	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.06	-
Soluble Phosphorus	(mg/L)	0.06	-
Nitrate-N	(mg/L)	0.50	-
TKN	(mg/L)	0.60	-
Chlorides	(mg/L)	76	-
Sulfates	(mg/L)	32	-
Alkalinity	(mg/L)	84	-
Hardness	(mg/L)	118	-
Nickel	(mg/L)	0.0100	-
Copper	(mg/L)	0.0140	-
Total Chromium	(mg/L)	<0.0100	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0800	-
Iron	(mg/L)	0.2000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0030	-
Mercury	(ug/L)	0.2000	HHSR(0.012)*
Fecal Coliform	(organisms/100ml)	16	-
pH	(s.u.)	8.1	-
E Coli	(organisms/100ml)	<2	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	1.90	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (K) - 10/08/97

Parameter		Value	Excursion
Temperature	(degrees C)	20.0	-
Dissolved Oxygen	(mg/L)	9.9	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	10	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	168	-
Dissolved Solids	(mg/L)	159	-
Specific Conductance	(mS/cm)	0.270	-
Turbidity	(NTU)	1.50	-
Ammonia-N	(mg/L)	0.01	-
Phosphorus	(mg/L)	0.06	-
Soluble Phosphorus	(mg/L)	0.02	-
Nitrate-N	(mg/L)	0.30	-
TKN	(mg/L)	0.30	-
Chlorides	(mg/L)	14	-
Sulfates	(mg/L)	19	-
Alkalinity	(mg/L)	86	-
Hardness	(mg/L)	114	-
Nickel	(mg/L)	0.0020	-
Copper	(mg/L)	0.0040	-
Total Chromium	(mg/L)	<0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.0500	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	10	-
pH	(s.u.)	7.8	-
E Coli	(organisms/100ml)	2	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	0.90	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (K) - 09/21/98

Parameter		Value	Excursion
Temperature	(degrees C)	23.0	-
Dissolved Oxygen	(mg/L)	9.3	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	1	-
Total Solids	(mg/L)	180	-
Dissolved Solids	(mg/L)	160	-
Specific Conductance	(mS/cm)	0.300	-
Turbidity	(NTU)	2.50	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.05	-
Soluble Phosphorus	(mg/L)	0.04	-
Nitrate-N	(mg/L)	0.40	-
TKN	(mg/L)	0.60	-
Chlorides	(mg/L)	26	-
Sulfates	(mg/L)	34	-
Alkalinity	(mg/L)	93	-
Hardness	(mg/L)	113	-
Nickel	(mg/L)	0.0031	-
Copper	(mg/L)	0.0075	-
Total Chromium	(mg/L)	0.0030	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0530	-
Iron	(mg/L)	0.1630	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	12	-
pH	(s.u.)	7.5	-
E Coli	(organisms/100ml)	4	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Transparency	(ft.)	6.00	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (L) - 10/17/96

Parameter		Value	Excursion
Temperature	(degrees C)	17.5	-
Dissolved Oxygen	(mg/L)	9.0	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	16	-
Suspended Solids	(mg/L)	3	-
Total Solids	(mg/L)	346	-
Dissolved Solids	(mg/L)	302	-
Specific Conductance	(mS/cm)	0.470	-
Turbidity	(NTU)	2.00	-
Ammonia-N	(mg/L)	0.90	-
Phosphorus	(mg/L)	0.29	-
Soluble Phosphorus	(mg/L)	0.20	-
Nitrate-N	(mg/L)	2.80	-
TKN	(mg/L)	1.40	-
Chlorides	(mg/L)	90	-
Sulfates	(mg/L)	51	-
Alkalinity	(mg/L)	93	-
Hardness	(mg/L)	145	-
Nickel	(mg/L)	0.0100	-
Copper	(mg/L)	0.0060	-
Total Chromium	(mg/L)	0.0030	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.1300	-
Iron	(mg/L)	0.1000	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	12	-
pH	(s.u.)	7.6	-
E Coli	(organisms/100ml)	10	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	4.00	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (L) - 10/08/97

Parameter		Value	Excursion
Temperature	(degrees C)	20.5	-
Dissolved Oxygen	(mg/L)	9.1	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	14	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	382	-
Dissolved Solids	(mg/L)	369	-
Specific Conductance	(mS/cm)	0.530	-
Turbidity	(NTU)	1.50	-
Ammonia-N	(mg/L)	0.80	-
Phosphorus	(mg/L)	0.49	-
Soluble Phosphorus	(mg/L)	0.38	-
Nitrate-N	(mg/L)	6.70	-
TKN	(mg/L)	1.30	-
Chlorides	(mg/L)	90	-
Sulfates	(mg/L)	50	-
Alkalinity	(mg/L)	77	-
Hardness	(mg/L)	145	-
Nickel	(mg/L)	0.0110	-
Copper	(mg/L)	0.0070	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0500	-
Iron	(mg/L)	0.1200	-
Cadmium	(mg/L)	0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	12	-
pH	(s.u.)	6.8	-
E Coli	(organisms/100ml)	6	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	4.90	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (L) - 09/21/98

Parameter		Value	Excursion
Temperature	(degrees C)	23.0	-
Dissolved Oxygen	(mg/L)	8.7	-
BOD-5	(mg/L)	3	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	1	-
Total Solids	(mg/L)	300	-
Dissolved Solids	(mg/L)	240	-
Specific Conductance	(mS/cm)	0.300	-
Turbidity	(NTU)	1.50	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.23	-
Soluble Phosphorus	(mg/L)	0.21	-
Nitrate-N	(mg/L)	2.60	-
TKN	(mg/L)	0.70	-
Chlorides	(mg/L)	54	-
Sulfates	(mg/L)	46	-
Alkalinity	(mg/L)	94	-
Hardness	(mg/L)	128	-
Nickel	(mg/L)	0.0032	-
Copper	(mg/L)	0.0061	-
Total Chromium	(mg/L)	0.0021	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0280	-
Iron	(mg/L)	0.1090	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	160	-
pH	(s.u.)	8.0	-
E Coli	(organisms/100ml)	76	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Transparency	(ft.)	6.00	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (M) - 10/17/96

Parameter		Value	Excursion
Temperature	(degrees C)	16.5	-
Dissolved Oxygen	(mg/L)	9.3	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	12	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	212	-
Dissolved Solids	(mg/L)	181	-
Specific Conductance	(mS/cm)	0.290	-
Turbidity	(NTU)	3.20	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.08	-
Soluble Phosphorus	(mg/L)	0.11	-
Nitrate-N	(mg/L)	0.70	-
TKN	(mg/L)	0.60	-
Chlorides	(mg/L)	38	-
Sulfates	(mg/L)	34	-
Alkalinity	(mg/L)	95	-
Hardness	(mg/L)	116	-
Nickel	(mg/L)	0.0030	-
Copper	(mg/L)	0.0060	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.1400	EWH(0.1325)
Iron	(mg/L)	0.0800	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	12	-
pH	(s.u.)	8.0	-
E Coli	(organisms/100ml)	16	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	1.60	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (M) - 10/08/97

Parameter		Value	Excursion
Temperature	(degrees C)	19.0	-
Dissolved Oxygen	(mg/L)	9.8	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	10	-
Suspended Solids	(mg/L)	1	-
Total Solids	(mg/L)	180	-
Dissolved Solids	(mg/L)	177	-
Specific Conductance	(mS/cm)	0.280	-
Turbidity	(NTU)	1.00	-
Ammonia-N	(mg/L)	0.03	-
Phosphorus	(mg/L)	0.04	-
Soluble Phosphorus	(mg/L)	0.04	-
Nitrate-N	(mg/L)	0.60	-
TKN	(mg/L)	0.30	-
Chlorides	(mg/L)	22	-
Sulfates	(mg/L)	20	-
Alkalinity	(mg/L)	90	-
Hardness	(mg/L)	114	-
Nickel	(mg/L)	0.0030	-
Copper	(mg/L)	0.0050	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0600	-
Iron	(mg/L)	0.0400	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	18	-
pH	(s.u.)	7.4	-
E Coli	(organisms/100ml)	8	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	1.20	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (M) - 09/21/98

Parameter		Value	Excursion
Temperature	(degrees C)	23.0	-
Dissolved Oxygen	(mg/L)	8.3	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	4	-
Total Solids	(mg/L)	190	-
Dissolved Solids	(mg/L)	180	-
Specific Conductance	(mS/cm)	0.300	-
Turbidity	(NTU)	3.00	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.06	-
Soluble Phosphorus	(mg/L)	0.06	-
Nitrate-N	(mg/L)	0.50	-
TKN	(mg/L)	0.50	-
Chlorides	(mg/L)	26	-
Sulfates	(mg/L)	32	-
Alkalinity	(mg/L)	92	-
Hardness	(mg/L)	112	-
Nickel	(mg/L)	0.0031	-
Copper	(mg/L)	0.0055	-
Total Chromium	(mg/L)	0.0075	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0630	-
Iron	(mg/L)	0.1520	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	91	-
pH	(s.u.)	7.6	-
E Coli	(organisms/100ml)	48	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Transparency	(ft.)	5.00	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (N) - 10/17/96

Parameter		Value	Excursion
Temperature	(degrees C)	16.0	-
Dissolved Oxygen	(mg/L)	9.5	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	12	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	230	-
Dissolved Solids	(mg/L)	200	-
Specific Conductance	(mS/cm)	0.270	-
Turbidity	(NTU)	1.80	-
Ammonia-N	(mg/L)	0.04	-
Phosphorus	(mg/L)	0.05	-
Soluble Phosphorus	(mg/L)	0.04	-
Nitrate-N	(mg/L)	0.40	-
TKN	(mg/L)	0.60	-
Chlorides	(mg/L)	32	-
Sulfates	(mg/L)	33	-
Alkalinity	(mg/L)	82	-
Hardness	(mg/L)	119	-
Nickel	(mg/L)	0.0010	-
Copper	(mg/L)	0.0060	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0900	-
Iron	(mg/L)	0.0600	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	58	-
pH	(s.u.)	7.9	-
E Coli	(organisms/100ml)	54	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	1.20	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (N) - 10/08/97

Parameter		Value	Excursion
Temperature	(degrees C)	19.0	-
Dissolved Oxygen	(mg/L)	9.9	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	12	-
Suspended Solids	(mg/L)	1	-
Total Solids	(mg/L)	193	-
Dissolved Solids	(mg/L)	183	-
Specific Conductance	(mS/cm)	0.280	-
Turbidity	(NTU)	2.00	-
Ammonia-N	(mg/L)	0.02	-
Phosphorus	(mg/L)	0.10	-
Soluble Phosphorus	(mg/L)	0.03	-
Nitrate-N	(mg/L)	0.40	-
TKN	(mg/L)	0.40	-
Chlorides	(mg/L)	20	-
Sulfates	(mg/L)	32	-
Alkalinity	(mg/L)	79	-
Hardness	(mg/L)	113	-
Nickel	(mg/L)	0.0020	-
Copper	(mg/L)	0.0060	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0200	-
Iron	(mg/L)	0.0500	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	36	-
pH	(s.u.)	7.4.	-
E Coli	(organisms/100ml)	36	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	1.30	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (N) - 09/21/98

Parameter		Value	Excursion
Temperature	(degrees C)	23.0	-
Dissolved Oxygen	(mg/L)	8.9	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	<10	-
Suspended Solids	(mg/L)	5	-
Total Solids	(mg/L)	180	-
Dissolved Solids	(mg/L)	160	-
Specific Conductance	(mS/cm)	0.300	-
Turbidity	(NTU)	1.20	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.04	-
Soluble Phosphorus	(mg/L)	0.04	-
Nitrate-N	(mg/L)	0.20	-
TKN	(mg/L)	0.50	-
Chlorides	(mg/L)	20	-
Sulfates	(mg/L)	14	-
Alkalinity	(mg/L)	90	-
Hardness	(mg/L)	108	-
Nickel	(mg/L)	0.0022	-
Copper	(mg/L)	0.0057	-
Total Chromium	(mg/L)	0.0019	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0280	-
Iron	(mg/L)	0.0520	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	4	-
pH	(s.u.)	7.7	-
E Coli	(organisms/100ml)	2	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Transparency	(ft.)	7.00	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (O) - 10/17/96

Parameter		Value	Excursion
Temperature	(degrees C)	16.5	-
Dissolved Oxygen	(mg/L)	9.5	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	13	-
Suspended Solids	(mg/L)	4	-
Total Solids	(mg/L)	212	-
Dissolved Solids	(mg/L)	165	-
Specific Conductance	(mS/cm)	0.250	-
Turbidity	(NTU)	2.70	-
Ammonia-N	(mg/L)	0.01	-
Phosphorus	(mg/L)	0.07	-
Soluble Phosphorus	(mg/L)	0.04	-
Nitrate-N	(mg/L)	0.50	-
TKN	(mg/L)	0.50	-
Chlorides	(mg/L)	34	-
Sulfates	(mg/L)	33	-
Alkalinity	(mg/L)	95	-
Hardness	(mg/L)	116	-
Nickel	(mg/L)	0.0020	-
Copper	(mg/L)	0.0100	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.1100	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
pH	(s.u.)	8.1	-
Arsenic	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	1.40	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (O) - 08/01/97

Parameter		Value	Excursion
Temperature	(degrees C)	23.5	-
Dissolved Oxygen	(mg/L)	8.0	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	7	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	200	-
Dissolved Solids	(mg/L)	163	-
Specific Conductance	(mS/cm)	0.270	-
Turbidity	(NTU)	2.20	-
Ammonia-N	(mg/L)	0.04	-
Phosphorus	(mg/L)	0.06	-
Soluble Phosphorus	(mg/L)	0.06	-
Nitrate-N	(mg/L)	0.40	-
TKN	(mg/L)	0.40	-
Chlorides	(mg/L)	18	-
Sulfates	(mg/L)	37	-
Alkalinity	(mg/L)	86	-
Hardness	(mg/L)	110	-
Nickel	(mg/L)	0.0060	-
Copper	(mg/L)	0.0090	-
Total Chromium	(mg/L)	0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	<0.0050	-
Iron	(mg/L)	0.0700	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
pH	(s.u.)	7.5	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	1.10	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (O) - 08/28/97

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	10.4	-
BOD-5	(mg/L)	2	-
COD	(mg/L)	26	-
Suspended Solids	(mg/L)	4	-
Total Solids	(mg/L)	174	-
Dissolved Solids	(mg/L)	155	-
Specific Conductance	(mS/cm)	0.260	-
Turbidity	(NTU)	2.20	-
Ammonia-N	(mg/L)	0.03	-
Phosphorus	(mg/L)	0.06	-
Soluble Phosphorus	(mg/L)	0.05	-
Nitrate-N	(mg/L)	0.30	-
TKN	(mg/L)	0.40	-
Chlorides	(mg/L)	30	-
Sulfates	(mg/L)	27	-
Alkalinity	(mg/L)	96	-
Hardness	(mg/L)	103	-
Nickel	(mg/L)	0.0010	-
Copper	(mg/L)	0.0030	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0400	-
Iron	(mg/L)	0.1200	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	58	-
pH	(s.u.)	8.3	-
E Coli	(organisms/100ml)	57	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potassium	(mg/L)	<1.00	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (O) - 10/08/97

Parameter		Value	Excursion
Temperature	(degrees C)	19.0	-
Dissolved Oxygen	(mg/L)	9.8	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	12	-
Suspended Solids	(mg/L)	2	-
Total Solids	(mg/L)	178	-
Dissolved Solids	(mg/L)	140	-
Specific Conductance	(mS/cm)	0.250	-
Turbidity	(NTU)	1.10	-
Ammonia-N	(mg/L)	0.02	-
Phosphorus	(mg/L)	0.01	-
Soluble Phosphorus	(mg/L)	0.01	-
Nitrate-N	(mg/L)	0.30	-
TKN	(mg/L)	0.30	-
Chlorides	(mg/L)	16	-
Sulfates	(mg/L)	19	-
Alkalinity	(mg/L)	82	-
Hardness	(mg/L)	107	-
Nickel	(mg/L)	0.0020	-
Copper	(mg/L)	0.0060	-
Total Chromium	(mg/L)	0.0020	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0300	-
Iron	(mg/L)	0.0600	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	0.0030	-
Mercury	(ug/L)	<0.2000	-
pH	(s.u.)	7.5	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Potaesium	(mg/L)	1.70	-
Cobalt	(mg/L)	<0.0010	-

NEORSD

WQIS

LAKE ERIE (O) - 09/21/98

Parameter		Value	Excursion
Temperature	(degrees C)	22.0	-
Dissolved Oxygen	(mg/L)	8.7	-
BOD-5	(mg/L)	<2	-
COD	(mg/L)	18	-
Suspended Solids	(mg/L)	4	-
Total Solids	(mg/L)	180	-
Dissolved Solids	(mg/L)	160	-
Specific Conductance	(mS/cm)	0.300	-
Turbidity	(NTU)	1.70	-
Ammonia-N	(mg/L)	0.10	-
Phosphorus	(mg/L)	0.06	-
Soluble Phosphorus	(mg/L)	0.04	-
Nitrate-N	(mg/L)	0.30	-
TKN	(mg/L)	0.50	-
Chlorides	(mg/L)	20	-
Sulfates	(mg/L)	29	-
Alkalinity	(mg/L)	95	-
Hardness	(mg/L)	106	-
Nickel	(mg/L)	0.0017	-
Copper	(mg/L)	0.0067	-
Total Chromium	(mg/L)	<0.0010	-
Hexavalent Chromium	(mg/L)	<0.0100	-
Zinc	(mg/L)	0.0310	-
Iron	(mg/L)	0.0730	-
Cadmium	(mg/L)	<0.0010	-
Lead	(mg/L)	<0.0030	-
Mercury	(ug/L)	<0.2000	-
Fecal Coliform	(organisms/100ml)	12	-
pH	(s.u.)	7.9	-
E Coli	(organisms/100ml)	8	-
Antimony	(mg/L)	<0.0070	-
Arsenic	(mg/L)	<0.0050	-
Selenium	(mg/L)	<0.0050	-
Thallium	(mg/L)	<0.0070	-
Silver	(mg/L)	<0.0010	-
Beryllium	(mg/L)	<0.0010	-
Transparency	(ft.)	7.00	-
Cobalt	(mg/L)	<0.0010	-

APPENDIX D
QUALITATIVE HABITAT EVALUATION INDEX SCORES
1996-1998

OhioEPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 54

River Code:______ RM: _____ Stream Euclid Creek
Date 7/9/98 Location Site # 0.5 (Downstream of Lake Shore Blvd)
Scorers Initials: CZ JS Comments

1] SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % present);

TYPE — POOL RIFFLE

- ☐ ☐-BLDR /SLBS[10] ___ ___
- ☐ ☐-BOULDER [9] ___ ___
- ☐ ☐-COBBLE [8] ✓ ___
- ☐ ☐-HARDPAN [4] ___ ___
- ☐ ☐-MUCK [2] ___ ___
- ☐ ☐-SILT [2] ✓ ___
- ■ ☐-GRAVEL [7] ✓ ___
- ■ ☐-SAND [6] ✓ ___
- ☐ ☐-BEDROCK[5] ___ ___
- ☐ ☐-DETRITUS[3] ✓ ___
- ☐ ☐-ARTIFICIAL[0] ✓ ___

NOTE : (Ignore sludge originating from point-sources; score on natural substrates)

NUMBER OF SUBSTRATE TYPES: ■-5 or More [2] ☐-4 or Less [0]

SUBSTRATE ORIGIN — Check ONE (OR 2 & AVERAGE)

- ☐ -LIMESTONE [1]
- ■ -TILLS [1]
- ☐ -WETLANDS[0]
- ☐ -HARDPAN [0]
- ☐ -SANDSTONE [0]
- ☐ -RIP/RAP [0]
- ☐ -LACUSTRINE [0]
- ☐ -SHALE [-1]
- ☐-COAL FINES [-2]

SUBSTRATE QUALITY — Check ONE (OR 2 & AVERAGE)

SILT:
- ■ -SILT HEAVY [-2]
- ■ -SILT MODERATE [-1]
- ☐ -SILT NORMAL [0]
- ☐ -SILT FREE [1]

EMBEDDEDNESS:
- ☐ -EXTENSIVE [-2]
- ■ -MODERATE [-1]
- ■ -NORMAL [0]
- ☐ -NONE [1]

COMMENTS

Substrate: 14 (Max 20)

2] INSTREAM COVER

TYPE: (Check All That Apply)

- ■ -UNDERCUT BANKS [1]
- ■ -OVERHANGING VEGETATION [1]
- ☐-SHALLOWS (IN SLOW WATER) [1]
- ☐-ROOTMATS [1]
- ■ -POOLS> 70 cm [2]
- ■ -ROOTWADS [1]
- ☐-BOULDERS [1]
- ☐ -OXBOWS, BACKWATERS [1]
- ☐ -AQUATIC MACROPHYTES [1]
- ☐-LOGS OR WOODY DEBRIS [1]

COMMENTS:

AMOUNT: (Check ONLY One or check 2 and AVERAGE)

- ☐ - EXTENSIVE > 75% [11]
- ☐ - MODERATE 25-75% [7]
- ■-SPARSE 5-25% [3]
- ☐-NEARLY ABSENT < 5% [1]

Cover: 8 (Max 20)

3] CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE)

SINUOSITY
- ☐-HIGH [4]
- ☐-MODERATE [3]
- ■-LOW [2]
- ■-NONE [1]

DEVELOPMENT
- ☐-EXCELLENT [7]
- ☐-GOOD [5]
- ☐-FAIR [3]
- ■-POOR [1]

CHANNELIZATION
- ■-NONE [6]
- ☐-RECOVERED [4]
- ☐-RECOVERING [3]
- ☐-RECENT OR NO RECOVERY [1]

STABILITY
- ■-HIGH [3]
- ☐-MODERATE [2]
- ☐-LOW [1]

MODIFICATIONS/OTHER
- ☐-SNAGGING
- ☐-RELOCATION
- ☐-CANOPY REMOVAL
- ☐-DREDGING
- ☐-ONE SIDE CHANNEL MODIFICATIONS
- ☐-IMPOUND.
- ☐-ISLANDS
- ☐-LEVEED
- ☐-BANK SHAPING

COMMENTS:

Channel: 11.5 (Max 20)

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH — L R (Per Bank)
- ☐ ☐-WIDE > 50m [4]
- ☐ ☐-MODERATE 10-50m [3]
- ☐ ■-NARROW 5-10m [2]
- ■ ☐-VERY NARROW < 5m [1]
- ☐ ☐-NONE [0]

FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) — L R (Most Predominant Per Bank)
- ☐ ☐-FOREST, SWAMP [3]
- ☐ ☐-SHRUB OR OLD FIELD [2]
- ■ ■-RESIDENTIAL, PARK, NEW FIELD [1]
- ☐ ☐-FENCED PASTURE [1]
- ☐ ☐-CONSERVATION TILLAGE [1]
- ☐ ☐-URBAN OR INDUSTRIAL [0]
- ☐ ☐-OPEN PASTURE, ROWCROP [0]
- ☐ ☐-MINING/CONSTRUCTION [0]

BANK EROSION — L R (Per Bank)
- ■ ■-NONE/LITTLE [3]
- ☐ ☐-MODERATE [2]
- ☐ ☐-HEAVY/SEVERE [1]

COMMENTS:

Riparian: 5.5 (Max 10)

5.] POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
- ■ - >1m [6]
- ☐- 0.7-1m [4]
- ☐- 0.4-0.7m [2]
- ☐- 0.2-0.4m [1]
- ☐ - < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
- ■ -POOL WIDTH > RIFFLE WIDTH [2]
- ☐-POOL WIDTH = RIFFLE WIDTH [1]
- ☐ -POOL WIDTH < RIFFLE W. [0]

CURRENT VELOCITY [POOLS & RIFFLES!] (Check All That Apply)
- ☐ -EDDIES [1]
- ☐ -FAST [1]
- ☐ -MODERATE [1]
- ■ -SLOW [1]
- ☐ -TORRENTIAL [-1]
- ☐ -INTERSTITIAL [-1]
- ☐ -INTERMITTENT [-2]

COMMENTS:

Pool/Current: 9 (Max 12)

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH
- ☐ - Generally > 10 cm, MAX > 50 [4]
- ☐ - Generally > 10 cm, MAX < 50 [3]
- ☐ - Generally 5-10 cm [1]
- ☐ - Generally < 5 cm [RIFFLE=0]

RIFFLE/RUN SUBSTRATE
- ☐-STABLE (e.g., Cobble, Boulder) [2]
- ☐-MOD. STABLE (e.g., Large Gravel) [1]
- ☐-UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE/RUN EMBEDDEDNESS
- ☐ - NONE [2]
- ☐ - LOW [1]
- ☐ - MODERATE [0]
- ☐ - EXTENSIVE [-1]

COMMENTS: ■ - NO RIFFLE [Metric=0]

Riffle/Run: 0 (Max 8)

6] GRADIENT (ft/mi): 5.9 **DRAINAGE AREA (sq.mi.):** 24.2

%POOL: ____ %GLIDE: ____
%RIFFLE: ____ %RUN: ____

Gradient: 6 (Max 10)

*Must pass must be large enough to support a population of riffle-obligate fish species.

EPA 4520 — 7/24/97

OhioEPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 78.5

River Code:_____ RM: _____ Stream EUCLID CREEK

Date 7/9/98 Location SITE #1 (AT ST. CLAIR AVE. BRIDGE)

Scorers Initials: CZ JS Comments

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR/SLBS[10]	✓	
☐ ☐-BOULDER [9]	✓	✓
■ ■-COBBLE [8]	✓	✓
☐ ☐-HARDPAN [4]		
☐ ☐-MUCK [2]		
☐ ☐-SILT [2]		
☐ ☐-GRAVEL [7]	✓	✓
☐ ☐-SAND [6]	✓	✓
☐ ☐-BEDROCK[5]	✓	✓
☐ ☐-DETRITUS[3]	✓	✓
☐ ☐-ARTIFICIAL[0]		✓

NOTE : (Ignore sludge originating from point-sources; score on natural substrates)

NUMBER OF SUBSTRATE TYPES: ■-5 or More [2] ☐-4 or Less [0]

SUBSTRATE ORIGIN (Check ONE (OR 2 & AVERAGE)): ☐ -LIMESTONE [1] ■ -TILLS [1] ☐ -WETLANDS[0] ☐ -HARDPAN [0] ☐ -SANDSTONE [0] ☐ -RIP/RAP [0] ☐ -LACUSTRINE [0] ☐ -SHALE [-1] ☐-COAL FINES [-2]

SUBSTRATE QUALITY (Check ONE (OR 2 & AVERAGE)): SILT: ☐ -SILT HEAVY [-2] ■ -SILT MODERATE [-1] ■ -SILT NORMAL [0] ☐ -SILT FREE [1]; EMBEDDEDNESS: ☐ -EXTENSIVE [-2] ■ -MODERATE [-1] ■ -NORMAL [0] ☐ -NONE [1]

Substrate: 18 Max 20

COMMENTS:

2] INSTREAM COVER

TYPE: (Check *All* That Apply): ■ -UNDERCUT BANKS [1] ■ -OVERHANGING VEGETATION [1] ■ -SHALLOWS (IN SLOW WATER) [1] ■ -ROOTMATS [1] ■ -POOLS > 70 cm [2] ■ -ROOTWADS [1] ■ -BOULDERS [1] ☐ -OXBOWS, BACKWATERS [1] ☐ -AQUATIC MACROPHYTES [1] ■ -LOGS OR WOODY DEBRIS [1]

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*): ☐ - EXTENSIVE > 75% [11] ■ - MODERATE 25-75% [7] ■ -SPARSE 5-25% [3] ☐ -NEARLY ABSENT < 5% [1]

Cover: 14 Max 20

COMMENTS:

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐ -HIGH [4]	☐ - EXCELLENT [7]	■ -NONE [6]	☐ -HIGH [3]	☐ -SNAGGING	☐ -IMPOUND.
■ -MODERATE [3]	■ -GOOD [5]	☐ -RECOVERED [4]	■ -MODERATE [2]	☐ -RELOCATION	■ -ISLANDS
■ -LOW [2]	■ -FAIR [3]	☐ -RECOVERING [3]	☐ -LOW [1]	☐ -CANOPY REMOVAL	☐ -LEVEED
☐ -NONE [1]	☐ -POOR [1]	☐ -RECENT OR NO RECOVERY [1]		☐ -DREDGING	☐ -BANK SHAPING
				■ -ONE SIDE CHANNEL MODIFICATIONS	

Channel: 14.5 Max 20

COMMENTS:

4]. RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R Per Bank)	FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) (L R Most Predominant Per Bank)		BANK EROSION (L R Per Bank)	
☐ ■ -WIDE > 50m [4]	☐ ■ -FOREST, SWAMP [3]	☐ ☐ -CONSERVATION TILLAGE [1]	☐ ■ -NONE/LITTLE [3]	
☐ ☐ -MODERATE 10-50m [3]	☐ ■ -SHRUB OR OLD FIELD [2]	☐ ☐ -URBAN OR INDUSTRIAL [0]	■ ■ -MODERATE [2]	
☐ ☐ -NARROW 5-10m [2]	■ ☐ -RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐ -OPEN PASTURE, ROWCROP [0]	☐ ☐ -HEAVY/SEVERE [1]	
■ ☐ -VERY NARROW < 5m [1]	☐ ☐ -FENCED PASTURE [1]	☐ ☐ -MINING/CONSTRUCTION [0]		
☐ ☐ -NONE [0]				

Riparian: 6.5 Max 10

COMMENTS:

5.] POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!): ■ - > 1m [6] ☐ - 0.7-1m [4] ☐ - 0.4-0.7m [2] ☐ - 0.2-0.4m [1] ☐ - < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE): ☐ -POOL WIDTH > RIFFLE WIDTH [2] ■ -POOL WIDTH = RIFFLE WIDTH [1] ☐ -POOL WIDTH < RIFFLE W. [0]

CURRENT VELOCITY [POOLS & RIFFLES!] (Check *All* That Apply): ■ -EDDIES [1] ■ -FAST [1] ■ -MODERATE [1] ■ -SLOW [1] ☐ -TORRENTIAL [-1] ☐ -INTERSTITIAL [-1] ☐ -INTERMITTENT [-2]

Pool/Current: 11 Max 12

COMMENTS:

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH: ☐ - Generally > 10 cm, MAX > 50 [4] ■ - Generally > 10 cm, MAX < 50 [3] ☐ - Generally 5-10 cm [1] ☐ - Generally < 5 cm (RIFFLE=0)

RIFFLE/RUN SUBSTRATE: ☐ STABLE (e.g., Cobble, Boulder) [2] ■ -MOD. STABLE (e.g., Large Gravel) [1] ☐ -UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE/RUN EMBEDDEDNESS: ☐ - NONE [1] ■ - LOW [1] ■ - MODERATE [0] ☐ - EXTENSIVE [-1]

Riffle/Run: 4.5 Max 8

COMMENTS: ☐ - NO RIFFLE (Metric=0)

Gradient: 10 Max 10

6] GRADIENT (ft/mi): 16.2 DRAINAGE AREA (sq.mi.): 22.2 %POOL: %GLIDE: %RIFFLE: %RUN:

EPA 4520 7/24/97

OhioEPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 57.75

River Code:_____ RM: ____ Stream EUCLID CREEK
Date 7/9/98 Location SITE #2 (SOUTH BRANCH, HIGHLAND PICNIC AREA)
Scorers Initials: JJ Comments

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR/SLBS[10]	____	____
☐ ☐-BOULDER [9]	✓	•
☐ ☐-COBBLE [8]	✓	✓
☐ ☐-HARDPAN [4]	____	____
☐ ☐-MUCK [2]	____	____
☐ ☐-SILT [2]	____	____
■ ☐-GRAVEL [7]	✓	____
☐ ☐-SAND [6]	✓	✓
■ ☐-BEDROCK[5]	✓	✓
☐ ☐-DETRITUS[3]	✓	____
☐ ☐-ARTIFICIAL[0]	✓	____

NOTE : *(Ignore sludge originating from point-sources; score on natural substrates)*
NUMBER OF SUBSTRATE TYPES: ■-*5 or More [2]* ☐-*4 or Less [0]*

SUBSTRATE ORIGIN — Check ONE (OR 2 & AVERAGE)
☐ -*LIMESTONE [1]*
■ -*TILLS [1]*
☐ -*WETLANDS[0]*
☐ -*HARDPAN [0]*
☐ -*SANDSTONE [0]*
☐ -*RIP/RAP [0]*
☐ -*LACUSTRINE [0]*
☐ -*SHALE [-1]*
☐-*COAL FINES [-2]*

SUBSTRATE QUALITY — Check ONE (OR 2 & AVERAGE)
SILT:
☐ -*SILT HEAVY [-2]*
■ -*SILT MODERATE [-1]*
☐ -*SILT NORMAL [0]*
☐ -*SILT FREE [1]*
EMBEDDEDNESS:
☐ -*EXTENSIVE [-2]*
☐ -*MODERATE [-1]*
■ -*NORMAL [0]*
☐ -*NONE [1]*

Substrate: 14 (Max 20)

COMMENTS:

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
■ -*UNDERCUT BANKS [1]*
☐ -*OVERHANGING VEGETATION [1]*
■ -*SHALLOWS (IN SLOW WATER) [1]*
☐ -*ROOTMATS[1]*
■ -*POOLS > 70 cm [2]*
☐ -*ROOTWADS [1]*
■ -*BOULDERS[1]*
☐ -*OXBOWS, BACKWATERS [1]*
☐ -*AQUATIC MACROPHYTES [1]*
■ -*LOGS OR WOODY DEBRIS [1]*

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐ - *EXTENSIVE > 75% [11]*
☐ - *MODERATE 25-75% [7]*
■ - *SPARSE 5-25% [3]*
☐ - *NEARLY ABSENT < 5% [1]*

COMMENTS:

Cover: 9 (Max 20)

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY
☐-*HIGH [4]*
■-*MODERATE [3]*
■-*LOW [2]*
☐-*NONE [1]*

DEVELOPMENT
☐- *EXCELLENT [7]*
■-*GOOD [5]*
■- *FAIR [3]*
☐-*POOR [1]*

CHANNELIZATION
☐-*NONE [6]*
☐- *RECOVERED [4]*
■- *RECOVERING [3]*
☐- *RECENT OR NO RECOVERY [1]*

STABILITY
■-*HIGH [3]*
☐-*MODERATE [2]*
☐-*LOW [1]*

MODIFICATIONS/OTHER
☐-*SNAGGING* ☐-*IMPOUND.*
☐-*RELOCATION* ☐- *ISLANDS*
☐-*CANOPY REMOVAL* ☐- *LEVEED*
☐-*DREDGING* ■- *BANK SHAPING*
■-*ONE SIDE CHANNEL MODIFICATIONS*

Channel: 12.5 (Max 20)

COMMENTS:

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R (Per Bank))
☐ ☐-*WIDE > 50m[4]*
☐ ☐-*MODERATE 10-50m[3]*
☐ ■-*NARROW 5-10m[2]*
☐ ☐-*VERY NARROW < 5m[1]*
■ ☐-*NONE[0]*

FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) (L R (Most Predominant Per Bank))
☐ ■-*FOREST, SWAMP [3]*
☐ ■-*SHRUB OR OLD FIELD [2]*
■ ☐-*RESIDENTIAL, PARK, NEW FIELD [1]*
☐ ☐-*FENCED PASTURE [1]*
☐ ☐-*CONSERVATION TILLAGE[1]*
☐ ☐-*URBAN OR INDUSTRIAL [0]*
☐ ☐-*OPEN PASTURE, ROWCROP [0]*
☐ ☐-*MINING/CONSTRUCTION[0]*

BANK EROSION (L R (Per Bank))
■ ■-*NONE/LITTLE[3]*
☐ ☐-*MODERATE[2]*
☐ ☐-*HEAVY/SEVERE[1]*

Riparian: 5.75 (Max 10)

COMMENTS:

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
■ - *> 1m [6]*
☐- *0.7-1m[4]*
☐- *0.4-0.7m[2]*
☐- *0.2-0.4m[1]*
☐ - *< 0.2m [POOL=0]*

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☐ -*POOL WIDTH > RIFFLE WIDTH [2]*
■-*POOL WIDTH = RIFFLE WIDTH [1]*
☐ -*POOL WIDTH < RIFFLE W. [0]*

CURRENT VELOCITY [POOLS & RIFFLES!] (Check *All* That Apply)
☐ -*EDDIES[1]* ☐ -*TORRENTIAL[-1]*
☐ -*FAST[1]* ☐ -*INTERSTITIAL[-1]*
■ -*MODERATE[1]* ☐ -*INTERMITTENT[-2]*
■ -*SLOW[1]*

Pool/Current: 9 (Max 12)

COMMENTS:

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH
☐ - *Generally > 10 cm, MAX > 50 [4]*
☐ - *Generally > 10 cm, MAX < 50 [3]*
■ - *Generally 5-10 cm[1]*
☐ - *Generally < 5 cm [RIFFLE=0]*

RIFFLE/RUN SUBSTRATE
■-*STABLE (e.g., Cobble, Boulder) [2]*
■-*MOD. STABLE (e.g., Large Gravel) [1]*
☐-*UNSTABLE (Fine Gravel, Sand) [0]*

RIFFLE/RUN EMBEDDEDNESS
☐ - *NONE [2]*
■ - *LOW [1]*
☐ - *MODERATE [0]*
☐ - *EXTENSIVE [-1]*

COMMENTS: ☐ - *NO RIFFLE [Metric=0]*

Riffle/Run: 3.5 (Max 8)
Gradient: 4 (Max 10)

6] GRADIENT (ft/mi): 60.3 DRAINAGE AREA (sq.mi.): 12.5 %POOL: ____ %GLIDE: ____ %RIFFLE: ____ %RUN: ____

* Text areas must be large enough to support a population of riffle-obligate fish species.

Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 63.25

River Code:_____ RM: _____ Stream EUCLID CREEK
Date 7/9/98 Location SITE #3 (NORTH BRANCH, HIGHLAND PICNIC AREA)
Scorers Initials: JJ Comments

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR /SLBS[10]	___	___
☐ ☐-BOULDER [9]	___	___
☐ ☐-COBBLE [8]	✓	✓
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	✓	✓
■ ☐-GRAVEL [7]	✓	✓
☐ ☐-SAND [6]	✓	✓
■ ☐-BEDROCK[5]	✓	✓
☐ ☐-DETRITUS[3]	___	___
☐ ☐-ARTIFICIAL[0]	___	___

NOTE : *(Ignore sludge originating from point-sources; score on natural substrates)*

NUMBER OF SUBSTRATE TYPES: ■-*5 or More [2]* ☐-*4 or Less [0]*

SUBSTRATE ORIGIN — Check ONE (OR 2 & AVERAGE)
☐ -*LIMESTONE [1]*
■ -*TILLS [1]*
☐ -*WETLANDS[0]*
☐ -*HARDPAN [0]*
☐ -*SANDSTONE [0]*
☐ -*RIP/RAP [0]*
☐ -*LACUSTRINE [0]*
☐ -*SHALE [-1]*
☐-*COAL FINES [-2]*

SILT: ☐ -*SILT HEAVY [-2]* ■ -*SILT MODERATE [-1]* ☐ -*SILT NORMAL [0]* ☐ -*SILT FREE [1]*

EMBEDDEDNESS: ☐ -*EXTENSIVE [-2]* ☐ -*MODERATE [-1]* ■ -*NORMAL [0]* ☐ -*NONE [1]*

SUBSTRATE QUALITY — Check ONE (OR 2 & AVERAGE)

Substrate: 14 (Max 20)

*COMMENTS*_____

2] INSTREAM COVER

TYPE: **(Check *All* That Apply)**
☐ -*UNDERCUT BANKS [1]*
■ -*OVERHANGING VEGETATION [1]*
■ -*SHALLOWS (IN SLOW WATER) [1]*
☐ -*ROOTMATS[1]*
■ -*POOLS > 70 cm [2]*
☐ -*ROOTWADS [1]*
☐ -*BOULDERS[1]*
☐ -*OXBOWS, BACKWATERS [1]*
■ -*AQUATIC MACROPHYTES [1]*
■ -*LOGS OR WOODY DEBRIS[1]*

*COMMENTS:*_____

AMOUNT: **(Check *ONLY* One or check 2 and *AVERAGE*)**
☐ - *EXTENSIVE > 75% [11]*
☐ - *MODERATE 25-75% [7]*
■ -*SPARSE 5-25% [3]*
☐ -*NEARLY ABSENT < 5% [1]*

Cover: 9 (Max 20)

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	*DEVELOPMENT*	*CHANNELIZATION*	*STABILITY*	*MODIFICATIONS/OTHER*	
☐-*HIGH[4]*	☐-*EXCELLENT[7]*	■-*NONE[6]*	☐-*HIGH[3]*	■-*SNAGGING*	■-*IMPOUND.*
☐-*MODERATE[3]*	☐-*GOOD[5]*	☐-*RECOVERED[4]*	■-*MODERATE[2]*	☐-*RELOCATION*	☐-*ISLANDS*
■-*LOW[2]*	■-*FAIR[3]*	☐-*RECOVERING[3]*	☐-*LOW[1]*	☐-*CANOPY REMOVAL*	☐-*LEVEED*
☐-*NONE[1]*	☐-*POOR[1]*	☐-*RECENT OR NO RECOVERY[1]*		☐-*DREDGING*	☐-*BANKSHAPING*
				☐-*ONESIDE CHANNEL MODIFICATIONS*	

Channel: 13 (Max 20)

*COMMENTS:*_____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH L R (Per Bank)	*FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN)* L R (Most Predominant Per Bank)	L R	*BANK EROSION* L R (Per Bank)	
☐ ■ -*WIDE >50m[4]*	■ ■-*FOREST, SWAMP[3]*	☐ ☐-*CONSERVATION TILLAGE[1]*	☐ ☐-*NONE/LITTLE[3]*	
■ ☐-*MODERATE 10-50m[3]*	■ ☐-*SHRUB OR OLD FIELD[2]*	☐ ☐-*URBAN OR INDUSTRIAL[0]*	■ ■-*MODERATE[2]*	
☐ ☐ -*NARROW 5-10m[2]*	☐ ☐-*RESIDENTIAL, PARK, NEW FIELD[1]*	☐ ☐-*OPEN PASTURE, ROWCROP[0]*	☐ ☐-*HEAVY/SEVERE[1]*	
☐ ☐ -*VERY NARROW <5m[1]*	☐ ☐-*FENCED PASTURE[1]*	☐ ☐-*MINING/CONSTRUCTION[0]*		
☐ ☐ -*NONE[0]*				

Riparian: 8.25 (Max 10)

COM-
*MENTS:*_____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH **(Check 1 ONLY!)**
■ - *> 1m [6]*
☐ - *0.7-1m[4]*
☐ - *0.4-0.7m[2]*
☐ - *0.2-0.4m[1]*
☐ - *< 0.2m [POOL=0]*

MORPHOLOGY **(Check 1 or 2 & AVERAGE)**
■ -*POOL WIDTH > RIFFLE WIDTH [2]*
☐-*POOL WIDTH = RIFFLE WIDTH [1]*
☐ -*POOL WIDTH < RIFFLE W. [0]*

CURRENT VELOCITY **[POOLS & RIFFLES!] (Check *All* That Apply)**
☐ -*EDDIES[1]*
☐ -*FAST[1]*
■ -*MODERATE[1]*
■ -*SLOW[1]*
☐ -*TORRENTIAL[-1]*
☐ -*INTERSTITIAL[-1]*
☐ -*INTERMITTENT[-2]*

Pool/Current: 10 (Max 12)

*COMMENTS:*_____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH
☐ - *Generally > 10 cm, MAX > 50 [4]*
■ - *Generally > 10 cm, MAX < 50 [3]*
☐ - *Generally 5-10 cm[1]*
☐ - *Generally < 5 cm [RIFFLE=0]*

RIFFLE/RUN SUBSTRATE
☐-*STABLE (e.g., Cobble, Boulder) [2]*
■-*MOD. STABLE (e.g., Large Gravel) [1]*
☐-*UNSTABLE (Fine Gravel, Sand) [0]*

RIFFLE/RUN EMBEDDEDNESS
☐ - *NONE [2]*
■ - *LOW [1]*
☐ - *MODERATE [0]*
☐ - *EXTENSIVE [-1]*

☐ - *NO RIFFLE [Metric=0]*

Riffle/Run: 5 (Max 8)

*COMMENTS:*_____

Gradient: 4 (Max 10)

6] GRADIENT (ft/mi): 50.6 **DRAINAGE AREA (sq.mi.):** 8.5

%POOL: ____ %GLIDE: ____
%RIFFLE: ____ %RUN: ____

*Instream habitat must be large enough to support a population of riffle-obligate fish species.

Ohio EPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 50

River Code: _____ RM: ____ Stream EUCLID CREEK
Date 7/10/98 Location SITE #4 (SOUTH BRANCH AT MAYFIELD ROAD)
Scorers Initials: JJ Comments _____

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR/SLBS[10]	___	___
☐ ☐-BOULDER [9]	✓	✓
☐ ☐-COBBLE [8]	✓	✓
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	✓	✓
■ ☐-GRAVEL [7]	✓	✓
☐ ☐-SAND [6]	✓	✓
■ ☐-BEDROCK[5]	✓	✓
☐ ☐-DETRITUS[3]	✓	✓
☐ ☐-ARTIFICIAL[0]	___	___

NOTE : *(Ignore sludge originating from point-sources; score on natural substrates)*
NUMBER OF SUBSTRATE TYPES: ■-*5 or More [2]* ☐-*4 or Less [0]*

SUBSTRATE ORIGIN — Check ONE (OR 2 & AVERAGE)
☐ -LIMESTONE [1]
■ -TILLS [1]
☐ -WETLANDS[0]
☐ -HARDPAN [0]
☐ -SANDSTONE [0]
☐ -RIP/RAP [0]
☐ -LACUSTRINE [0]
☐ -SHALE [-1]
☐-COAL FINES [-2]

SILT: — Check ONE (OR 2 & AVERAGE)
■ -SILT HEAVY [-2]
■ -SILT MODERATE [-1]
☐ -SILT NORMAL [0]
☐ -SILT FREE [1]

EMBEDDED NESS: ☐ -EXTENSIVE [-2] ■ -MODERATE [-1] ☐ -NORMAL [0] ☐ -NONE [1]

Substrate: 12.5 Max 20

COMMENTS _____

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
☐ -UNDERCUT BANKS [1]
☐ -OVERHANGING VEGETATION [1]
■ -SHALLOWS(IN SLOW WATER) [1]
☐-ROOTMATS[1]
☐ -POOLS > 70 cm [2]
☐ -ROOTWADS [1]
■ -BOULDERS[1]
☐ -OXBOWS, BACKWATERS [1]
☐ -AQUATIC MACROPHYTES [1]
☐-LOGS OR WOODY DEBRIS[1]

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐ - EXTENSIVE > 75% [11]
☐ - MODERATE 25-75% [7]
■ -SPARSE 5-25% [3]
■ -NEARLY ABSENT < 5% [1]

Cover: 4 Max 20

COMMENTS: _____

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH [4]	☐ - EXCELLENT [7]	☐-NONE[6]	☐-HIGH[3]	☐-SNAGGING	☐-IMPOUND.
■-MODERATE[3]	☐-GOOD[5]	■ - RECOVERED [4]	■-MODERATE[2]	☐-RELOCATION	☐-ISLANDS
■-LOW[2]	■ - FAIR [3]	☐-RECOVERING[3]	☐-LOW[1]	☐-CANOPY REMOVAL	☐ - LEVEED
☐-NONE[1]	☐-POOR[1]	☐ - RECENT OR NO RECOVERY[1]		☐-DREDGING	☐-BANK SHAPING
				■-ONE SIDE CHANNEL MODIFICATIONS	

Channel: 11.5 Max 20

COMMENTS: _____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R Per Bank)	FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) (L R Most Predominant Per Bank)		BANK EROSION (L R Per Bank)	
☐ ☐ -WIDE > 50m[4]	☐ ☐-FOREST, SWAMP [3]	☐ ☐-CONSERVATION TILLAGE [1]	☐ ☐-NONE/LITTLE[3]	
■ ■-MODERATE 10-50m[3]	☐ ☐-SHRUB OR OLD FIELD [2]	☐ ☐-URBAN OR INDUSTRIAL [0]	■ ■-MODERATE[2]	
■ ■ -NARROW 5-10m[2]	■ ■-RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐-OPEN PASTURE, ROWCROP [0]	☐ ☐-HEAVY/SEVERE[1]	
☐ ☐ -VERY NARROW < 5m[1]	☐ ☐-FENCED PASTURE [1]	☐ ☐-MINING/CONSTRUCTION[0]		
☐ ☐ -NONE[0]				

Riparian: 5.5 Max 10

COMMENTS: _____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
☐ - > 1m [6]
☐ - 0.7-1m [4]
■ - 0.4-0.7m [2]
☐ - 0.2-0.4m [1]
☐ - < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
■ -POOL WIDTH > RIFFLE WIDTH [2]
■-POOL WIDTH = RIFFLE WIDTH [1]
☐ -POOL WIDTH < RIFFLE W. [0]

CURRENT VELOCITY [POOLS & RIFFLES!] (Check *All* That Apply)
☐ -EDDIES[1]
☐ -FAST[1]
■ -MODERATE[1]
■ -SLOW[1]
☐ -TORRENTIAL[-1]
☐ -INTERSTITIAL[-1]
☐ -INTERMITTENT[-2]

Pool/Current: 5.5 Max 12

COMMENTS: _____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH
☐ - Generally > 10 cm, MAX > 50 [4]
☐ - Generally > 10 cm, MAX < 50 [3]
■ - Generally 5-10 cm[1]
☐ - Generally < 5 cm [RIFFLE=0]

RIFFLE/RUN SUBSTRATE
☐-STABLE (e.g., Cobble, Boulder) [2]
■-MOD. STABLE (e.g., Large Gravel) [1]
☐-UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE/RUN EMBEDDEDNESS
☐ - NONE [2]
■ - LOW [1]
☐ - MODERATE [0]
☐ - EXTENSIVE [-1]

☐ - NO RIFFLE [Metric=0]

Riffle/Run: 3 Max 8

Gradient: 8 Max 10

COMMENTS: _____

6] GRADIENT (ft/mi): 30.2 DRAINAGE AREA (sq.mi.): 3.4

%POOL: ____ %GLIDE: ____
%RIFFLE: ____ %RUN: ____

* Pool areas must be large enough to support a population of riffle-obligate fish species.

Ohio EPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 45.75

River Code_____ River Mile_____ Stream GREEN CREEK
Date 5/21/97 Location SITE #7 (SOUTH OF EUCLID AVENUE AND UPPER VALLEY DRIVE)
Scorers Initials: JS Comments:_____

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR /SLBS[10]	✓	✓
☐ ☐-BOULDER [9]	___	✓
■ ☐-COBBLE [8]	___	✓
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	___	___
■ ☐-GRAVEL [7]	✓	✓
☐ ☐-SAND [6]	___	✓
☐ ☐-BEDROCK[5]	___	___
☐ ☐-DETRITUS[3]	✓	✓
☐ ☐-ARTIFICIAL[0]	___	___

NOTE : (Ignore sludge originating from point-sources; score on natural substrates)
NUMBER OF SUBSTRATE TYPES: ■-5 or More [2] ☐-4 or Less [0]

SUBSTRATE ORIGIN (Check ONE (OR 2 & AVERAGE)): ☐ -LIMESTONE [1] ■ -TILLS [1] ☐ -WETLANDS[0] ☐ -HARDPAN [0] ☐ -SANDSTONE [0] ☐ -RIP/RAP [0] ☐ -LACUSTRINE [0] ☐ -SHALE [-1] ☐-COAL FINES [-2]

SILT: ☐ -SILT HEAVY [-2] ☐ -SILT MODERATE [-1] ■ -SILT NORMAL [0] ☐ -SILT FREE [1]

EMBEDDEDNESS: ☐ -EXTENSIVE [-2] ■ -MODERATE [-1] ☐ -NORMAL [0] ☐ -NONE [1]

SUBSTRATE QUALITY (Check ONE (OR 2 & AVERAGE))

Substrate: 17 Max 20

COMMENTS_____

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
☐-UNDERCUT BANKS [1] ☐-OVERHANGING VEGETATION [1] ■-SHALLOWS (IN SLOW WATER) [1] ■-ROOTMATS [1] ☐-DEEP POOLS > 70cm [2] ☐-ROOTWADS [1] ■-BOULDERS [1] ☐-OXBOWS [1] ☐-AQUATIC MACROPHYTES [1] ☐-LOGS OR WOODY DEBRIS [1]

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐-EXTENSIVE > 75% [11] ☐-MODERATE 25-75% [7] ■-SPARSE 5-25% [3] ■-NEARLY ABSENT < 5% [1]

Cover: 5 Max 20

COMMENTS:_____

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER
☐-HIGH [4]	☐-EXCELLENT [7]	☐-NONE [6]	☐-HIGH [3]	■-SNAGGING ■-IMPOUND.
☐-MODERATE [3]	☐-GOOD [5]	☐-RECOVERED [4]	■-MODERATE [2]	☐-RELOCATION ☐-ISLANDS
■-LOW [2]	☐-FAIR [3]	■-RECOVERING [3]	■-LOW [1]	☐-CANOPY REMOVAL ☐-LEVEED
☐-NONE [1]	■-POOR [1]	☐-RECENT OR NO RECOVERY [1]		☐-DREDGING ■-BANK SHAPING
				☐-ONE SIDE CHANNEL MODIFICATIONS

Channel: 7.5 Max 20

COMMENTS:_____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R Per Bank)	FLOOD PLAIN QUALITY (PAST 100 FOOT RIPARIAN) (L R Most Predominant Per Bank)		BANK EROSION (L R Per Bank)
☐ ☐'-WIDE > 50m [4]	■ ☐-FOREST, SWAMP [3]	☐ ☐-CONSERVATION TILLAGE [1]	☐ ☐-NONE/LITTLE [3]
■ ☐-MODERATE 10-50m [3]	☐ ☐-SHRUB OR OLD FIELD [2]	☐ ☐-URBAN OR INDUSTRIAL [0]	■ ■-MODERATE [2]
☐ ■'-NARROW 5-10m [2]	☐ ■-RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐-OPEN PASTURE, ROWCROP [0]	☐ ☐-HEAVY/SEVERE [1]
☐ ■'-VERY NARROW < 5m [1]	☐ ☐-FENCED PASTURE [1]	☐ ☐-MINING/CONSTRUCTION [0]	
☐ ☐'-NONE [0]			

Riparian: 6.25 Max 10

COMMENTS:_____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
☐ - > 1m [6] ☐-0.7-1m [4] ☐-0.4-0.7m [2] ■-0.2-0.4m [1] ☐ - < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☐'-POOL WIDTH > RIFFLE WIDTH [2] ■-POOL WIDTH = RIFFLE WIDTH [1] ☐'-POOL WIDTH < RIFFLE W. [0]

CURRENT VELOCITY [POOL & RIFFLES!] (Check *All* That Apply)
■'-EDDIES [1] ☐'-FAST [1] ■'-MODERATE [1] ☐'-SLOW [1] ☐'-TORRENTIAL [-1] ☐'-INTERSTITIAL [-1] ☐'-INTERMITTENT [-2]

Pool/Glide: 4 Max 12

COMMENTS:_____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE /RUN DEPTH
☐ - GENERALLY > 10 cm; MAX > 50 [4] ☐ - GENERALLY > 10 cm; MAX < 50 [3] ■ - GENERALLY 5-10 cm [1] ☐-GENERALLY < 5 cm [RIFFLE=0]

RIFFLE/RUN SUBSTRATE
☐-STABLE (e.g., Cobble, Boulder) [2] ■-MOD. STABLE (e.g., Large Gravel) [1] ☐-UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE/RUN EMBEDDEDNESS
☐ - NONE [2] ☐ - LOW [1] ■ - MODERATE [0] ☐-EXTENSIVE [-1]

Riffle/Run: 2 Max 8

☐- NO RIFFLE [Metric=0]

Gradient: 4 Max 10

COMMENTS:_____

6] GRADIENT (ft/mi): 105.6 **DRAINAGE AREA (sq.mi.):** 0.4 %POOL: ____ %GLIDE: ____ %RIFFLE: ____ %RUN: ____

Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 56.75

River Code:_____ RM: ____ Stream NINE MILE CREEK
Date 5/27/97 Location SITE # 8A (DOWNSTREAM OF LAKE SHORE BLVD)
Scorers Initials: JJ Comments_____

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR/SLBS[10]	___	___
☐ ☐-BOULDER [9]	___	___
☐ ☐-COBBLE [8]	___	___
☐ ☐-HARDPAN [4]	___	___
■ ☐-MUCK [2]	✓	___
■ ☐-SILT [2]	✓	___
☐ ☐-GRAVEL [7]	✓	___
☐ ☐-SAND [6]	✓	___
☐ ☐-BEDROCK[5]	___	___
☐ ☐-DETRITUS[3]	✓	___
☐ ☐-ARTIFICIAL[0]	___	___

NOTE : (Ignore sludge originating from point-sources; score on natural substrates)
NUMBER OF SUBSTRATE TYPES: ■-5 or More [2] ☐-4 or Less [0]

SUBSTRATE ORIGIN — Check ONE (OR 2 & AVERAGE)
☐ -LIMESTONE [1]
■ -TILLS [1]
☐ -WETLANDS[0]
☐ -HARDPAN [0]
☐ -SANDSTONE [0]
☐ -RIP/RAP [0]
☐ -LACUSTRINE [0]
☐ -SHALE [-1]
☐-COAL FINES [-2]

SILT: EMBEDDEDNESS:

SUBSTRATE QUALITY — Check ONE (OR 2 & AVERAGE)
■ -SILT HEAVY [-2]
☐ -SILT MODERATE [-1]
☐ -SILT NORMAL [0]
☐ -SILT FREE [1]
■ -EXTENSIVE [-2]
■ -MODERATE [-1]
☐ -NORMAL [0]
☐ -NONE [1]

Substrate: 4.5 Max 20

COMMENTS_____

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
■ -UNDERCUT BANKS [1]
■ -OVERHANGING VEGETATION [1]
☐-SHALLOWS(IN SLOW WATER) [1]
■-ROOTMATS[1]
■ -POOLS > 70 cm [2]
■ -ROOTWADS [1]
☐-BOULDERS[1]
☐ -OXBOWS, BACKWATERS [1]
■ -AQUATIC MACROPHYTES [1]
■-LOGS OR WOODY DEBRIS[1]

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
■ - EXTENSIVE > 75% [11]
☐ - MODERATE 25-75% [7]
☐-SPARSE 5-25% [3]
☐-NEARLY ABSENT < 5% [1]

Cover: 19 Max 20

COMMENTS:_____

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
■-HIGH[4]	☐-EXCELLENT[7]	☐-NONE[6]	☐-HIGH[3]	■-SNAGGING	☐-IMPOUND.
☐-MODERATE[3]	☐-GOOD[5]	☐-RECOVERED[4]	■-MODERATE[2]	☐-RELOCATION	☐-ISLANDS
☐-LOW[2]	☐-FAIR[3]	■-RECOVERING[3]	☐-LOW[1]	☐-CANOPY REMOVAL	☐-LEVEED
☐-NONE[1]	■-POOR[1]	☐-RECENT OR NO RECOVERY[1]		☐-DREDGING	■-BANK SHAPING
				■-ONE SIDE CHANNEL MODIFICATIONS	

Channel: 10 Max 20

COMMENTS:_____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R Per Bank)	FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) (L R Most Predominant Per Bank)		BANK EROSION (L R Per Bank)	
☐ ☐-WIDE > 50m[4]	☐ ☐-FOREST, SWAMP[3]	☐ ☐-CONSERVATION TILLAGE[1]	■ ■-NONE/LITTLE[3]	
☐ ☐-MODERATE 10-50m[3]	☐ ☐-SHRUB OR OLD FIELD[2]	☐ ☐-URBAN OR INDUSTRIAL[0]	☐ ☐-MODERATE[2]	
■ ☐-NARROW 5-10m[2]	■ ■-RESIDENTIAL, PARK, NEW FIELD[1]	☐ ☐-OPEN PASTURE, ROWCROP[0]	☐ ☐-HEAVY/SEVERE[1]	
■ ■-VERY NARROW < 5m[1]	☐ ☐-FENCED PASTURE[1]	☐ ☐-MINING/CONSTRUCTION[0]		
☐ ☐-NONE[0]				

Riparian: 5.25 Max 10

COMMENTS:_____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
■ - > 1m [6]
☐- 0.7-1m[4]
☐- 0.4-0.7m[2]
☐- 0.2-0.4m[1]
☐ - < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☐-POOL WIDTH > RIFFLE WIDTH [2]
■-POOL WIDTH = RIFFLE WIDTH[1]
☐-POOL WIDTH < RIFFLE W.[0]

CURRENT VELOCITY [POOLS & RIFFLES!] (Check *All* That Apply)
☐-EDDIES[1]
☐-FAST[1]
☐-MODERATE[1]
■-SLOW[1]
☐-TORRENTIAL[-1]
☐-INTERSTITIAL[-1]
☐-INTERMITTENT[-2]

Pool/Current: 8 Max 12

COMMENTS:_____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH
☐ - Generally > 10 cm, MAX > 50 [4]
☐ - Generally > 10 cm, MAX < 50 [3]
☐ - Generally 5-10 cm[1]
☐ - Generally < 5 cm [RIFFLE=0]

RIFFLE/RUN SUBSTRATE
☐-STABLE (e.g., Cobble, Boulder) [2]
☐-MOD. STABLE (e.g., Large Gravel) [1]
☐-UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE/RUN EMBEDDEDNESS
☐ - NONE [3]
☐ - LOW [1]
☐ - MODERATE [0]
☐ - EXTENSIVE [-1]
■ - NO RIFFLE [Metric=0]

Riffle/Run: 0 Max 8

Gradient: 10 Max 10

COMMENTS:_____

6] GRADIENT (ft/mi): 15.1 **DRAINAGE AREA (sq.mi.):** 8.3 %POOL: ____ %GLIDE: ____ %RIFFLE: ____ %RUN: ____

* Headwater stream must be large enough to support a population of riffle-dwelling fish species.

OhioEPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 43.75

River Code:_____ RM: _____ Stream NINE MILE CREEK
Date 6/10/97 Location SITE #9 ("NELA PARK" BRANCH)
Scorers Initials: JJ Comments

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR /SLBS[10]	___	___
☐ ☐-BOULDER [9]	✓	✓
☐ ☐-COBBLE [8]	✓	✓
☐ ☐-HARDPAN [4]	✓	✓
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	___	___
■ ■-GRAVEL [7]	✓	✓
☐ ☐-SAND [6]	✓	✓
☐ ☐-BEDROCK[5]	___	___
☐ ☐-DETRITUS[3]	___	___
☐ ☐-ARTIFICIAL[0]	___	___

NOTE : *(Ignore sludge originating from point-sources; score on natural substrates)*

NUMBER OF SUBSTRATE TYPES: ■-*5 or More [2]* ☐-*4 or Less [0]*

COMMENTS

SUBSTRATE ORIGIN *Check ONE (OR 2 & AVERAGE)*
☐ -*LIMESTONE [1]*
■ -*TILLS [1]*
☐ -*WETLANDS[0]*
☐ -*HARDPAN [0]*
☐ -*SANDSTONE [0]*
☐ -*RIP/RAP [0]*
☐ -*LACUSTRINE [0]*
☐ -*SHALE [-1]*
☐-*COAL FINES [-2]*

SILT:

EMBEDDEDNESS:

SUBSTRATE QUALITY *Check ONE (OR 2 & AVERAGE)*
☐ -*SILT HEAVY [-2]*
☐ -*SILT MODERATE [-1]*
■ -*SILT NORMAL [0]*
☐ -*SILT FREE [1]*
☐ -*EXTENSIVE [-2]*
■ -*MODERATE [-1]*
☐ -*NORMAL [0]*
☐ -*NONE [1]*

Substrate: 16 Max 20

2] INSTREAM COVER

TYPE: **(Check *All* That Apply)**
☐ -*UNDERCUT BANKS [1]*
■ -*OVERHANGING VEGETATION [1]*
■ -*SHALLOWS (IN SLOW WATER) [1]*
☐ -*ROOTMATS[1]*
☐ -*POOLS> 70 cm [2]*
☐ -*ROOTWADS [1]*
☐ -*BOULDERS[1]*
☐ -*OXBOWS, BACKWATERS [1]*
☐ -*AQUATIC MACROPHYTES [1]*
■ -*LOGS OR WOODY DEBRIS[1]*

COMMENTS:

AMOUNT: **(Check *ONLY* One or check 2 and *AVERAGE*)**
☐ - *EXTENSIVE > 75% [11]*
☐ - *MODERATE 25-75% [7]*
■ -*SPARSE 5-25% [3]*
☐-*NEARLY ABSENT < 5%[1]*

Cover: 6 Max 20

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	*DEVELOPMENT*	*CHANNELIZATION*	*STABILITY*	*MODIFICATIONS/OTHER*	
☐-*HIGH[4]*	☐-*EXCELLENT[7]*	☐-*NONE[6]*	☐-*HIGH[3]*	☐-*SNAGGING*	☐-*IMPOUND.*
☐-*MODERATE[3]*	☐-*GOOD[5]*	☐-*RECOVERED[4]*	☐-*MODERATE[2]*	☐-*RELOCATION*	☐-*ISLANDS*
■-*LOW[2]*	■-*FAIR[3]*	■-*RECOVERING[3]*	■-*LOW[1]*	☐-*CANOPY REMOVAL*	☐-*LEVEED*
☐-*NONE[1]*	■-*POOR[1]*	☐-*RECENT OR NO RECOVERY[1]*		☐-*DREDGING*	☐-*BANKSHAPING*
				☐-*ONESIDE CHANNEL MODIFICATIONS*	

Channel: 8 Max 20

COMMENTS:

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH L R (Per Bank)	*FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN)* L R (Most Predominant Per Bank)	L R	*BANK EROSION* L R (Per Bank)
☐ ☐-*WIDE > 50m[4]*	■ ■-*FOREST, SWAMP [3]*	☐ ☐-*CONSERVATION TILLAGE[1]*	■ ■-*NONE/LITTLE[3]*
■ ☐-*MODERATE 10-50m[3]*	☐ ☐-*SHRUB OR OLD FIELD [2]*	☐ ☐-*URBAN OR INDUSTRIAL [0]*	☐ ■-*MODERATE[2]*
☐ ■-*NARROW 5-10m[2]*	■ ■-*RESIDENTIAL, PARK, NEW FIELD [1]*	☐ ☐-*OPEN PASTURE, ROW CROP [0]*	☐ ☐-*HEAVY/SEVERE[1]*
☐ ☐-*VERY NARROW <5m[1]*	☐ ☐-*FENCED PASTURE [1]*	☐ ☐-*MINING/CONSTRUCTION[0]*	
☐ ☐-*NONE[0]*			

Riparian: 7.25 Max 10

COMMENTS:

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH **(Check 1 ONLY!)**
☐ - *> 1m [6]*
☐ - *0.7-1m[4]*
☐ - *0.4-0.7m[2]*
☐ - *0.2-0.4m[1]*
■ - *< 0.2m [POOL=0]*

MORPHOLOGY **(Check 1 or 2 & AVERAGE)**
☐ -*POOL WIDTH > RIFFLE WIDTH [2]*
☐ -*POOL WIDTH = RIFFLE WIDTH [1]*
■ -*POOL WIDTH < RIFFLE W. [0]*

CURRENT VELOCITY **(POOLS & RIFFLES!) (Check *All* That Apply)**
☐ -*EDDIES[1]*
☐ -*FAST[1]*
■ -*MODERATE[1]*
■ -*SLOW[1]*
☐ -*TORRENTIAL[-1]*
■ -*INTERSTITIAL[-1]*
☐ -*INTERMITTENT[-2]*

Pool/Current: 1 Max 12

COMMENTS:

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH
☐ - *Generally > 10 cm, MAX > 50 [4]*
☐ - *Generally > 10 cm, MAX < 50 [3]*
■ - *Generally 5-10 cm[1]*
☐ - *Generally < 5 cm [RIFFLE=0]*

RIFFLE/RUN SUBSTRATE
☐-*STABLE (e.g., Cobble, Boulder) [2]*
■-*MOD. STABLE (e.g., Large Gravel) [1]*
■-*UNSTABLE (Fine Gravel, Sand) [0]*

RIFFLE/RUN EMBEDDEDNESS
☐ - *NONE [2]*
☐ - *LOW [1]*
■ - *MODERATE [0]*
☐ - *EXTENSIVE [-1]*

☐ - *NO RIFFLE [Metric=0]*

Riffle/Run: 1.5 Max 8

Gradient: 4 Max 10

COMMENTS:

6] GRADIENT (ft/mi): 150.8 **DRAINAGE AREA (sq.mi.):** 0.6

%POOL: ___ %GLIDE: ___
%RIFFLE: ___ %RUN: ___

* Must (this must be large enough to support a population of riffle-obligate fish species.

OhioEPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 57.5

River Code:_____ RM: ____ Stream NINE MILE CREEK
Date 5/22/97 Location SITE #10 (UPSTREAM of CULVERT, SOUTH of BELVOIR ROAD)
Scorers Initials: CZ Comments

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR /SLBS[10]	___	___
☐ ☐-BOULDER [9]	✓	___
■ ☐-COBBLE [8]	✓	✓
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	___	___
■ ☐-GRAVEL [7]	✓	✓
☐ ☐-SAND [6]	✓	___
☐ ☐-BEDROCK[5]	✓	✓
☐ ☐-DETRITUS[3]	___	___
☐ ☐-ARTIFICIAL[0]	___	___

NOTE : (Ignore sludge originating from point-sources; score on natural substrates)

NUMBER OF SUBSTRATE TYPES: ☐-4 or Less [0] ■-5 or More [2]

SUBSTRATE ORIGIN (Check ONE (OR 2 & AVERAGE)): ☐-LIMESTONE [1] ■-TILLS [1] ☐-WETLANDS[0] ☐-HARDPAN [0] ☐-SANDSTONE [0] ☐-RIP/RAP [0] ☐-LACUSTRINE [0] ☐-SHALE [-1] ☐-COAL FINES [-2]

SILT: ☐-SILT HEAVY [-2] ☐-SILT MODERATE [-1] ■-SILT NORMAL [0] ■-SILT FREE [1]

EMBEDDEDNESS: ☐-EXTENSIVE [-2] ☐-MODERATE [-1] ■-NORMAL [0] ■-NONE [1]

SUBSTRATE QUALITY (Check ONE (OR 2 & AVERAGE))

Substrate: 19 Max 20

COMMENTS:

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
☐ -UNDERCUT BANKS [1] ☐ -OVERHANGING VEGETATION [1] ■-SHALLOWS (IN SLOW WATER) [1] ■-ROOTMATS[1] ☐ -POOLS > 70 cm [2] ☐ -ROOTWADS [1] ■-BOULDERS[1] COMMENTS: ☐ -OXBOWS, BACKWATERS [1] ☐ -AQUATIC MACROPHYTES [1] ■-LOGS OR WOODY DEBRIS[1]

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐ - EXTENSIVE > 75% [11] ☐ - MODERATE 25-75% [7] ■-SPARSE 5-25% [3] ☐-NEARLY ABSENT < 5% [1]

Cover: 7 Max 20

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH [4]	☐- EXCELLENT [7]	■-NONE[6]	☐-HIGH [3]	☐-SNAGGING	☐-IMPOUND.
☐-MODERATE [3]	☐-GOOD[5]	☐- RECOVERED [4]	■-MODERATE [2]	☐-RELOCATION	■-ISLANDS
■-LOW [2]	■- FAIR [3]	☐- RECOVERING [3]	■-LOW [1]	☐-CANOPY REMOVAL	☐- LEVEED
☐-NONE[1]	☐-POOR[1]	☐- RECENT OR NO RECOVERY [1]		☐-DREDGING	☐-BANK SHAPING
				☐-ONE SIDE CHANNEL MODIFICATIONS	

Channel: 12.5 Max 20

COMMENTS:

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R (Per Bank))	FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) (L R (Most Predominant Per Bank))		BANK EROSION (L R (Per Bank))	
■ ☐ -WIDE > 50m[4]	■ ■-FOREST, SWAMP [3]	☐ ☐-CONSERVATION TILLAGE[1]	■ ■-NONE/LITTLE[3]	
☐ ☐-MODERATE 10-50m[3]	☐ ☐-SHRUB OR OLD FIELD [2]	☐ ☐-URBAN OR INDUSTRIAL [0]	☐ ☐-MODERATE[2]	
☐ ■ -NARROW 5-10m[2]	■ ■-RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐-OPEN PASTURE, ROWCROP [0]	☐ ☐-HEAVY/SEVERE[1]	
☐ ☐ -VERY NARROW < 5m[1]	☐ ☐-FENCED PASTURE [1]	☐ ☐-MINING/CONSTRUCTION[0]		
☐ ☐ -NONE[0]				

Riparian: 8 Max 10

COMMENTS:

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
☐ - > 1m [6]
☐- 0.7-1m[4]
■- 0.4-0.7m[2]
☐- 0.2-0.4m[1]
☐ - < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☐ -POOL WIDTH > RIFFLE WIDTH [2]
■-POOL WIDTH = RIFFLE WIDTH [1]
☐ -POOL WIDTH < RIFFLE W. [0]

CURRENT VELOCITY [POOLS & RIFFLES!] (Check *All* That Apply)
☐ -EDDIES[1] ☐ -TORRENTIAL[-1]
☐ -FAST[1] ☐ -INTERSTITIAL[-1]
■ -MODERATE[1] ☐ -INTERMITTENT[-2]
■ -SLOW[1]

Pool/ Current: 4.5 Max 12

COMMENTS:

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH
☐ - Generally > 10 cm, MAX > 50 [4]
☐ - Generally > 10 cm, MAX < 50 [3]
■ - Generally 5-10 cm[1]
☐ - Generally < 5 cm [RIFFLE=0]

RIFFLE/RUN SUBSTRATE
■-STABLE (e.g., Cobble, Boulder) [2]
■-MOD. STABLE (e.g., Large Gravel) [1]
☐-UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE/RUN EMBEDDEDNESS
☐ - NONE [2]
☐ - LOW [1]
■ - MODERATE [0]
☐ - EXTENSIVE [-1]

☐ - NO RIFFLE [Metric=0]

Riffle/Run: 2.5 Max 8

Gradient: 4 Max 10

COMMENTS:

6] GRADIENT (ft/mi): 57.6 DRAINAGE AREA (sq.mi.): 1.8

%POOL: ____ %GLIDE: ____
%RIFFLE: ____ %RUN: ____

* Headwater stream must be large enough to support a population of riffle-obligate fish species.

OhioEPA Qualitative Habitat Evaluation Index Field Sheet *QHEI Score:* 54

River Code_____ River Mile_____ Stream Dugway Brook
Date 6/12/97 Location Site #12 (Lake Shore Blvd)
Scorers Initials: JJ Comments:_____

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR /SLBS[10]	___	___
☐ ☐-BOULDER [9]	✓	✓
■ ■-COBBLE [8]	✓	✓
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	___	___
☐ ☐-GRAVEL [7]	✓	✓
☐ ☐-SAND [6]	✓	✓
☐ ☐-BEDROCK[5]	___	___
☐ ☐-DETRITUS[3]	___	___
☐ ☐-ARTIFICIAL[0]	___	___

NOTE : *(Ignore sludge originating from point-sources; score on natural substrates)*
NUMBER OF SUBSTRATE TYPES: ☐-*5 or More [2]* ■-*4 or Less [0]*
COMMENTS_____

SUBSTRATE ORIGIN — Check ONE (OR 2 & AVERAGE)
☐ -LIMESTONE [1]
■ -TILLS [1]
☐ -WETLANDS[0]
☐ -HARDPAN [0]
☐ -SANDSTONE [0]
☐ -RIP/RAP [0]
☐ -LACUSTRINE [0]
☐ -SHALE [-1]
☐-COAL FINES [-2]

SILT: ■ -SILT HEAVY [-2] ■ -SILT MODERATE [-1] ☐ -SILT NORMAL [0] ☐ -SILT FREE [1]

EMBEDDEDNESS: ☐ -EXTENSIVE [-2] ■ -MODERATE [-1] ☐ -NORMAL [0] ☐ -NONE [1]

SUBSTRATE QUALITY — Check ONE (OR 2 & AVERAGE)

Substrate: 11.5 / Max 20

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
■-UNDERCUT BANKS [1] ■-DEEP POOLS > 70cm [2] ☐-OXBOWS [1]
■-OVERHANGING VEGETATION [1] ■-ROOTWADS [1] ■-AQUATIC MACROPHYTES [1]
■-SHALLOWS (IN SLOW WATER) [1] ☐-BOULDERS [1] ■-LOGS OR WOODY DEBRIS [1]
☐-ROOTMATS [1] COMMENTS:_____

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐-EXTENSIVE > 75% [11]
■-MODERATE 25-75% [7]
☐-SPARSE 5-25% [3]
☐-NEARLY ABSENT < 5% [1]

Cover: 15 / Max 20

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH [4]	☐-EXCELLENT [7]	☐-NONE [6]	☐-HIGH [3]	☐-SNAGGING	☐-IMPOUND.
☐-MODERATE [3]	☐-GOOD [5]	☐-RECOVERED [4]	■-MODERATE [2]	☐-RELOCATION	☐-ISLANDS
■-LOW [2]	☐-FAIR [3]	■-RECOVERING [3]	■-LOW [1]	☐-CANOPY REMOVAL	☐-LEVEED
☐-NONE [1]	■-POOR [1]	■-RECENT OR NO RECOVERY [1]		☐-DREDGING	☐-BANKSHAPING
				☐-ONE SIDE CHANNEL MODIFICATIONS	

Channel: 10.5 / Max 20

COMMENTS:_____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R Per Bank)	FLOOD PLAIN QUALITY (PAST 100 FOOT RIPARIAN) (L R Most Predominant Per Bank)		BANK EROSION (L R Per Bank)	
☐ ☐-WIDE > 50m [4]	☐ ■-FOREST, SWAMP [3]	☐ ☐-CONSERVATION TILLAGE [1]	☐ ■-NONE/LITTLE [3]	
☐ ■-MODERATE 10-50m [3]	☐ ☐-SHRUB OR OLD FIELD [2]	☐ ☐-URBAN OR INDUSTRIAL [0]	■ ■-MODERATE [2]	
■ ☐-NARROW 5-10m [2]	■ ■-RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐-OPEN PASTURE, ROWCROP [0]	■ ☐-HEAVY/SEVERE [1]	
☐ ☐-VERY NARROW < 5m [1]	☐ ☐-FENCED PASTURE [1]	☐ ☐-MINING/CONSTRUCTION [0]		
☐ ☐-NONE [0]				

Riparian: 6 / Max 10

COMMENTS:_____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
■ - > 1m [6]
☐-0.7-1m [4]
☐-0.4-0.7m [2]
☐-0.2-0.4m [1]
☐ - < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☐-POOL WIDTH > RIFFLE WIDTH [2]
☐-POOL WIDTH = RIFFLE WIDTH [1]
■-POOL WIDTH < RIFFLE W. [0]

CURRENT VELOCITY [POOL & RIFFLES!] (Check *All* That Apply)
☐-EDDIES [1] ☐-TORRENTIAL [-1]
☐-FAST [1] ☐-INTERSTITIAL [-1]
☐-MODERATE [1] ☐-INTERMITTENT [-2]
■-SLOW [1]

Pool/Glide: 7 / Max 12

COMMENTS:_____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE /RUN DEPTH
☐ - GENERALLY > 10 cm; MAX > 50 [4]
☐ - GENERALLY > 10 cm; MAX < 50 [3]
☐ - GENERALLY 5-10 cm [1]
☐-GENERALLY < 5 cm [RIFFLE=0]

RIFFLE/RUN SUBSTRATE
☐-STABLE (e.g., Cobble, Boulder) [2]
☐-MOD. STABLE (e.g., Large Gravel) [1]
☐-UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE/RUN EMBEDDEDNESS
☐ - NONE [2]
☐ - LOW [1]
☐ - MODERATE [0]
☐-EXTENSIVE [-1]

■- NO RIFFLE [Metric=0]

Riffle/Run: 0 / Max 8

Gradient: 4 / Max 10

COMMENTS:_____

6] GRADIENT (ft/mi): 43.9 **DRAINAGE AREA (sq.mi.):** 7 %POOL: ____ %GLIDE: ____ %RIFFLE: ____ %RUN: ____

OhioEPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 45

River Code_____ River Mile_____ Stream DUGWAY BROOK
Date 5/27/97 Location SITE #14 (WEST BRANCH AT LAKEVIEW CEMETARY)
Scorers Initials: JJ Comments:_____

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR /SLBS[10]	___	___
☐ ☐-BOULDER [9]	___	✓
■ ☐-COBBLE [8]	___	✓
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	___	___
■ ☐-GRAVEL [7]	✓	✓
☐ ☐-SAND [6]	✓	✓
☐ ☐-BEDROCK[5]	___	___
☐ ☐-DETRITUS[3]	___	___
☐ ☐-ARTIFICIAL[0]	___	___

NOTE : *(Ignore sludge originating from point-sources; score on natural substrates)*

NUMBER OF SUBSTRATE TYPES: ☐-5 or More [2] ■-4 or Less [0]

SUBSTRATE ORIGIN — Check ONE (OR 2 & AVERAGE)
☐ -LIMESTONE [1]
■ -TILLS [1]
☐ -WETLANDS[0]
☐ -HARDPAN [0]
☐ -SANDSTONE [0]
☐ -RIP/RAP [0]
☐ -LACUSTRINE [0]
☐ -SHALE [-1]
☐-COAL FINES [-2]

SILT: EMBEDDED NESS:

SUBSTRATE QUALITY — Check ONE (OR 2 & AVERAGE)
☐ -SILT HEAVY [-2]
■ -SILT MODERATE [-1]
■ -SILT NORMAL [0]
☐ -SILT FREE [1]
☐ -EXTENSIVE [-2]
■ -MODERATE [-1]
☐ -NORMAL [0]
☐ -NONE [1]

Substrate: 14.5 Max 20

COMMENTS_____

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
☐-UNDERCUT BANKS [1]
☐-OVERHANGING VEGETATION [1]
■-SHALLOWS (IN SLOW WATER) [1]
■-ROOTMATS [1]
☐-DEEP POOLS > 70 cm [2]
☐-ROOTWADS [1]
☐-BOULDERS [1]
☐-OXBOWS [1]
☐-AQUATIC MACROPHYTES [1]
■-LOGS OR WOODY DEBRIS [1]

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐-EXTENSIVE > 75% [11]
☐-MODERATE 25-75% [7]
■-SPARSE 5-25% [3]
■-NEARLY ABSENT < 5% [1]

Cover: 5 Max 20

COMMENTS:_____

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH [4]	☐-EXCELLENT [7]	■-NONE [6]	☐-HIGH [3]	☐-SNAGGING	☐-IMPOUND.
☐-MODERATE [3]	☐-GOOD [5]	☐-RECOVERED [4]	■-MODERATE [2]	☐-RELOCATION	☐-ISLANDS
■-LOW [2]	■-FAIR [3]	☐-RECOVERING [3]	☐-LOW [1]	☐-CANOPY REMOVAL	☐-LEVEED
■-NONE [1]	■-POOR [1]	☐-RECENT OR NO RECOVERY [1]		☐-DREDGING	☐-BANK SHAPING
				☐-ONE SIDE CHANNEL MODIFICATIONS	

Channel: 11.5 Max 20

COMMENTS:_____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R Per Bank)	FLOOD PLAIN QUALITY (PAST 100 FOOT RIPARIAN) (L R Most Predominant Per Bank)		BANK EROSION (L R Per Bank)	
☐ ☐-WIDE > 50m [4]	☐ ☐-FOREST, SWAMP [3]	☐ ☐-CONSERVATION TILLAGE [1]	☐ ☐-NONE/LITTLE [3]	
☐ ☐-MODERATE 10-50m [3]	☐ ☐-SHRUB OR OLD FIELD [2]	☐ ☐-URBAN OR INDUSTRIAL [0]	■ ■-MODERATE [2]	
■ ■-NARROW 5-10m [2]	■ ■-RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐-OPEN PASTURE, ROWCROP [0]	☐ ☐-HEAVY/SEVERE [1]	
■ ■-VERY NARROW < 5m [1]	☐ ☐-FENCED PASTURE [1]	☐ ☐-MINING/CONSTRUCTION [0]		
☐ ☐-NONE [0]				

Riparian: 4.5 Max 10

COMMENTS:_____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
☐ - > 1m [6]
☐-0.7-1m [4]
☐-0.4-0.7m [2]
☐-0.2-0.4m [1]
■ - < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☐ -POOL WIDTH > RIFFLE WIDTH [2]
■-POOL WIDTH = RIFFLE WIDTH [1]
☐ -POOL WIDTH < RIFFLE W. [0]

CURRENT VELOCITY [POOL & RIFFLES!] (Check *All* That Apply)
☐ -EDDIES [1]
☐ -FAST [1]
■ -MODERATE [1]
■ -SLOW [1]
☐ -TORRENTIAL [-1]
☐ -INTERSTITIAL [-1]
☐ -INTERMITTENT [-2]

Pool/Glide: 3 Max 12

COMMENTS:_____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE /RUN DEPTH
☐ - GENERALLY > 10 cm; MAX > 50 [4]
■ - GENERALLY > 10 cm; MAX < 50 [3]
■ - GENERALLY 5-10 cm [1]
☐-GENERALLY < 5 cm [RIFFLE=0]

RIFFLE/RUN SUBSTRATE
☐-STABLE (e.g., Cobble, Boulder) [2]
■-MOD. STABLE (e.g., Large Gravel) [1]
■-UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE/RUN EMBEDDEDNESS
☐ - NONE [2]
☐ - LOW [1]
■ - MODERATE [0]
☐ - EXTENSIVE [-1]

Riffle/Run: 2.5 Max 8

COMMENTS:_____ ☐- NO RIFFLE [Metric=0]

Gradient: 4 Max 10

6] GRADIENT (ft/mi): 132 DRAINAGE AREA (sq.mi.): 1.6 %POOL: ___ %GLIDE: ___ %RIFFLE: ___ %RUN: ___

OhioEPA Qualitative Habitat Evaluation Index Field Sheet *QHEI Score:* 50

River Code_____ River Mile_____ Stream DUGWAY BROOK
Date 6/9/97 Location SITE #15 (EAST BRANCH AT CUMBERLAND PARK)
Scorers Initials: JJ Comments:_____

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR /SLBS[10]	___	___
☐ ☐-BOULDER [9]	___	✓
■ ☐-COBBLE [8]	___	✓
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	✓	✓

	POOL	RIFFLE
■ ☐-GRAVEL [7]	___	✓
☐ ☐-SAND [6]	✓	___
☐ ☐-BEDROCK[5]	___	___
☐ ☐-DETRITUS[3]	___	___
☐ ☐-ARTIFICIAL[0]	___	✓

NOTE : (Ignore sludge originating from point-sources; score on natural substrates)

■-5 or More [2]
☐-4 or Less [0]
NUMBER OF SUBSTRATE TYPES:

SUBSTRATE ORIGIN — Check ONE (OR 2 & AVERAGE)
☐ -LIMESTONE [1]
■ -TILLS [1]
☐ -WETLANDS[0]
☐ -HARDPAN [0]
☐ -SANDSTONE [0]
☐ -RIP/RAP [0]
☐ -LACUSTRINE [0]
☐ -SHALE [-1]
☐-COAL FINES [-2]

SILT:
☐ -SILT HEAVY [-2]
■ -SILT MODERATE [-1]
☐ -SILT NORMAL [0]
☐ -SILT FREE [1]

EMBEDDEDNESS:
☐ -EXTENSIVE [-2]
■ -MODERATE [-1]
☐ -NORMAL [0]
☐ -NONE [1]

SUBSTRATE QUALITY — Check ONE (OR 2 & AVERAGE)

Substrate: 16 (Max 20)

COMMENTS_____

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
☐-UNDERCUT BANKS [1]
☐-OVERHANGING VEGETATION [1]
☐-SHALLOWS (IN SLOW WATER) [1]
■-ROOTMATS [1]
☐-DEEP POOLS > 70cm [2]
■-ROOTWADS [1]
☐-BOULDERS [1]
☐-OXBOWS [1]
■-AQUATIC MACROPHYTES [1]
■-LOGS OR WOODY DEBRIS [1]

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐-EXTENSIVE > 75% [11]
☐-MODERATE 25-75% [7]
■-SPARSE 5-25% [3]
☐-NEARLY ABSENT < 5% [1]

Cover: 7 (Max 20)

COMMENTS:_____

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH [4]	☐-EXCELLENT [7]	☐-NONE [6]	☐-HIGH [3]	■-SNAGGING	☐-IMPOUND.
■-MODERATE [3]	☐-GOOD [5]	■-RECOVERED [4]	■-MODERATE [2]	☐-RELOCATION	☐-ISLANDS
■-LOW [2]	■-FAIR [3]	☐-RECOVERING [3]	☐-LOW [1]	☐-CANOPY REMOVAL	☐-LEVEED
☐-NONE [1]	■-POOR [1]	☐-RECENT OR NO RECOVERY [1]		☐-DREDGING	☐-BANK SHAPING
				☐-ONE SIDE CHANNEL MODIFICATIONS	

Channel: 12.5 (Max 20)

COMMENTS:_____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R Per Bank)	FLOOD PLAIN QUALITY (PAST 100 FOOT RIPARIAN) (L R Most Predominant Per Bank)		BANK EROSION (L R Per Bank)	
☐ ☐'-WIDE > 50m [4]	☐ ☐-FOREST, SWAMP [3]	☐ ☐-CONSERVATION TILLAGE [1]	■ ■-NONE/LITTLE [3]	
■ ☐-MODERATE 10-50m [3]	☐ ☐-SHRUB OR OLD FIELD [2]	☐ ☐-URBAN OR INDUSTRIAL [0]	☐ ■-MODERATE [2]	
☐ ■'-NARROW 5-10m [2]	■ ■-RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐-OPEN PASTURE, ROWCROP [0]	☐ ☐-HEAVY/SEVERE [1]	
☐ ■'-VERY NARROW < 5m [1]	☐ ☐-FENCED PASTURE [1]	☐ ☐-MINING/CONSTRUCTION [0]		
☐ ☐'-NONE [0]				

Riparian: 6 (Max 10)

COMMENTS:_____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
☐ - > 1m [6]
☐ - 0.7-1m [4]
■ - 0.4-0.7m [2]
☐ - 0.2-0.4m [1]
☐ - < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☐'-POOL WIDTH > RIFFLE WIDTH [2]
☐-POOL WIDTH = RIFFLE WIDTH [1]
■'-POOL WIDTH < RIFFLE W. [0]

CURRENT VELOCITY [POOL & RIFFLES!] (Check *All* That Apply)
☐'-EDDIES [1]
☐'-FAST [1]
☐'-MODERATE [1]
■'-SLOW [1]
☐'-TORRENTIAL [-1]
☐'-INTERSTITIAL [-1]
☐'-INTERMITTENT [-2]

Pool/Glide: 3 (Max 12)

COMMENTS:_____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE /RUN DEPTH
☐ - GENERALLY > 10 cm; MAX > 50 [4]
☐ - GENERALLY > 10 cm; MAX < 50 [3]
■ - GENERALLY 5-10 cm [1]
☐ - GENERALLY < 5 cm [RIFFLE=0]

RIFFLE/RUN SUBSTRATE
☐-STABLE (e.g., Cobble, Boulder) [2]
■-MOD. STABLE (e.g., Large Gravel) [1]
■-UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE/RUN EMBEDDEDNESS
☐ - NONE [2]
☐ - LOW [1]
■ - MODERATE [0]
☐ - EXTENSIVE [-1]

☐ - NO RIFFLE [Metric=0]

Riffle/Run: 1.5 (Max 8)

Gradient: 4 (Max 10)

COMMENTS:_____

6] GRADIENT (ft/mi): 129.8 **DRAINAGE AREA (sq.mi.):** 1.1

%POOL: ___ %GLIDE: ___
%RIFFLE: ___ %RUN: ___

OhioEPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 53.75

River Code: ____ RM: ____ Stream DOAN BROOK
Date 10/16/98 Location SITE #16 (NORTH OF ST. CLAIR AVENUE)
Scorers Initials: CZ TZ Comments ____

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR/SLBS[10]	____	____
☐ ☐-BOULDER [9]	✓	____
☐ ☐-COBBLE [8]	✓	____
☐ ☐-HARDPAN [4]	____	____
☐ ☐-MUCK [2]	____	____
☐ ☐-SILT [2]	____	____
■ ☐-GRAVEL [7]	✓	____
■ ☐-SAND [6]	✓	____
☐ ☐-BEDROCK[5]	____	____
☐ ☐-DETRITUS[3]	____	____
☐ ☐-ARTIFICIAL[0]	____	____

NOTE : *(Ignore sludge originating from point-sources; score on natural substrates)*
NUMBER OF SUBSTRATE TYPES: ☐-*5 or More [2]* ■-*4 or Less [0]*

SUBSTRATE ORIGIN — *Check ONE (OR 2 & AVERAGE)*
☐ -*LIMESTONE [1]*
☐ -*TILLS [1]*
☐ -*WETLANDS[0]*
☐ -*HARDPAN [0]*
☐ -*SANDSTONE [0]*
☐ -*RIP/RAP [0]*
☐ -*LACUSTRINE [0]*
☐ -*SHALE [-1]*
☐-*COAL FINES [-2]*

SILT: / *EMBEDDEDNESS:*
SUBSTRATE QUALITY — *Check ONE (OR 2 & AVERAGE)*
☐ -*SILT HEAVY [-2]*
☐ -*SILT MODERATE [-1]*
■ -*SILT NORMAL [0]*
☐ -*SILT FREE [1]*
■ -*EXTENSIVE [-2]*
■ -*MODERATE [-1]*
☐ -*NORMAL [0]*
☐ -*NONE [1]*

COMMENTS ____

Substrate: 12.5 Max 20

2] INSTREAM COVER

TYPE: **(Check *All* That Apply)**
■ -*UNDERCUT BANKS [1]*
☐ -*OVERHANGING VEGETATION [1]*
■-*SHALLOWS(IN SLOW WATER)[1]*
☐-*ROOTMATS[1]*
■ -*POOLS>70 cm [2]*
☐ -*ROOTWADS [1]*
■-*BOULDERS[1]*
☐ -*OXBOWS, BACKWATERS [1]*
☐ -*AQUATIC MACROPHYTES [1]*
☐-*LOGS OR WOODY DEBRIS[1]*

AMOUNT: **(Check *ONLY* One or check 2 and *AVERAGE*)**
☐ - *EXTENSIVE > 75% [11]*
☐ - *MODERATE 25-75% [7]*
■-*SPARSE 5-25% [3]*
☐-*NEARLY ABSENT < 5%[1]*

COMMENTS: ____

Cover: 8 Max 20

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	*DEVELOPMENT*	*CHANNELIZATION*	*STABILITY*	*MODIFICATIONS/OTHER*	
☐-*HIGH[4]*	☐ - *EXCELLENT[7]*	☐-*NONE[6]*	■-*HIGH[3]*	☐-*SNAGGING*	☐-*IMPOUND.*
■-*MODERATE[3]*	☐-*GOOD[5]*	☐- *RECOVERED[4]*	☐-*MODERATE[2]*	☐-*RELOCATION*	☐-*ISLANDS*
■-*LOW[2]*	■- *FAIR[3]*	☐-*RECOVERING[3]*	☐-*LOW[1]*	☐-*CANOPY REMOVAL*	☐ - *LEVEED*
☐-*NONE[1]*	■-*POOR[1]*	■- *RECENT OR NO RECOVERY[1]*		☐-*DREDGING*	■-*BANK SHAPING*
				☐-*ONE SIDE CHANNEL MODIFICATIONS*	

Channel: 8.5 Max 20

COMMENTS: ____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH L R (Per Bank)	*FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN)* L R (Most Predominant Per Bank)	L R	*BANK EROSION* L R (Per Bank)
☐ ☐ -*WIDE > 50m[4]*	☐ ☐-*FOREST, SWAMP[3]*	☐ ☐-*CONSERVATION TILLAGE[1]*	■ ■-*NONE/LITTLE[3]*
☐ ☐-*MODERATE 10-50m[3]*	☐ ☐-*SHRUB OR OLD FIELD[2]*	■ ■-*URBAN OR INDUSTRIAL[0]*	☐ ☐-*MODERATE[2]*
☐ ☐ -*NARROW 5-10m[2]*	☐ ■-*RESIDENTIAL, PARK, NEW FIELD[1]*	☐ ☐-*OPEN PASTURE, ROW CROP[0]*	☐ ☐-*HEAVY/SEVERE[1]*
■ ■ -*VERY NARROW <5m[1]*	☐ ☐-*FENCED PASTURE[1]*	☐ ☐-*MINING/CONSTRUCTION[0]*	
■ ■ -*NONE[0]*			

Riparian: 3.75 Max 10

COMMENTS: ____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH **(Check 1 ONLY!)**
■ - *> 1m [6]*
☐- *0.7-1m[4]*
☐- *0.4-0.7m[2]*
☐- *0.2-0.4m[1]*
☐ - *< 0.2m [POOL=0]*

MORPHOLOGY **(Check 1 or 2 & AVERAGE)**
☐ -*POOL WIDTH > RIFFLE WIDTH [2]*
■-*POOL WIDTH = RIFFLE WIDTH[1]*
☐ -*POOL WIDTH < RIFFLE W.[0]*

CURRENT VELOCITY **(POOLS & RIFFLES! Check *All* That Apply)**
☐ -*EDDIES[1]*
☐ -*FAST[1]*
■ -*MODERATE[1]*
■ -*SLOW[1]*
☐ -*TORRENTIAL[-1]*
☐ -*INTERSTITIAL[-1]*
☐ -*INTERMITTENT[-2]*

Pool/Current: 9 Max 12

COMMENTS: ____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH
☐ - *Generally >10 cm, MAX > 50 [4]*
☐ - *Generally > 10 cm, MAX < 50 [3]*
■ - *Generally 5-10 cm[1]*
☐ - *Generally < 5 cm [RIFFLE=0]*

RIFFLE/RUN SUBSTRATE
☐-*STABLE (e.g., Cobble, Boulder) [2]*
■-*MOD. STABLE (e.g., Large Gravel) [1]*
☐-*UNSTABLE (Fine Gravel, Sand) [0]*

RIFFLE/RUN EMBEDDEDNESS
☐ - *NONE [2]*
☐ - *LOW [1]*
■ - *MODERATE [0]*
☐ - *EXTENSIVE [-1]*

☐ - *NO RIFFLE [Metric=0]*

Riffle/Run: 2 Max 8

Gradient: 10 Max 10

COMMENTS: ____

6] GRADIENT (ft/mi): 15.8 DRAINAGE AREA (sq.mi.): 9.6 %POOL: ____ %GLIDE: ____ %RIFFLE: ____ %RUN: ____

* Any: reach must be large enough to support a population of riffle-obligate fish species.

OhioEPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 73.25

River Code:_____ RM: _____ Stream DOAN BROOK
Date 6/9/97 Location SITE #17 (NORTH OF CLEVELAND ART MUSEUM)
Scorers Initials: JS Comments ALSO HESTER DENOY #2 SITE

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR/SLBS[10]	___	___
☐ ☐-BOULDER [9]	___	✓
■ ■-COBBLE [8]	✓	✓
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	✓	✓
☐ ☐-GRAVEL [7]	✓	___
☐ ☐-SAND [6]	✓	✓
☐ ☐-BEDROCK[5]	___	✓
☐ ☐-DETRITUS[3]	___	___
☐ ☐-ARTIFICIAL[0]	___	___

NOTE : *(Ignore sludge originating from point-sources; score on natural substrates)*

NUMBER OF SUBSTRATE TYPES: ■-*5 or More [2]* ☐-*4 or Less [0]*

*COMMENTS*_____

SUBSTRATE ORIGIN Check ONE (OR 2 & AVERAGE)
☐ -*LIMESTONE [1]*
■ -*TILLS [1]*
☐ -*WETLANDS[0]*
☐ -*HARDPAN [0]*
☐ -*SANDSTONE [0]*
☐ -*RIP/RAP [0]*
☐ -*LACUSTRINE [0]*
☐ -*SHALE [-1]*
☐-*COAL FINES [-2]*

SILT: / **EMBEDDEDNESS:**
SUBSTRATE QUALITY Check ONE (OR 2 & AVERAGE)
☐ -*SILT HEAVY [-2]*
■ -*SILT MODERATE [-1]*
☐ -*SILT NORMAL [0]*
☐ -*SILT FREE [1]*
☐ -*EXTENSIVE [-2]*
■ -*MODERATE [-1]*
■ -*NORMAL [0]*
☐ -*NONE [1]*

Substrate: 17.5 Max 20

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
■ -*UNDERCUT BANKS [1]*
☐ -*OVERHANGING VEGETATION [1]*
■ -*SHALLOWS(IN SLOWWATER) [1]*
■ -*ROOTMATS[1]*
■ -*POOLS> 70 cm [2]*
■ -*ROOTWADS [1]*
☐ -*BOULDERS[1]*
☐ -*OXBOWS, BACKWATERS [1]*
■ -*AQUATIC MACROPHYTES [1]*
■ -*LOGSORWOODYDEBRIS[1]*

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐ - *EXTENSIVE > 75% [11]*
■ - *MODERATE 25-75% [7]*
☐ -*SPARSE5-25% [3]*
☐ -*NEARLYABSENT < 5%[1]*

Cover: 15 Max 20

COMMENTS:_____

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-*HIGH[4]*	☐-*EXCELLENT[7]*	☐-*NONE[6]*	■-*HIGH[3]*	☐-*SNAGGING*	☐-*IMPOUND.*
■-*MODERATE[3]*	■-*GOOD[5]*	☐-*RECOVERED[4]*	■-*MODERATE[2]*	☐-*RELOCATION*	☐-*ISLANDS*
☐-*LOW[2]*	■-*FAIR[3]*	■-*RECOVERING[3]*	☐-*LOW[1]*	☐-*CANOPYREMOVAL*	☐-*LEVEED*
☐-*NONE[1]*	☐-*POOR[1]*	■-*RECENT ORNO RECOVERY[1]*		☐-*DREDGING*	■-*BANKSHAPING*
				☐-*ONESIDECHANNELMODIFICATIONS*	

Channel: 11.5 Max 20

COMMENTS:_____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R Per Bank)	FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) (L R Most Predominant Per Bank)		BANK EROSION (L R Per Bank)	
☐ ☐-*WIDE>50m[4]*	☐ ☐-*FOREST,SWAMP[3]*	☐ ☐-*CONSERVATIONTILLAGE[1]*	■ ■-*NONE/LITTLE[3]*	
☐ ☐-*MODERATE 10-50m[3]*	☐ ☐-*SHRUBOROLDFIELD[2]*	■ ■-*URBANORINDUSTRIAL[0]*	☐ ☐-*MODERATE[2]*	
☐ ☐-*NARROW5-10m[2]*	■ ■-*RESIDENTIAL,PARK,NEWFIELD[1]*	☐ ☐-*OPENPASTURE,ROWCROP[0]*	☐ ☐-*HEAVY/SEVERE[1]*	
■ ■-*VERYNARROW <5m[1]*	☐ ☐-*FENCEDPASTURE[1]*	☐ ☐-*MINING/CONSTRUCTION[0]*		
■ ☐-*NONE[0]*				

Riparian: 4.25 Max 10

COMMENTS:_____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
☐ - *>1m [6]*
■ - *0.7-1m[4]*
☐ - *0.4-0.7m[2]*
☐ - *0.2-0.4m[1]*
☐ - *< 0.2m [POOL=0]*

MORPHOLOGY (Check 1 or 2 & AVERAGE)
■-*POOL WIDTH > RIFFLE WIDTH [2]*
☐-*POOLWIDTH=RIFFLEWIDTH[1]*
☐-*POOLWIDTH<RIFFLEW.[0]*

CURRENT VELOCITY [POOLS & RIFFLES!] (Check *All* That Apply)
■-*EDDIES[1]*
■-*FAST[1]*
■-*MODERATE[1]*
■-*SLOW[1]*
☐-*TORRENTIAL[-1]*
☐-*INTERSTITIAL[-1]*
☐-*INTERMITTENT[-2]*

Pool/Current: 10 Max 12

COMMENTS:_____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH
☐ - *Generally >10 cm, MAX > 50 [4]*
■ - *Generally > 10 cm, MAX < 50 [3]*
☐ - *Generally 5-10 cm[1]*
☐ - *Generally < 5 cm [RIFFLE=0]*

RIFFLE/RUN SUBSTRATE
■-*STABLE (e.g.,Cobble, Boulder) [2]*
☐-*MOD. STABLE (e.g.,Large Gravel) [1]*
☐-*UNSTABLE (Fine Gravel,Sand) [0]*

RIFFLE/RUN EMBEDDEDNESS
☐ - *NONE [3]*
☐ - *LOW [1]*
■ - *MODERATE [0]*
☐ - *EXTENSIVE [-1]*

Riffle/Run: 5 Max 8

COMMENTS:_____ ☐ - *NO RIFFLE [Metric=0]*

Gradient: 10 Max 10

6] GRADIENT (ft/mi): 21.1 **DRAINAGE AREA (sq.mi.):** 8.0

%POOL: ___ %GLIDE: ___
%RIFFLE: ___ %RUN: ___

* Headwater stream must be large enough to support a population of riffle-obligate fish species.

ONEPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 70.25

River Code:_____ RM: ____ Stream DOAN BROOK
Date 9/17/98 Location SITE # 17 (NORTH OF CLEVELAND ART MUSEUM)
Scorers Initials: CZ Comments ALSO HESTER DENDY #2 SITE

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR/SLBS[10]	___	___
☐ ☐-BOULDER [9]	✓	✓
■ ☐-COBBLE [8]	✓	___
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	___	___
■ ☐-GRAVEL [7]	✓	✓
☐ ☐-SAND [6]	✓	___
☐ ☐-BEDROCK[5]	✓	___
☐ ☐-DETRITUS[3]	___	___
☐ ☐-ARTIFICIAL[0]	___	___

NOTE : (Ignore sludge originating from point-sources; score on natural substrates)
NUMBER OF SUBSTRATE TYPES: ■-5 or More [2] ☐-4 or Less [0]

SUBSTRATE ORIGIN (Check ONE (OR 2 & AVERAGE)): ☐-LIMESTONE [1] ■-TILLS [1] ☐-WETLANDS[0] ☐-HARDPAN [0] ☐-SANDSTONE [0] ☐-RIP/RAP [0] ☐-LACUSTRINE [0] ☐-SHALE [-1] ☐-COAL FINES [-2]

SUBSTRATE QUALITY (Check ONE (OR 2 & AVERAGE)):
SILT: ☐-SILT HEAVY [-2] ☐-SILT MODERATE [-1] ■-SILT NORMAL [0] ☐-SILT FREE [1]
EMBEDDEDNESS: ☐-EXTENSIVE [-2] ■-MODERATE [-1] ■-NORMAL [0] ☐-NONE [1]

Substrate: 17.5 Max 20

COMMENTS:_____

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
■-UNDERCUT BANKS [1] ■-POOLS > 70 cm [2] ☐-OXBOWS, BACKWATERS [1]
☐-OVERHANGING VEGETATION [1] ☐-ROOTWADS [1] ☐-AQUATIC MACROPHYTES [1]
■-SHALLOWS (IN SLOW WATER) [1] ■-BOULDERS [1] ■-LOGS OR WOODY DEBRIS [1]
■-ROOTMATS [1] COMMENTS:_____

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐-EXTENSIVE > 75% [11] ■-MODERATE 25-75% [7] ■-SPARSE 5-25% [3] ☐-NEARLY ABSENT < 5% [1]

Cover: 12 Max 20

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH [4]	☐-EXCELLENT [7]	☐-NONE [6]	☐-HIGH [3]	☐-SNAGGING	☐-IMPOUND.
■-MODERATE [3]	■-GOOD [5]	☐-RECOVERED [4]	■-MODERATE [2]	☐-RELOCATION	☐-ISLANDS
☐-LOW [2]	■-FAIR [3]	■-RECOVERING [3]	■-LOW [1]	☐-CANOPY REMOVAL	☐-LEVEED
☐-NONE [1]	☐-POOR [1]	☐-RECENT OR NO RECOVERY [1]		☐-DREDGING	☐-BANKSHAPING
				■-ONE SIDE CHANNEL MODIFICATIONS	

Channel: 11.5 Max 20

COMMENTS:_____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R Per Bank)	FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) (L R Most Predominant Per Bank)		BANK EROSION (L R Per Bank)	
☐ ☐-WIDE > 50m [4]	☐ ☐-FOREST, SWAMP [3]	☐ ☐-CONSERVATION TILLAGE [1]	☐ ☐-NONE/LITTLE [3]	
☐ ☐-MODERATE 10-50m [3]	☐ ☐-SHRUB OR OLD FIELD [2]	■ ■-URBAN OR INDUSTRIAL [0]	■ ■-MODERATE [2]	
☐ ☐-NARROW 5-10m [2]	■ ☐-RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐-OPEN PASTURE, ROWCROP [0]	☐ ■-HEAVY/SEVERE [1]	
■ ■-VERY NARROW < 5m [1]	☐ ☐-FENCED PASTURE [1]	☐ ☐-MINING/CONSTRUCTION [0]		
■ ☐-NONE [0]				

Riparian: 2.75 Max 10

COMMENTS:_____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
■- > 1m [6]
☐- 0.7-1m [4]
☐- 0.4-0.7m [2]
☐- 0.2-0.4m [1]
☐- < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
■-POOL WIDTH > RIFFLE WIDTH [2]
☐-POOL WIDTH = RIFFLE WIDTH [1]
☐-POOL WIDTH < RIFFLE W. [0]

CURRENT VELOCITY [POOLS & RIFFLES] (Check *All* That Apply)
☐-EDDIES [1] ☐-TORRENTIAL [-1]
■-FAST [1] ☐-INTERSTITIAL [-1]
■-MODERATE [1] ☐-INTERMITTENT [-2]
■-SLOW [1]

Pool/Current: 11 Max 12

COMMENTS:_____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH
☐ - Generally > 10 cm, MAX > 50 [4]
■ - Generally > 10 cm, MAX < 50 [3]
☐ - Generally 5-10 cm [1]
☐ - Generally < 5 cm [RIFFLE=0]

RIFFLE/RUN SUBSTRATE
■-STABLE (e.g., Cobble, Boulder) [2]
■-MOD. STABLE (e.g., Large Gravel) [1]
☐-UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE/RUN EMBEDDEDNESS
☐ - NONE [2]
■ - LOW [1]
☐ - MODERATE [0]
☐ - EXTENSIVE [-1]

☐ - NO RIFFLE [Metric=0]

Riffle/Run: 5.5 Max 8

COMMENTS:_____

Gradient: 10 Max 10

6] GRADIENT (ft/mi): 21.1 DRAINAGE AREA (sq.mi.): 8.0 %POOL: ____ %GLIDE: ____ %RIFFLE: ____ %RUN: ____

* Pools must be large enough to support a population of riffle-obligate fish species.

OhioEPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 68.25

River Code: ______ RM: ______ Stream: Doan Brook
Date: 6/12/97 Location: Site #18 (North Branch, at Shaker Lakes Nature Center)
Scorers Initials: JJ Comments: ______

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE	TYPE	POOL	RIFFLE
☐ ☐-BLDR/SLBS[10]			■ ☐-GRAVEL [7]	✓	✓
☐ ☐-BOULDER [9]			■ ☐-SAND [6]	✓	✓
☐ ☐-COBBLE [8]	✓	✓	☐ ☐-BEDROCK[5]		
☐ ☐-HARDPAN [4]	✓	✓	☐ ☐-DETRITUS[3]	✓	✓
☐ ☐-MUCK [2]			☐ ☐-ARTIFICIAL[0]		
☐ ☐-SILT [2]	✓	✓			

NOTE : (Ignore sludge originating from point-sources; score on natural substrates)

NUMBER OF SUBSTRATE TYPES: ■-5 or More [2] ☐-4 or Less [0]

COMMENTS ______

SUBSTRATE ORIGIN — Check ONE (OR 2 & AVERAGE)
☐ -LIMESTONE [1]
■ -TILLS [1]
☐ -WETLANDS[0]
☐ -HARDPAN [0]
☐ -SANDSTONE [0]
☐ -RIP/RAP [0]
☐ -LACUSTRINE [0]
☐ -SHALE [-1]
☐-COAL FINES [-2]

SUBSTRATE QUALITY — Check ONE (OR 2 & AVERAGE)
SILT:
☐ -SILT HEAVY [-2]
■ -SILT MODERATE [-1]
☐ -SILT NORMAL [0]
☐ -SILT FREE [1]

EMBEDDEDNESS:
☐ -EXTENSIVE [-2]
■ -MODERATE [-1]
☐ -NORMAL [0]
☐ -NONE [1]

Substrate: 14 (Max 20)

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
■ -UNDERCUT BANKS [1]
■ -OVERHANGING VEGETATION [1]
■-SHALLOWS (IN SLOW WATER) [1]
■-ROOTMATS [1]
■ -POOLS> 70 cm [2]
■ -ROOTWADS [1]
☐-BOULDERS [1]
☐ -OXBOWS, BACKWATERS [1]
■ -AQUATIC MACROPHYTES [1]
■-LOGS OR WOODY DEBRIS [1]

COMMENTS: ______

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
■ - EXTENSIVE > 75% [11]
☐ - MODERATE 25-75% [7]
☐- SPARSE 5-25% [3]
☐- NEARLY ABSENT < 5% [1]

Cover: 20 (Max 20)

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH [4]	☐- EXCELLENT [7]	■-NONE [6]	☐-HIGH [3]	☐-SNAGGING	☐-IMPOUND.
■-MODERATE [3]	☐-GOOD [5]	☐- RECOVERED [4]	☐-MODERATE [2]	☐- RELOCATION	☐- ISLANDS
☐-LOW [2]	■- FAIR [3]	☐- RECOVERING [3]	■-LOW [1]	☐- CANOPY REMOVAL	☐ - LEVEED
☐-NONE [1]	☐-POOR [1]	☐- RECENT OR NO RECOVERY [1]		☐-DREDGING	☐- BANK SHAPING
				☐- ONE SIDE CHANNEL MODIFICATIONS	

Channel: 13 (Max 20)

COMMENTS: ______

4]. RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R Per Bank)	FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) (L R Most Predominant Per Bank)	L R	BANK EROSION (L R Per Bank)
☐ ☐-WIDE > 50m [4]	■ ■-FOREST, SWAMP [3]	☐ ☐-CONSERVATION TILLAGE [1]	☐ ■-NONE/LITTLE [3]
■ ☐-MODERATE 10-50m [3]	☐ ☐-SHRUB OR OLD FIELD [2]	☐ ☐-URBAN OR INDUSTRIAL [0]	■ ☐-MODERATE [2]
■ ■-NARROW 5-10m [2]	■ ■-RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐-OPEN PASTURE, ROWCROP [0]	☐ ☐-HEAVY/SEVERE [1]
☐ ☐-VERY NARROW < 5m [1]	☐ ☐-FENCED PASTURE [1]	☐ ☐-MINING/CONSTRUCTION [0]	
☐ ☐-NONE [0]			

Riparian: 6.75 (Max 10)

COMMENTS: ______

5.] POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
■ - > 1m [6]
☐- 0.7-1m [4]
☐- 0.4-0.7m [2]
☐- 0.2-0.4m [1]
☐ - < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
■-POOL WIDTH > RIFFLE WIDTH [2]
☐-POOL WIDTH = RIFFLE WIDTH [1]
☐-POOL WIDTH < RIFFLE W. [0]

CURRENT VELOCITY [POOLS & RIFFLES!] (Check *All* That Apply)
☐-EDDIES [1]
☐-FAST [1]
■-MODERATE [1]
■-SLOW [1]
☐-TORRENTIAL [-1]
☐-INTERSTITIAL [-1]
☐-INTERMITTENT [-2]

COMMENTS: ______

Pool/Current: 10 (Max 12)

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH
☐ - Generally > 10 cm, MAX > 50 [4]
☐ - Generally > 10 cm, MAX < 50 [3]
■ - Generally 5-10 cm [1]
■ - Generally < 5 cm [RIFFLE=0]

RIFFLE/RUN SUBSTRATE
☐-STABLE (e.g., Cobble, Boulder) [2]
☐-MOD. STABLE (e.g., Large Gravel) [1]
■-UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE/RUN EMBEDDEDNESS
☐ - NONE [2]
☐ - LOW [1]
■ - MODERATE [0]
☐ - EXTENSIVE [-1]

COMMENTS: ______ ☐ - NO RIFFLE [Metric=0]

Riffle/Run: 0.5 (Max 8)

6] GRADIENT (ft/mi): 49.5 **DRAINAGE AREA (sq.mi.):** 2.0

%POOL: ______ %GLIDE: ______
%RIFFLE: ______ %RUN: ______

Gradient: 4 (Max 10)

* Best areas must be large enough to support a population of riffle-obligate fish species.

OhioEPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 75

River Code:________ RM: _____ Stream Doan Brook
Date 6/12/97 Location Site # 19 (South Branch at Shaker Lakes Nature Center)
Scorers Initials: JJ Comments

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES*; Estimate % present);

TYPE	POOL	RIFFLE	TYPE	POOL	RIFFLE	SUBSTRATE ORIGIN	SUBSTRATE QUALITY
☐ ☐-BLDR /SLBS[10]			■ ■-GRAVEL [7]	✓	✓	Check ONE (OR 2 & AVERAGE)	Check ONE (OR 2 & AVERAGE)
☐ ☐-BOULDER [9]	✓	✓	☐ ☐-SAND [6]	✓	✓	☐ -LIMESTONE [1]	SILT: ☐ -SILT HEAVY [-2]
☐ ☐-COBBLE [8]		✓	☐ ☐-BEDROCK[5]			■ -TILLS [1]	■ -SILT MODERATE [-1]
☐ ☐-HARDPAN [4]			☐ ☐-DETRITUS[3]	✓	✓	☐ -WETLANDS[0]	☐ -SILT NORMAL [0]
☐ ☐-MUCK [2]	✓		☐ ☐-ARTIFICIAL[0]			☐ -HARDPAN [0]	☐ -SILT FREE [1]
☐ ☐-SILT [2]	✓	✓				☐ -SANDSTONE [0]	EMBEDDEDNESS: ☐ -EXTENSIVE [-2]
						☐ -RIP/RAP [0]	■ -MODERATE [-1]
						☐ -LACUSTRINE [0]	■ -NORMAL [0]
						☐ -SHALE [-1]	☐ -NONE [1]
						☐-COAL FINES [-2]	

NOTE : (Ignore sludge originating from point-sources; score on natural substrates)

NUMBER OF SUBSTRATE TYPES: ■-5 or More [2] ☐-4 or Less [0]

COMMENTS

Substrate: 15.5 (Max 20)

2] INSTREAM COVER

TYPE: (Check *All* That Apply)

■ -UNDERCUT BANKS [1] ■ -POOLS> 70 cm [2] ☐ -OXBOWS, BACKWATERS [1]
■ -OVERHANGING VEGETATION [1] ■ -ROOTWADS [1] ■ -AQUATIC MACROPHYTES [1]
■-SHALLOWS (IN SLOW WATER) [1] ☐-BOULDERS [1] ■-LOGS OR WOODY DEBRIS [1]
■-ROOTMATS [1] COMMENTS:

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)

■ - EXTENSIVE > 75% [11]
■ - MODERATE 25-75% [7]
☐-SPARSE 5-25% [3]
☐-NEARLY ABSENT < 5% [1]

Cover: 18 (Max 20)

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH [4]	☐- EXCELLENT [7]	■-NONE [6]	☐-HIGH [3]	☐-SNAGGING	☐-IMPOUND.
■-MODERATE [3]	☐-GOOD [5]	☐- RECOVERED [4]	■-MODERATE [2]	☐-RELOCATION	☐ - ISLANDS
☐-LOW [2]	■- FAIR [3]	☐- RECOVERING [3]	■-LOW [1]	☐- CANOPY REMOVAL	☐ - LEVEED
☐-NONE [1]	☐-POOR [1]	☐- RECENT OR NO RECOVERY [1]		☐-DREDGING	☐-BANK SHAPING
				☐- ONE SIDE CHANNEL MODIFICATIONS	

COMMENTS:

Channel: 13.5 (Max 20)

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH	FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN)		BANK EROSION
L R (Per Bank)	L R (Most Predominant Per Bank)	L R	L R (Per Bank)
■ ■ -WIDE > 50m [4]	■ ■-FOREST, SWAMP [3]	☐ ☐-CONSERVATION TILLAGE [1]	■ ■-NONE/LITTLE [3]
☐ ☐-MODERATE 10-50m [3]	☐ ☐-SHRUB OR OLD FIELD [2]	☐ ☐-URBAN OR INDUSTRIAL [0]	☐ ☐-MODERATE [2]
☐ ☐ -NARROW 5-10m [2]	■ ■-RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐-OPEN PASTURE, ROWCROP [0]	☐ ☐-HEAVY/SEVERE [1]
☐ ☐ -VERY NARROW < 5m [1]	☐ ☐-FENCED PASTURE [1]	☐ ☐-MINING/CONSTRUCTION [0]	
☐ ☐ -NONE [0]			

COMMENTS:

Riparian: 9 (Max 10)

5.] POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)	MORPHOLOGY (Check 1 or 2 & AVERAGE)	CURRENT VELOCITY [POOLS & RIFFLES!] (Check *All* That Apply)	
■ - > 1m [6]	■ -POOL WIDTH > RIFFLE WIDTH [2]	☐ -EDDIES [1]	☐ -TORRENTIAL [-1]
☐- 0.7-1m [4]	☐-POOL WIDTH = RIFFLE WIDTH [1]	☐ -FAST [1]	☐ -INTERSTITIAL [-1]
☐- 0.4-0.7m [2]	☐ -POOL WIDTH < RIFFLE W. [0]	■ -MODERATE [1]	☐ -INTERMITTENT [-2]
☐- 0.2-0.4m [1]		■ -SLOW [1]	
☐ - < 0.2m [POOL=0]			

COMMENTS:

Pool/Current: 10 (Max 12)

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH	RIFFLE/RUN SUBSTRATE	RIFFLE/RUN EMBEDDEDNESS
☐ - Generally > 10 cm, MAX > 50 [4]	☐-STABLE (e.g., Cobble, Boulder) [2]	☐ - NONE [2]
☐ - Generally > 10 cm, MAX < 50 [3]	■-MOD. STABLE (e.g., Large Gravel) [1]	☐ - LOW [1]
■ - Generally 5-10 cm [1]	■-UNSTABLE (Fine Gravel, Sand) [0]	■ - MODERATE [0]
■ - Generally < 5 cm [RIFFLE=0]		☐ - EXTENSIVE [-1]

COMMENTS: ☐ - NO RIFFLE [Metric=0]

Riffle/Run: 1 (Max 8)

Gradient: 8 (Max 10)

6] GRADIENT (ft/mi): 39.6 **DRAINAGE AREA (sq.mi.):** 3.8

%POOL: ____ %GLIDE: ____
%RIFFLE: ____ %RUN: ____

*Best areas must be large enough to support a population of riffle-obligate fish species.

EPA 4520 7/24/97

OhioEPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 29.5

River Code: ______ RM: 0.3 Stream: Cuyahoga River
Date: 10/27/98 Location: Site #20 Behind Fagan's Restaurant
Scorers Initials: CZ TZ Comments: (Navigation Channel)

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE* BOXES; Estimate % present);

TYPE POOL RIFFLE / POOL RIFFLE / **SUBSTRATE ORIGIN** / **SUBSTRATE QUALITY**

- ☐ ☐-BLDR /SLBS[10] ___ ___ ☐ ☐-GRAVEL [7] ✓ ___ Check ONE (OR 2 & AVERAGE) Check ONE (OR 2 & AVERAGE)
- ☐ ☐-BOULDER [9] ___ ___ ☐ ☐-SAND [6] ✓ ___ ☐ -LIMESTONE [1] SILT: ☐ -SILT HEAVY [-2]
- ☐ ☐-COBBLE [8] ___ ___ ☐ ☐-BEDROCK[5] ___ ___ ■ -TILLS [1] ■ -SILT MODERATE [-1]
- ☐ ☐-HARDPAN [4] ✓ ___ ☐ ☐-DETRITUS[3] ___ ___ ☐ -WETLANDS[0] ☐ -SILT NORMAL [0]
- ■ ■-MUCK [2] ✓ ___ ☐ ☐-ARTIFICIAL[0] ___ ___ ☐ -HARDPAN [0] ☐ -SILT FREE [1]
- ☐ ☐-SILT [2] ___ ___ ☐ -SANDSTONE [0] EMBEDDEDNESS: ■ -EXTENSIVE [-2]
- ☐ -RIP/RAP [0] ■ -MODERATE [-1]
- ☐ -LACUSTRINE [0] ☐ -NORMAL [0]
- ☐ -SHALE [-1] ☐ -NONE [1]
- ☐-COAL FINES [-2]

NOTE: (Ignore sludge originating from point-sources; score on natural substrates) ☐-5 or More [2]
NUMBER OF SUBSTRATE TYPES: ■-4 or Less [0]
COMMENTS: Used Petite Ponar Dredge to Determine Type.

Substrate: 25 (Max 20)

2] INSTREAM COVER

TYPE: (Check *All* That Apply) — AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)

- ☐ -UNDERCUT BANKS [1] ☐ -POOLS> 70 cm [2] ☐ -OXBOWS, BACKWATERS [1] ☐ - EXTENSIVE > 75% [11]
- ☐ -OVERHANGING VEGETATION [1] ☐ -ROOTWADS [1] ☐ -AQUATIC MACROPHYTES [1] ☐ - MODERATE 25-75% [7]
- ☐-SHALLOWS (IN SLOW WATER) [1] ☐-BOULDERS [1] ☐-LOGS OR WOODY DEBRIS [1] ☐-SPARSE 5-25% [3]
- ☐-ROOTMATS [1] COMMENTS: ______ ■-NEARLY ABSENT < 5% [1]

Cover: 1 (Max 20)

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH [4]	☐-EXCELLENT [7]	■-NONE [6]	■-HIGH [3]	☐-SNAGGING	☐-IMPOUND.
☐-MODERATE [3]	☐-GOOD [5]	☐-RECOVERED [4]	☐-MODERATE [2]	☐-RELOCATION	☐-ISLANDS
☐-LOW [2]	☐-FAIR [3]	☐-RECOVERING [3]	☐-LOW [1]	☐-CANOPY REMOVAL	☐-LEVEED
■-NONE [1]	■-POOR [1]	☐-RECENT OR NO RECOVERY [1]		■-DREDGING	■-BANK SHAPING
				☐-ONE SIDE CHANNEL MODIFICATIONS	

COMMENTS: Channel Routinely Dredged

Channel: 6 (Max 20)

4]. RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R Per Bank)	FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) (L R Most Predominant Per Bank)	(L R)	BANK EROSION (L R Per Bank)
☐ ☐-WIDE > 50m [4]	☐ ☐-FOREST, SWAMP [3]	☐ ☐-CONSERVATION TILLAGE [1]	■ ■-NONE/LITTLE [3]
☐ ☐-MODERATE 10-50m [3]	☐ ☐-SHRUB OR OLD FIELD [2]	■ ■-URBAN OR INDUSTRIAL [0]	☐ ☐-MODERATE [2]
☐ ☐-NARROW 5-10m [2]	☐ ☐-RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐-OPEN PASTURE, ROWCROP [0]	☐ ☐-HEAVY/SEVERE [1]
☐ ☐-VERY NARROW < 5m [1]	☐ ☐-FENCED PASTURE [1]	☐ ☐-MINING/CONSTRUCTION [0]	
■ ■-NONE [0]			

COMMENTS: Steel-Lined Banks

Riparian: 3 (Max 10)

5.] POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)	MORPHOLOGY (Check 1 or 2 & AVERAGE)	CURRENT VELOCITY [POOLS & RIFFLES!] (Check *All* That Apply)	
■ - > 1m [6]	■-POOL WIDTH > RIFFLE WIDTH [2]	☐-EDDIES [1]	☐-TORRENTIAL [-1]
☐- 0.7-1m [4]	☐-POOL WIDTH = RIFFLE WIDTH [1]	☐-FAST [1]	☐-INTERSTITIAL [-1]
☐- 0.4-0.7m [2]	☐-POOL WIDTH < RIFFLE W. [0]	☐-MODERATE [1]	☐-INTERMITTENT [-2]
☐- 0.2-0.4m [1]		■-SLOW [1]	
☐ - < 0.2m [POOL=0]			

COMMENTS: ______

Pool/Current: 9 (Max 12)

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH	RIFFLE/RUN SUBSTRATE	RIFFLE/RUN EMBEDDEDNESS
☐ - Generally > 10 cm, MAX > 50 [4]	☐-STABLE (e.g., Cobble, Boulder) [2]	☐ - NONE [2]
☐ - Generally > 10 cm, MAX < 50 [3]	☐-MOD. STABLE (e.g., Large Gravel) [1]	☐ - LOW [1]
☐ - Generally 5-10 cm [1]	☐-UNSTABLE (Fine Gravel, Sand) [0]	☐ - MODERATE [0]
☐ - Generally < 5 cm [RIFFLE=0]		☐ - EXTENSIVE [-1]

COMMENTS: ______ ■ - NO RIFFLE [Metric=0]

Riffle/Run: 0 (Max 8)

Gradient: 8 (Max 10)

6] GRADIENT (ft/mi): 0.9 **DRAINAGE AREA (sq.mi.):** 809 %POOL: ___ %GLIDE: ___ %RIFFLE: ___ %RUN: ___

*Most areas must be large enough to support a population of riffle-obligate fish species.

Ohio EPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 29.5

River Code:_____ RM: 1.0 Stream CUYAHOGA RIVER
Date 10/27/98 Location SITE #21 CENTER STREET BRIDGE
Scorers Initials: CZ TZ Comments (NAVIGATION CHANNEL)

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR/SLBS[10]	___	___
☐ ☐-BOULDER [9]	___	___
☐ ☐-COBBLE [8]	___	___
☐ ☐-HARDPAN [4]	___	___
■ ■-MUCK [2]	✓	___
☐ ☐-SILT [2]	✓	___
☐ ☐-GRAVEL [7]	✓	___
☐ ☐-SAND [6]	✓	___
☐ ☐-BEDROCK[5]	___	___
☐ ☐-DETRITUS[3]	___	___
☐ ☐-ARTIFICIAL[0]	___	___

NOTE : (Ignore sludge originating from point-sources; score on natural substrates)
NUMBER OF SUBSTRATE TYPES: ■-4 or Less [0] ☐-5 or More [2]
COMMENTS USED PETITE PONAR DREDGE TO DETERMINE TYPE.

SUBSTRATE ORIGIN — Check ONE (OR 2 & AVERAGE)
☐ -LIMESTONE [1]
■ -TILLS [1]
☐ -WETLANDS[0]
☐ -HARDPAN [0]
☐ -SANDSTONE [0]
☐ -RIP/RAP [0]
☐ -LACUSTRINE [0]
☐ -SHALE [-1]
☐ -COAL FINES [-2]

SUBSTRATE QUALITY — Check ONE (OR 2 & AVERAGE)
SILT:
☐ -SILT HEAVY [-2]
■ -SILT MODERATE [-1]
☐ -SILT NORMAL [0]
☐ -SILT FREE [1]
EMBEDDEDNESS:
■ -EXTENSIVE [-2]
■ -MODERATE [-1]
☐ -NORMAL [0]
☐ -NONE [1]

Substrate: 2.5 Max 20

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
☐ -UNDERCUT BANKS [1]
☐ -OVERHANGING VEGETATION [1]
☐ -SHALLOWS (IN SLOW WATER) [1]
☐ -ROOTMATS [1]
☐ -POOLS > 70 cm [2]
☐ -ROOTWADS [1]
☐ -BOULDERS [1]
☐ -OXBOWS, BACKWATERS [1]
☐ -AQUATIC MACROPHYTES [1]
☐ -LOGS OR WOODY DEBRIS [1]
COMMENTS:

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐ - EXTENSIVE > 75% [11]
☐ - MODERATE 25-75% [7]
☐ - SPARSE 5-25% [3]
■ - NEARLY ABSENT < 5% [1]

Cover: 1 Max 20

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH [4]	☐ - EXCELLENT [7]	■-NONE [6]	■-HIGH [3]	☐-SNAGGING	☐-IMPOUND.
☐-MODERATE [3]	☐-GOOD [5]	☐ - RECOVERED [4]	☐-MODERATE [2]	☐-RELOCATION	☐-ISLANDS
☐-LOW [2]	☐ - FAIR [3]	☐ - RECOVERING [3]	☐-LOW [1]	☐-CANOPY REMOVAL	☐ - LEVEED
■-NONE [1]	■-POOR [1]	☐ - RECENT OR NO RECOVERY [1]		■-DREDGING	■-BANKSHAPING
				☐-ONE SIDE CHANNEL MODIFICATIONS	

Channel: 6 Max 20

COMMENTS: CHANNEL ROUTINELY DREDGED

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R Per Bank)	FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) (L R Most Predominant Per Bank)		BANK EROSION (L R Per Bank)	
☐ ☐ -WIDE > 50m [4]	☐ ☐-FOREST, SWAMP [3]	☐ ☐-CONSERVATION TILLAGE [1]	■ ■-NONE/LITTLE [3]	
☐ ☐-MODERATE 10-50m [3]	☐ ☐-SHRUB OR OLD FIELD [2]	■ ■-URBAN OR INDUSTRIAL [0]	☐ ☐-MODERATE [2]	
☐ ☐ -NARROW 5-10m [2]	☐ ☐-RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐-OPEN PASTURE, ROWCROP [0]	☐ ☐-HEAVY/SEVERE [1]	
☐ ☐ -VERY NARROW < 5m [1]	☐ ☐-FENCED PASTURE [1]	☐ ☐-MINING/CONSTRUCTION [0]		
■ ■ -NONE [0]				

Riparian: 3 Max 10

COMMENTS: STEEL-LINED BANKS

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
■ - > 1m [6]
☐ - 0.7-1m [4]
☐ - 0.4-0.7m [2]
☐ - 0.2-0.4m [1]
☐ - < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
■ -POOL WIDTH > RIFFLE WIDTH [2]
☐-POOL WIDTH = RIFFLE WIDTH [1]
☐ -POOL WIDTH < RIFFLE W. [0]

CURRENT VELOCITY [POOLS & RIFFLES!] (Check *All* That Apply)
☐ -EDDIES [1]
☐ -FAST [1]
☐ -MODERATE [1]
■ -SLOW [1]
☐ -TORRENTIAL [-1]
☐ -INTERSTITIAL [-1]
☐ -INTERMITTENT [-2]

Pool/Current: 9 Max 12

COMMENTS:

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH
☐ - Generally > 10 cm, MAX > 50 [4]
☐ - Generally > 10 cm, MAX < 50 [3]
☐ - Generally 5-10 cm [1]
☐ - Generally < 5 cm [RIFFLE=0]

RIFFLE/RUN SUBSTRATE
☐-STABLE (e.g., Cobble, Boulder) [2]
☐-MOD. STABLE (e.g., Large Gravel) [1]
☐-UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE/RUN EMBEDDEDNESS
☐ - NONE [2]
☐ - LOW [1]
☐ - MODERATE [0]
☐ - EXTENSIVE [-1]
■ - NO RIFFLE [Metric=0]

Riffle/Run: 0 Max 8

Gradient: 8 Max 10

6] GRADIENT (ft/mi): 0.9 DRAINAGE AREA (sq.mi.): 809 %POOL: ___ %GLIDE: ___ %RIFFLE: ___ %RUN: ___

* Habitat must be large enough to support a population of mile-obligate fish species.

Ohio EPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 29.5

River Code:_____ RM: 3.3 Stream CUYAHOGA RIVER
Date 10/27/98 Location SITE #22 WEST 3RD STREET BRIDGE
Scorers Initials: CZ TZ Comments (NAVIGATION CHANNEL)

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR/SLBS[10]	___	___
☐ ☐-BOULDER [9]	___	___
☐ ☐-COBBLE [8]	___	___
☐ ☐-HARDPAN [4]	___	___
■ ■-MUCK [2]	✓	___
☐ ☐-SILT [2]	✓	___
☐ ☐-GRAVEL [7]	___	___
☐ ☐-SAND [6]	___	___
☐ ☐-BEDROCK[5]	___	___
☐ ☐-DETRITUS[3]	___	___
☐ ☐-ARTIFICIAL[0]	___	___

NOTE : *(Ignore sludge originating from point-sources; score on natural substrates)*
NUMBER OF SUBSTRATE TYPES: ☐-5 or More [2] ■-4 or Less [0]
COMMENTS USED PENCIL SONAR DREDGE TO DETERMINE TYPE.

SUBSTRATE ORIGIN (Check ONE (OR 2 & AVERAGE)): ☐ -LIMESTONE [1] ■ -TILLS [1] ☐ -WETLANDS[0] ☐ -HARDPAN [0] ☐ -SANDSTONE [0] ☐ -RIP/RAP [0] ☐ -LACUSTRINE [0] ☐ -SHALE [-1] ☐ -COAL FINES [-2]

SILT: ☐ -SILT HEAVY [-2] ■ -SILT MODERATE [-1] ☐ -SILT NORMAL [0] ☐ -SILT FREE [1]

EMBEDDEDNESS: ■ -EXTENSIVE [-2] ■ -MODERATE [-1] ☐ -NORMAL [0] ☐ -NONE [1]

SUBSTRATE QUALITY (Check ONE (OR 2 & AVERAGE))

Substrate: 2.5 Max 20

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
☐ -UNDERCUT BANKS [1] ☐ -POOLS> 70 cm [2] ☐ -OXBOWS, BACKWATERS [1]
☐ -OVERHANGING VEGETATION [1] ☐ -ROOTWADS [1] ☐ -AQUATIC MACROPHYTES [1]
☐ -SHALLOWS (IN SLOW WATER) [1] ☐ -BOULDERS [1] ☐ -LOGS OR WOODY DEBRIS [1]
☐ -ROOTMATS [1]
COMMENTS:

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐ - EXTENSIVE > 75% [11]
☐ - MODERATE 25-75% [7]
☐ - SPARSE 5-25% [3]
☐ - NEARLY ABSENT < 5% [1]

Cover: 1 Max 20

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH [4]	☐-EXCELLENT [7]	■-NONE [6]	■-HIGH [3]	☐-SNAGGING	☐-IMPOUND.
☐-MODERATE [3]	☐-GOOD [5]	☐-RECOVERED [4]	☐-MODERATE [2]	☐-RELOCATION	☐-ISLANDS
☐-LOW [2]	☐-FAIR [3]	☐-RECOVERING [3]	☐-LOW [1]	☐-CANOPY REMOVAL	☐-LEVEED
■-NONE [1]	■-POOR [1]	☐-RECENT OR NO RECOVERY [1]		■-DREDGING	■-BANK SHAPING
				☐-ONE SIDE CHANNEL MODIFICATIONS	

Channel: 6 Max 20

COMMENTS: CHANNEL ROUTINELY DREDGED

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R Per Bank)	FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) (L R Most Predominant Per Bank)		BANK EROSION (L R Per Bank)
☐ ☐-WIDE > 50m [4]	☐ ☐-FOREST, SWAMP [3]	☐ ☐-CONSERVATION TILLAGE [1]	■ ■-NONE/LITTLE [3]
☐ ☐-MODERATE 10-50m [3]	☐ ☐-SHRUB OR OLD FIELD [2]	■ ■-URBAN OR INDUSTRIAL [0]	☐ ☐-MODERATE [2]
☐ ☐-NARROW 5-10m [2]	☐ ☐-RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐-OPEN PASTURE, ROWCROP [0]	☐ ☐-HEAVY/SEVERE [1]
☐ ☐-VERY NARROW < 5m [1]	☐ ☐-FENCED PASTURE [1]	☐ ☐-MINING/CONSTRUCTION [0]	
■ ■-NONE [0]			

Riparian: 3 Max 10

COMMENTS: STEEL-LINED BANKS

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
■ - > 1m [6]
☐ - 0.7-1m [4]
☐ - 0.4-0.7m [2]
☐ - 0.2-0.4m [1]
☐ - < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
■ -POOL WIDTH > RIFFLE WIDTH [2]
☐ -POOL WIDTH = RIFFLE WIDTH [1]
☐ -POOL WIDTH < RIFFLE W. [0]

CURRENT VELOCITY [POOLS & RIFFLES!] (Check *All* That Apply)
☐ -EDDIES [1] ☐ -TORRENTIAL [-1]
☐ -FAST [1] ☐ -INTERSTITIAL [-1]
☐ -MODERATE [1] ☐ -INTERMITTENT [-2]
■ -SLOW [1]

Pool/Current: 9 Max 12

COMMENTS:

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH
☐ - Generally > 10 cm, MAX > 50 [4]
☐ - Generally > 10 cm, MAX < 50 [3]
☐ - Generally 5-10 cm [1]
☐ - Generally < 5 cm [RIFFLE=0]

RIFFLE/RUN SUBSTRATE
☐ -STABLE (e.g., Cobble, Boulder) [2]
☐ -MOD. STABLE (e.g., Large Gravel) [1]
☐ -UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE/RUN EMBEDDEDNESS
☐ - NONE [2]
☐ - LOW [1]
☐ - MODERATE [0]
☐ - EXTENSIVE [-1]

■ - NO RIFFLE [Metric=0]

Riffle/Run: 0 Max 8

COMMENTS:

Gradient: 8 Max 10

6] GRADIENT (ft/mi): 0.9 DRAINAGE AREA (sq.mi.): 805

%POOL: ___ %GLIDE: ___
%RIFFLE: ___ %RUN: ___

* Pool areas must be large enough to support a population of riffle-obligate fish species.

Ohio EPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 33.5

River Code:_____ RM: 5.6 Stream CUYAHOGA RIVER
Date 10/27/98 Location SITE # 22.5 NEWBURG AND SOUTH SHORE RAILROAD BRIDGE
Scorers Initials: C2 T2 Comments (HEAD OF NAVIGATION CHANNEL)

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR /SLBS[10]	___	___
☐ ☐-BOULDER [9]	___	___
☐ ☐-COBBLE [8]	___	___
☐ ☐-HARDPAN [4]	✓	___
■ ■-MUCK [2]	✓	___
☐ ☐-SILT [2]	✓	___
☐ ☐-GRAVEL [7]	✓	___
☐ ☐-SAND [6]	✓	___
☐ ☐-BEDROCK[5]	___	___
☐ ☐-DETRITUS[3]	___	___
☐ ☐-ARTIFICIAL[0]	___	___

NOTE : (Ignore sludge originating from point-sources; score on natural substrates)
NUMBER OF SUBSTRATE TYPES: ☐-4 or Less [0] ■-5 or More [2]

SUBSTRATE ORIGIN (Check ONE (OR 2 & AVERAGE))
☐ -LIMESTONE [1]
■ -TILLS [1]
☐ -WETLANDS[0]
☐ -HARDPAN [0]
☐ -SANDSTONE [0]
☐ -RIP/RAP [0]
☐ -LACUSTRINE [0]
☐ -SHALE [-1]
☐ -COAL FINES [-2]

SILT:
☐ -SILT HEAVY [-2]
■ -SILT MODERATE [-1]
☐ -SILT NORMAL [0]
☐ -SILT FREE [1]

EMBEDDEDNESS:
■ -EXTENSIVE [-2]
■ -MODERATE [-1]
☐ -NORMAL [0]
☐ -NONE [1]

SUBSTRATE QUALITY (Check ONE (OR 2 & AVERAGE))

Substrate: 4.5 Max 20

COMMENTS: USED PETITE PONAR DREDGE TO DETERMINE TYPE

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
■ -UNDERCUT BANKS [1]
☐ -OVERHANGING VEGETATION [1]
☐ -SHALLOWS (IN SLOW WATER) [1]
☐ -ROOTMATS [1]
☐ -POOLS > 70 cm [2]
☐ -ROOTWADS [1]
☐ -BOULDERS [1]
☐ -OXBOWS, BACKWATERS [1]
☐ -AQUATIC MACROPHYTES [1]
■ -LOGS OR WOODY DEBRIS [1]

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐ - EXTENSIVE > 75% [11]
☐ - MODERATE 25-75% [7]
☐ - SPARSE 5-25% [3]
■ - NEARLY ABSENT < 5% [1]

Cover: 3 Max 20

COMMENTS:

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH [4]	☐ - EXCELLENT [7]	■-NONE [6]	■-HIGH [3]	☐-SNAGGING	☐-IMPOUND.
☐-MODERATE [3]	☐-GOOD [5]	☐ - RECOVERED [4]	☐-MODERATE [2]	☐-RELOCATION	☐-ISLANDS
☐-LOW [2]	☐ - FAIR [3]	☐ - RECOVERING [3]	☐-LOW [1]	☐-CANOPY REMOVAL	☐ - LEVEED
■-NONE [1]	■-POOR [1]	☐ - RECENT OR NO RECOVERY [1]		■-DREDGING	■-BANK SHAPING
				☐-ONE SIDE CHANNEL MODIFICATIONS	

Channel: 6 Max 20

COMMENTS: CHANNEL ROUTINELY DREDGED

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R Per Bank)	FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) (L R Most Predominant Per Bank)		BANK EROSION (L R Per Bank)
☐ ☐ -WIDE > 50m [4]	☐ ☐-FOREST, SWAMP [3]	☐ ☐-CONSERVATION TILLAGE [1]	■ ■-NONE/LITTLE [3]
☐ ☐-MODERATE 10-50m [3]	☐ ☐-SHRUB OR OLD FIELD [2]	■ ■-URBAN OR INDUSTRIAL [0]	☐ ☐-MODERATE [2]
☐ ☐ -NARROW 5-10m [2]	☐ ☐-RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐-OPEN PASTURE, ROWCROP [0]	☐ ☐-HEAVY/SEVERE [1]
☐ ☐ -VERY NARROW < 5m [1]	☐ ☐-FENCED PASTURE [1]	☐ ☐-MINING/CONSTRUCTION [0]	
■ ■ -NONE [0]			

Riparian: 3 Max 10

COMMENTS: STEEL-LINED BANKS

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
■ - > 1m [6]
☐ - 0.7-1m [4]
☐ - 0.4-0.7m [2]
☐ - 0.2-0.4m [1]
☐ - < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
■ -POOL WIDTH > RIFFLE WIDTH [2]
☐ -POOL WIDTH = RIFFLE WIDTH [1]
☐ -POOL WIDTH < RIFFLE W. [0]

CURRENT VELOCITY (POOLS & RIFFLES!) (Check *All* That Apply)
☐ -EDDIES [1]
☐ -FAST [1]
☐ -MODERATE [1]
■ -SLOW [1]
☐ -TORRENTIAL [-1]
☐ -INTERSTITIAL [-1]
☐ -INTERMITTENT [-2]

Pool/Current: 9 Max 12

COMMENTS:

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH
☐ - Generally > 10 cm, MAX > 50 [4]
☐ - Generally > 10 cm, MAX < 50 [3]
☐ - Generally 5-10 cm [1]
☐ - Generally < 5 cm [RIFFLE=0]

RIFFLE/RUN SUBSTRATE
☐-STABLE (e.g., Cobble, Boulder) [2]
☐-MOD. STABLE (e.g., Large Gravel) [1]
☐-UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE/RUN EMBEDDEDNESS
☐ - NONE [3]
☐ - LOW [1]
☐ - MODERATE [0]
☐ - EXTENSIVE [-1]

■ - NO RIFFLE [Metric=0]

Riffle/Run: 0 Max 8

Gradient: 8 Max 10

COMMENTS:

6] GRADIENT (ft/mi): 0.9 **DRAINAGE AREA (sq.mi.):** 788 %POOL: ___ %GLIDE: ___ %RIFFLE: ___ %RUN: ___

* Trout streams must be large enough to support a population of riffle-obligate fish species.

Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 61.5

River Code____ River Mile 7.1 Stream CUYAHOGA RIVER
Date 9/25/97 Location SITE # 22.51 (LOWER HARVARD AVENUE BRIDGE)
Scorers Initials: JJ Comments:____

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR /SLBS[10]	___	___
☐ ☐-BOULDER [9]	___	___
☐ ☐-COBBLE [8]	___	___
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	✓	✓
☐ ☐-SILT [2]	✓	✓
■ ☐-GRAVEL [7]	✓	✓
■ ☐-SAND [6]	✓	✓
☐ ☐-BEDROCK[5]	___	___
☐ ☐-DETRITUS[3]	___	___
☐ ☐-ARTIFICIAL[0]	✓	✓

NOTE : (Ignore sludge originating from point-sources; score on natural substrates)
NUMBER OF SUBSTRATE TYPES: ■-5 or More [2] ☐-4 or Less [0]

SUBSTRATE ORIGIN — Check ONE (OR 2 & AVERAGE)
☐ -LIMESTONE [1]
■ -TILLS [1]
☐ -WETLANDS[0]
☐ -HARDPAN [0]
☐ -SANDSTONE [0]
☐ -RIP/RAP [0]
☐ -LACUSTRINE [0]
☐ -SHALE [-1]
☐-COAL FINES [-2]

SUBSTRATE QUALITY — Check ONE (OR 2 & AVERAGE)
SILT:
☐ -SILT HEAVY [-2]
■ -SILT MODERATE [-1]
☐ -SILT NORMAL [0]
☐ -SILT FREE [1]
EMBEDDEDNESS:
☐ -EXTENSIVE [-2]
■ -MODERATE [-1]
☐ -NORMAL [0]
☐ -NONE [1]

Substrate: 14 (Max 20)

COMMENTS:____

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
☐-UNDERCUT BANKS [1]
■-OVERHANGING VEGETATION [1]
☐-SHALLOWS (IN SLOW WATER) [1]
☐-ROOTMATS [1]
■-DEEP POOLS > 70cm [2]
■-ROOTWADS [1]
■-BOULDERS [1]
☐-OXBOWS [1]
■-AQUATIC MACROPHYTES [1]
■-LOGS OR WOODY DEBRIS [1]

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐-EXTENSIVE > 75% [11]
☐-MODERATE 25-75% [7]
☐-SPARSE 5-25% [3]
■-NEARLY ABSENT < 5% [1]

Cover: 7 (Max 20)

COMMENTS:____

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH [4]	☐-EXCELLENT [7]	■-NONE [6]	■-HIGH [3]	☐-SNAGGING	☐-IMPOUND.
☐-MODERATE [3]	☐-GOOD [5]	☐-RECOVERED [4]	■-MODERATE [2]	☐-RELOCATION	☐-ISLANDS
■-LOW [2]	■-FAIR [3]	☐-RECOVERING [3]	☐-LOW [1]	☐-CANOPY REMOVAL	☐-LEVEED
☐-NONE [1]	■-POOR [1]	☐-RECENT OR NO RECOVERY [1]		☐-DREDGING	☐-BANK SHAPING
				☐-ONE SIDE CHANNEL MODIFICATIONS	

Channel: 12.5 (Max 20)

COMMENTS:____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R (Per Bank))	FLOOD PLAIN QUALITY (PAST 100 FOOT RIPARIAN) (L R (Most Predominant Per Bank))	BANK EROSION (L R (Per Bank))
☐ ■-WIDE > 50m [4]	☐ ☐-FOREST, SWAMP [3]	■ ■-NONE/LITTLE [3]
☐ ☐-MODERATE 10-50m [3]	☐ ☐-SHRUB OR OLD FIELD [2]	■ ■-MODERATE [2]
☐ ☐-NARROW 5-10m [2]	☐ ☐-RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐-HEAVY/SEVERE [1]
■ ☐-VERY NARROW < 5m [1]	☐ ☐-FENCED PASTURE [1]	
☐ ☐-NONE [0]	■ ■-URBAN OR INDUSTRIAL [0]	
	☐ ☐-OPEN PASTURE, ROWCROP [0]	
	☐ ☐-MINING/CONSTRUCTION [0]	

Riparian: 5 (Max 10)

COMMENTS:____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
■ - > 1m [6]
☐-0.7-1m [4]
☐-0.4-0.7m [2]
☐-0.2-0.4m [1]
☐ - < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☐-POOL WIDTH > RIFFLE WIDTH [2]
■-POOL WIDTH = RIFFLE WIDTH [1]
☐-POOL WIDTH < RIFFLE W. [0]

CURRENT VELOCITY (POOL & RIFFLES!) (Check *All* That Apply)
■-EDDIES [1]
■-FAST [1]
■-MODERATE [1]
☐-SLOW [1]
☐-TORRENTIAL [-1]
☐-INTERSTITIAL [-1]
☐-INTERMITTENT [-2]

Pool/Glide: 10 (Max 12)

COMMENTS:____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE /RUN DEPTH	RIFFLE/RUN SUBSTRATE	RIFFLE/RUN EMBEDDEDNESS
■ - GENERALLY > 10 cm; MAX > 50 [4]	☐-STABLE (e.g., Cobble, Boulder) [2]	☐ - NONE [2]
☐ - GENERALLY > 10 cm; MAX < 50 [3]	■-MOD. STABLE (e.g., Large Gravel) [1]	☐ - LOW [1]
☐ - GENERALLY 5-10 cm [1]	☐-UNSTABLE (Fine Gravel, Sand) [0]	■ - MODERATE [0]
☐-GENERALLY < 5 cm [RIFFLE=0]		☐-EXTENSIVE [-1]

Riffle/Run: 5 (Max 8)

COMMENTS:____ ☐- NO RIFFLE [Metric=0]

Gradient: 8 (Max 10)

6] GRADIENT (ft/mi): 0.9 DRAINAGE AREA (sq.mi.): 786 %POOL: ____ %GLIDE: ____ %RIFFLE: ____ %RUN: ____

OHIO EPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 64

River Code:________ RM: 7.1 Stream Cuyahoga River
Date 10/27/98 Location Site #22.51 Lower Harvard Avenue Bridge
Scorers Initials: CZ TZ Comments

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE	TYPE	POOL	RIFFLE	SUBSTRATE ORIGIN	SUBSTRATE QUALITY
						Check ONE (OR 2 & AVERAGE)	Check ONE (OR 2 & AVERAGE)
☐ ☐-BLDR /SLBS[10]	✓		☐ ☐-GRAVEL [7]	✓	✓	☐ -LIMESTONE [1]	SILT: ☐ -SILT HEAVY [-2]
☐ ☐-BOULDER [9]			■ ☐-SAND [6]	✓	✓	■ -TILLS [1]	■ -SILT MODERATE [-1]
■ ☐-COBBLE [8]	✓	✓	☐ ☐-BEDROCK[5]			☐ -WETLANDS[0]	☐ -SILT NORMAL [0]
☐ ☐-HARDPAN [4]			☐ ☐-DETRITUS[3]			☐ -HARDPAN [0]	☐ -SILT FREE [1]
☐ ☐-MUCK [2]			☐ ☐-ARTIFICIAL[0]	✓		☐ -SANDSTONE [0]	EMBEDDEDNESS: ☐ -EXTENSIVE [-2]
☐ ☐-SILT [2]	✓					☐ -RIP/RAP [0]	■ -MODERATE [-1]
						☐ -LACUSTRINE [0]	☐ -NORMAL [0]
						☐ -SHALE [-1]	☐ -NONE [1]
						☐-COAL FINES [-2]	

NOTE : (Ignore sludge originating from point-sources; score on natural substrates)
NUMBER OF SUBSTRATE TYPES: ■-5 or More [2] ☐-4 or Less [0]
COMMENTS

Substrate: 15 (Max 20)

2] INSTREAM COVER

TYPE: (Check *All* That Apply)

☐ -UNDERCUT BANKS [1] ■ -POOLS> 70 cm [2] ☐ -OXBOWS, BACKWATERS [1]
☐ -OVERHANGING VEGETATION [1] ☐ -ROOTWADS [1] ☐ -AQUATIC MACROPHYTES [1]
■ -SHALLOWS (IN SLOW WATER) [1] ■ -BOULDERS [1] ■ -LOGS OR WOODY DEBRIS [1]
☐ -ROOTMATS [1] COMMENTS:

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐ - EXTENSIVE > 75% [11]
☐ - MODERATE 25-75% [7]
■ - SPARSE 5-25% [3]
☐ - NEARLY ABSENT < 5% [1]

Cover: 8 (Max 20)

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH [4]	☐- EXCELLENT [7]	■-NONE [6]	■-HIGH [3]	☐-SNAGGING	☐-IMPOUND.
☐-MODERATE [3]	☐-GOOD [5]	☐- RECOVERED [4]	☐-MODERATE [2]	☐-RELOCATION	☐- ISLANDS
■-LOW [2]	■- FAIR [3]	☐- RECOVERING [3]	☐-LOW [1]	☐-CANOPY REMOVAL	☐- LEVEED
☐-NONE [1]	☐-POOR [1]	☐- RECENT OR NO RECOVERY [1]		☐-DREDGING	☐-BANKSHAPING
				☐-ONE SIDE CHANNEL MODIFICATIONS	

COMMENTS:

Channel: 14 (Max 20)

4]. RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH L R (Per Bank)	FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) L R (Most Predominant Per Bank)	L R	BANK EROSION L R (Per Bank)
■ ■ -WIDE > 50m [4]	☐ ☐-FOREST, SWAMP [3]	☐ ☐-CONSERVATION TILLAGE [1]	■ ■-NONE/LITTLE [3]
☐ ☐-MODERATE 10-50m [3]	■ ■-SHRUB OR OLD FIELD [2]	■ ■-URBAN OR INDUSTRIAL [0]	☐ ☐-MODERATE [2]
☐ ☐-NARROW 5-10m [2]	☐ ☐-RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐-OPEN PASTURE, ROWCROP [0]	☐ ☐-HEAVY/SEVERE [1]
■ ■-VERY NARROW < 5m [1]	☐ ☐-FENCED PASTURE [1]	☐ ☐-MINING/CONSTRUCTION [0]	
☐ ☐-NONE [0]			

COMMENTS:

Riparian: 6.5 (Max 10)

5.] POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)	MORPHOLOGY (Check 1 or 2 & AVERAGE)	CURRENT VELOCITY [POOLS & RIFFLES!] (Check *All* That Apply)	
■ - >1m [6]	☐ -POOL WIDTH > RIFFLE WIDTH [2]	☐ -EDDIES [1]	☐ -TORRENTIAL [-1]
☐ - 0.7-1m [4]	☐ -POOL WIDTH = RIFFLE WIDTH [1]	☐ -FAST [1]	☐ -INTERSTITIAL [-1]
☐ - 0.4-0.7m [2]	■ -POOL WIDTH < RIFFLE W. [0]	■ -MODERATE [1]	☐ -INTERMITTENT [-2]
☐ - 0.2-0.4m [1]		■ -SLOW [1]	
☐ - < 0.2m [POOL=0]			

COMMENTS:

Pool/Current: 8 (Max 12)

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH	RIFFLE/RUN SUBSTRATE	RIFFLE/RUN EMBEDDEDNESS
☐ - Generally >10 cm, MAX > 50 [4]	■ -STABLE (e.g., Cobble, Boulder) [2]	☐ - NONE [2]
■ - Generally > 10 cm, MAX < 50 [3]	■ -MOD. STABLE (e.g., Large Gravel) [1]	☐ - LOW [1]
☐ - Generally 5-10 cm [1]	☐ -UNSTABLE (Fine Gravel, Sand) [0]	■ - MODERATE [0]
☐ - Generally < 5 cm [RIFFLE=0]		☐ - EXTENSIVE [-1]

COMMENTS: ☐ - NO RIFFLE [Metric=0]

Riffle/Run: 4.5 (Max 8)

Gradient: 8 (Max 10)

6] GRADIENT (ft/mi): 0.9 **DRAINAGE AREA (sq.mi.):** 786

%POOL: ____ %GLIDE: ____
%RIFFLE: ____ %RUN: ____

* ...must be large enough to support a population of riffle-obligate fish species.

EPA 4520 7/24/97

OhioEPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 57

River Code:_____ RM: 7.9 Stream CUYAHOGA RIVER
Date 10/27/98 Location SITE #22.6 (ADJACENT TO RIVER RECYCLING INDUSTRIES, 4195 BRADLEY ROAD)
Scorers Initials: CZ TZ Comments_____

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR /SLBS[10]	___	___
☐ ☐-BOULDER [9]	✓	___
☐ ☐-COBBLE [8]	✓	___
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	✓	___
■ ☐-GRAVEL [7]	✓	___
■ ☐-SAND [6]	✓	___
☐ ☐-BEDROCK[5]	___	___
☐ ☐-DETRITUS[3]	___	___
☐ ☐-ARTIFICIAL[0]	✓	___

NOTE : *(Ignore sludge originating from point-sources; score on natural substrates)*
NUMBER OF SUBSTRATE TYPES: ■-5 or More [2] ☐-4 or Less [0]

SUBSTRATE ORIGIN (Check ONE (OR 2 & AVERAGE)): ☐ -LIMESTONE [1] ■ -TILLS [1] ☐ -WETLANDS[0] ☐ -HARDPAN [0] ☐ -SANDSTONE [0] ☐ -RIP/RAP [0] ☐ -LACUSTRINE [0] ☐ -SHALE [-1] ☐-COAL FINES [-2]

SILT: ☐ -SILT HEAVY [-2] ■ -SILT MODERATE [-1] ☐ -SILT NORMAL [0] ☐ -SILT FREE [1]

EMBEDDEDNESS: ■ -EXTENSIVE [-2] ■ -MODERATE [-1] ☐ -NORMAL [0] ☐ -NONE [1]

SUBSTRATE QUALITY (Check ONE (OR 2 & AVERAGE))

Substrate: 13.5 Max 20

COMMENTS_____

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
■ -UNDERCUT BANKS [1] ■ -POOLS > 70 cm [2] ☐ -OXBOWS, BACKWATERS [1]
☐ -OVERHANGING VEGETATION [1] ■ -ROOTWADS [1] ☐ -AQUATIC MACROPHYTES [1]
☐-SHALLOWS (IN SLOW WATER) [1] ■ -BOULDERS [1] ■-LOGS OR WOODY DEBRIS [1]
■-ROOTMATS [1] COMMENTS:_____

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐ - EXTENSIVE > 75% [11]
☐ - MODERATE 25-75% [7]
■ - SPARSE 5-25% [3]
☐ - NEARLY ABSENT < 5% [1]

Cover: 10 Max 20

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH [4]	☐ - EXCELLENT [7]	■-NONE [6]	■-HIGH [3]	☐-SNAGGING	☐-IMPOUND.
☐-MODERATE [3]	☐-GOOD [5]	☐ - RECOVERED [4]	■-MODERATE [2]	☐-RELOCATION	☐-ISLANDS
■-LOW [2]	☐ - FAIR [3]	☐ - RECOVERING [3]	☐-LOW [1]	☐-CANOPY REMOVAL	☐ - LEVEED
■-NONE [1]	■-POOR [1]	☐ - RECENT OR NO RECOVERY [1]		☐-DREDGING	☐-BANK SHAPING
				☐-ONE SIDE CHANNEL MODIFICATIONS	

Channel: 11 Max 20

COMMENTS:_____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R Per Bank)	FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) (L R Most Predominant Per Bank)		BANK EROSION (L R Per Bank)	
☐ ☐ -WIDE > 50m [4]	☐ ☐-FOREST, SWAMP [3]	☐ ☐-CONSERVATION TILLAGE [1]	■ ■-NONE/LITTLE [3]	
☐ ■ -MODERATE 10-50m [3]	☐ ☐-SHRUB OR OLD FIELD [2]	■ ■-URBAN OR INDUSTRIAL [0]	☐ ☐-MODERATE [2]	
☐ ■ -NARROW 5-10m [2]	☐ ☐-RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐-OPEN PASTURE, ROWCROP [0]	☐ ☐-HEAVY/SEVERE [1]	
■ ☐ -VERY NARROW < 5m [1]	☐ ☐-FENCED PASTURE [1]	☐ ☐-MINING/CONSTRUCTION [0]		
■ ☐ -NONE [0]				

Riparian: 4.5 Max 10

COMMENTS:_____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
■ - > 1m [6]
☐ - 0.7-1m [4]
☐ - 0.4-0.7m [2]
☐ - 0.2-0.4m [1]
☐ - < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
■ -POOL WIDTH > RIFFLE WIDTH [2]
☐-POOL WIDTH = RIFFLE WIDTH [1]
☐ -POOL WIDTH < RIFFLE W. [0]

CURRENT VELOCITY [POOLS & RIFFLES!] (Check *All* That Apply)
☐ -EDDIES [1] ☐ -TORRENTIAL [-1]
☐ -FAST [1] ☐ -INTERSTITIAL [-1]
■ -MODERATE [1] ☐ -INTERMITTENT [-2]
■ -SLOW [1]

Pool/Current: 10 Max 12

COMMENTS:_____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH
☐ - Generally > 10 cm, MAX > 50 [4]
☐ - Generally > 10 cm, MAX < 50 [3]
☐ - Generally 5-10 cm [1]
☐ - Generally < 5 cm [RIFFLE=0]

RIFFLE/RUN SUBSTRATE
☐-STABLE (e.g., Cobble, Boulder) [2]
☐-MOD. STABLE (e.g., Large Gravel) [1]
☐-UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE/RUN EMBEDDEDNESS
☐ - NONE [3]
☐ - LOW [1]
☐ - MODERATE [0]
☐ - EXTENSIVE [-1]

■ - NO RIFFLE [Metric=0]

Riffle/Run: 0 Max 8

COMMENTS:_____

Gradient: 8 Max 10

6] GRADIENT (ft/mi): 0.9 **DRAINAGE AREA (sq.mi.):** 749 %POOL: ___ %GLIDE: ___ %RIFFLE: ___ %RUN: ___

* Head waters must be large enough to support a population of riffle-obligate fish species.

Ohio EPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 56.75

River Code:_____ RM: 9.7 Stream CUYAHOGA RIVER
Date 10/27/98 Location SITE #22.7 (SOUTHWEST INTERCEPTOR CROSSING)
Scorers Initials: CZ TZ Comments_____

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR/SLBS[10]	___	___
☐ ☐-BOULDER [9]	___	___
☐ ☐-COBBLE [8]	✓	___
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	✓	___
☐ ☐-GRAVEL [7]	✓	___
■ ■-SAND [6]	✓	___
☐ ☐-BEDROCK[5]	___	___
☐ ☐-DETRITUS[3]	___	___
☐ ☐-ARTIFICIAL[0]	___	___

NOTE : *(Ignore sludge originating from point-sources; score on natural substrates)*
NUMBER OF SUBSTRATE TYPES: ☐-5 or More [2] ■-4 or Less [0]

SUBSTRATE ORIGIN — Check ONE (OR 2 & AVERAGE)
☐ -LIMESTONE [1]
☐ -TILLS [1]
☐ -WETLANDS[0]
☐ -HARDPAN [0]
☐ -SANDSTONE [0]
☐ -RIP/RAP [0]
☐ -LACUSTRINE [0]
☐ -SHALE [-1]
☐-COAL FINES [-2]

SILT: EMBEDDEDNESS:

SUBSTRATE QUALITY — Check ONE (OR 2 & AVERAGE)
■ -SILT HEAVY [-2]
■ -SILT MODERATE [-1]
☐ -SILT NORMAL [0]
☐ -SILT FREE [1]
☐ -EXTENSIVE [-2]
■ -MODERATE [-1]
☐ -NORMAL [0]
☐ -NONE [1]

Substrate: 11 Max 20

COMMENTS_____

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
■ -UNDERCUT BANKS [1]
☐ -OVERHANGING VEGETATION [1]
☐-SHALLOWS(INSLOWWATER)[1]
■-ROOTMATS[1]
■ -POOLS>70 cm [2]
■ -ROOTWADS [1]
■-BOULDERS[1]
☐ -OXBOWS, BACKWATERS [1]
☐ -AQUATIC MACROPHYTES [1]
■-LOGSORWOODYDEBRIS[1]

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐ - EXTENSIVE > 75% [11]
☐ - MODERATE 25-75% [7]
■-SPARSE 5-25% [3]
☐-NEARLYABSENT<5%[1]

Cover: 10 Max 20

COMMENTS:_____

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH[4]	☐-EXCELLENT[7]	■-NONE[6]	■-HIGH[3]	☐-SNAGGING	☐-IMPOUND.
☐-MODERATE[3]	☐-GOOD[5]	☐-RECOVERED[4]	■-MODERATE[2]	☐-RELOCATION	☐-ISLANDS
■-LOW[2]	☐-FAIR[3]	☐-RECOVERING[3]	☐-LOW[1]	☐-CANOPYREMOVAL	☐-LEVEED
■-NONE[1]	■-POOR[1]	☐-RECENT ORNO RECOVERY[1]		☐-DREDGING	■-BANKSHAPING
				☐-ONESIDECHANNELMODIFICATIONS	

Channel: 11 Max 20

COMMENTS:_____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R Per Bank)	FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) (L R Most Predominant Per Bank)		BANK EROSION (L R Per Bank)
■ ☐-WIDE>50m[4]	■ ■-FOREST,SWAMP[3]	☐ ☐-CONSERVATIONTILLAGE[1]	■ ■-NONE/LITTLE[3]
☐ ■-MODERATE10-50m[3]	☐ ☐-SHRUBOROLDFIELD[2]	■ ☐-URBANORINDUSTRIAL[0]	☐ ■-MODERATE[2]
☐ ☐-NARROW5-10m[2]	☐ ☐-RESIDENTIAL,PARK,NEWFIELD[1]	☐ ☐-OPENPASTURE,ROWCROP[0]	☐ ☐-HEAVY/SEVERE[1]
☐ ☐-VERYNARROW<5m[1]	☐ ☐-FENCED PASTURE[1]	☐ ☐-MINING/CONSTRUCTION[0]	
■ ■-NONE[0]			

Riparian: 6.75 Max 10

COMMENTS:_____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)	MORPHOLOGY (Check 1 or 2 & AVERAGE)	CURRENT VELOCITY [POOLS & RIFFLES!] (Check *All* That Apply)	
■ - >1m [6]	■ -POOL WIDTH > RIFFLE WIDTH [2]	☐ -EDDIES[1]	☐ -TORRENTIAL[-1]
☐- 0.7-1m[4]	☐-POOLWIDTH=RIFFLEWIDTH[1]	☐ -FAST[1]	☐ -INTERSTITIAL[-1]
☐- 0.4-0.7m[2]	☐ -POOLWIDTH<RIFFLEW.[0]	■ -MODERATE[1]	☐ -INTERMITTENT[-2]
☐- 0.2-0.4m[1]		■ -SLOW[1]	
☐ - < 0.2m [POOL=0]			

Pool/Current: 10 Max 12

COMMENTS:_____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH	RIFFLE/RUN SUBSTRATE	RIFFLE/RUN EMBEDDEDNESS
☐ - Generally >10 cm, MAX > 50 [4]	☐-STABLE (e.g.,Cobble, Boulder) [2]	☐ - NONE [3]
☐ - Generally > 10 cm, MAX < 50 [3]	☐-MOD. STABLE (e.g.,Large Gravel) [1]	☐ - LOW [1]
☐ - Generally 5-10 cm[1]	☐-UNSTABLE (Fine Gravel,Sand) [0]	☐ - MODERATE [0]
☐ - Generally < 5 cm [RIFFLE=0]		☐ - EXTENSIVE [-1]
		■ - NO RIFFLE [Metric=0]

Riffle/Run: 0 Max 8

Gradient: 8 Max 10

COMMENTS:_____

6] GRADIENT (ft/mi): 0.9 **DRAINAGE AREA (sq.mi.):** 733 %POOL: ____ %GLIDE: ____ %RIFFLE: ____ %RUN: ____

* Pool areas must be large enough to support a population of pool-obligate fish species.

Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 63.75

River Code: ____ RM: 10.5 Stream CUYAHOGA RIVER
Date 9/25/97 Location DOWNSTREAM OF SOUTHERLY WWTP EFFLUENT CHANNEL
Scorers Initials: JJ Comments ELECTROFISHING SITE

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR /SLBS[10]	___	___
☐ ☐-BOULDER [9]	✓	✓
☐ ☐-COBBLE [8]	✓	✓
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	✓	✓
■ ☐-GRAVEL [7]	✓	✓
■ ☐-SAND [6]	✓	✓
☐ ☐-BEDROCK[5]	___	___
☐ ☐-DETRITUS[3]	___	___
☐ ☐-ARTIFICIAL[0]	___	___

NOTE : (Ignore sludge originating from point-sources; score on natural substrates)
NUMBER OF SUBSTRATE TYPES: ■-5 or More [2] ☐-4 or Less [0]

SUBSTRATE ORIGIN — Check ONE (OR 2 & AVERAGE)
☐ -LIMESTONE [1]
■ -TILLS [1]
☐ -WETLANDS[0]
☐ -HARDPAN [0]
☐ -SANDSTONE [0]
☐ -RIP/RAP [0]
☐ -LACUSTRINE [0]
☐ -SHALE [-1]
☐-COAL FINES [-2]

SILT: ____ EMBEDDEDNESS: ____

SUBSTRATE QUALITY — Check ONE (OR 2 & AVERAGE)
■ -SILT HEAVY [-2]
■ -SILT MODERATE [-1]
☐ -SILT NORMAL [0]
☐ -SILT FREE [1]
☐ -EXTENSIVE [-2]
■ -MODERATE [-1]
☐ -NORMAL [0]
☐ -NONE [1]

Substrate: 13.5 Max 20

COMMENTS: ____

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
■ -UNDERCUT BANKS [1]
■ -OVERHANGING VEGETATION [1]
☐-SHALLOWS (IN SLOW WATER) [1]
■-ROOTMATS[1]
■ -POOLS > 70 cm [2]
■ -ROOTWADS [1]
☐-BOULDERS[1]
☐ -OXBOWS, BACKWATERS [1]
☐ -AQUATIC MACROPHYTES [1]
■-LOGS OR WOODY DEBRIS [1]

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐ - EXTENSIVE > 75% [11]
☐ - MODERATE 25-75% [7]
■ - SPARSE 5-25% [3]
☐ - NEARLY ABSENT < 5% [1]

Cover: 10 Max 20

COMMENTS: ____

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH[4]	☐-EXCELLENT[7]	■-NONE[6]	☐-HIGH[3]	☐-SNAGGING	☐-IMPOUND.
■-MODERATE[3]	☐-GOOD[5]	☐-RECOVERED[4]	■-MODERATE[2]	☐-RELOCATION	☐-ISLANDS
■-LOW[2]	■-FAIR[3]	☐-RECOVERING[3]	☐-LOW[1]	☐-CANOPY REMOVAL	☐-LEVEED
☐-NONE[1]	☐-POOR[1]	☐-RECENT OR NO RECOVERY[1]		☐-DREDGING	☐-BANKSHAPING
				☐-ONE SIDE CHANNEL MODIFICATIONS	

Channel: 13.5 Max 20

COMMENTS: ____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R Per Bank)	FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) (L R Most Predominant Per Bank)		BANK EROSION (L R Per Bank)	
☐ ☐-WIDE > 50m[4]	☐ ☐-FOREST, SWAMP[3]	☐ ☐-CONSERVATION TILLAGE[1]	☐ ☐-NONE/LITTLE[3]	
☐ ☐-MODERATE 10-50m[3]	☐ ☐-SHRUB OR OLD FIELD[2]	■ ■-URBAN OR INDUSTRIAL[0]	■ ■-MODERATE[2]	
☐ ☐-NARROW 5-10m[2]	☐ ☐-RESIDENTIAL, PARK, NEW FIELD[1]	☐ ☐-OPEN PASTURE, ROWCROP[0]	☐ ☐-HEAVY/SEVERE[1]	
■ ■-VERY NARROW <5m[1]	☐ ☐-FENCED PASTURE[1]	☐ ☐-MINING/CONSTRUCTION[0]		
■ ☐-NONE[0]				

Riparian: 2.75 Max 10

COMMENTS: ____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
■ - > 1m [6]
☐ - 0.7-1m [4]
☐ - 0.4-0.7m [2]
☐ - 0.2-0.4m [1]
☐ - < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
■ -POOL WIDTH > RIFFLE WIDTH [2]
☐ -POOL WIDTH = RIFFLE WIDTH [1]
☐ -POOL WIDTH < RIFFLE W. [0]

CURRENT VELOCITY [POOLS & RIFFLES!] (Check *All* That Apply)
■ -EDDIES[1]
■ -FAST[1]
■ -MODERATE[1]
☐ -SLOW[1]
☐ -TORRENTIAL[-1]
☐ -INTERSTITIAL[-1]
☐ -INTERMITTENT[-2]

Pool/Current: 11 Max 12

COMMENTS: ____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH
■ - Generally > 10 cm, MAX > 50 [4]
☐ - Generally > 10 cm, MAX < 50 [3]
☐ - Generally 5-10 cm[1]
☐ - Generally < 5 cm [RIFFLE=0]

RIFFLE/RUN SUBSTRATE
☐ -STABLE (e.g., Cobble, Boulder) [2]
■ -MOD. STABLE (e.g., Large Gravel) [1]
☐ -UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE/RUN EMBEDDEDNESS
☐ - NONE [2]
☐ - LOW [1]
■ - MODERATE [0]
☐ - EXTENSIVE [-1]

Riffle/Run: 5 Max 8

Gradient: 8 Max 10

☐ - NO RIFFLE [Metric=0]

COMMENTS: ____

6] GRADIENT (ft/mi): 0.9 **DRAINAGE AREA (sq.mi.):** 733

%POOL: ____ %GLIDE: ____
%RIFFLE: ____ %RUN: ____

* Best areas must be large enough to support a population of riffle-obligate fish species.

ONEPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 66

River Code: _____ RM: 10.5 Stream CUYAHOGA RIVER
Date 10/2/98 Location DOWNSTREAM of SOUTHERLY WWTP EFFLUENT CHANNEL
Scorers Initials: CZ TZ Comments ELECTROFISHING SITE

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR/SLBS[10]	___	___
☐ ☐-BOULDER [9]	✓	___
☐ ☐-COBBLE [8]	___	___
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	✓	___
■ ☐-GRAVEL [7]	✓	___
■ ☐-SAND [6]	✓	___
☐ ☐-BEDROCK[5]	___	___
☐ ☐-DETRITUS[3]	___	___
☐ ☐-ARTIFICIAL[0]	___	___

NOTE : *(Ignore sludge originating from point-sources; score on natural substrates)*
NUMBER OF SUBSTRATE TYPES: ☐-*5 or More [2]* ■-*4 or Less [0]*

SUBSTRATE ORIGIN — Check ONE (OR 2 & AVERAGE)
☐ -*LIMESTONE [1]*
SILT:
■ -*TILLS [1]*
☐ -*WETLANDS[0]*
☐ -*HARDPAN [0]*
☐ -*SANDSTONE [0]*
EMBEDDEDNESS:
☐ -*RIP/RAP [0]*
☐ -*LACUSTRINE [0]*
☐ -*SHALE [-1]*
☐ -*COAL FINES [-2]*

SUBSTRATE QUALITY — Check ONE (OR 2 & AVERAGE)
☐ -*SILT HEAVY [-2]*
■ -*SILT MODERATE [-1]*
☐ -*SILT NORMAL [0]*
☐ -*SILT FREE [1]*
☐ -*EXTENSIVE [-2]*
■ -*MODERATE [-1]*
☐ -*NORMAL [0]*
☐ -*NONE [1]*

Substrate: 12 Max 20

COMMENTS: _____

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
■ -*UNDERCUT BANKS [1]*
☐ -*OVERHANGING VEGETATION [1]*
☐ -*SHALLOWS(IN SLOW WATER) [1]*
■ -*ROOTMATS[1]*
■ -*POOLS> 70 cm [2]*
■ -*ROOTWADS [1]*
■ -*BOULDERS[1]*
☐ -*OXBOWS, BACKWATERS [1]*
☐ -*AQUATIC MACROPHYTES [1]*
■ -*LOGS OR WOODY DEBRIS[1]*

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐ -*EXTENSIVE > 75% [11]*
■ -*MODERATE 25-75% [7]*
☐ -*SPARSE 5-25% [3]*
☐ -*NEARLY ABSENT < 5% [1]*

Cover: 12 Max 20

COMMENTS: _____

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-*HIGH[4]*	☐-*EXCELLENT[7]*	■-*NONE[6]*	■-*HIGH[3]*	☐-*SNAGGING*	☐-*IMPOUND.*
■-*MODERATE[3]*	☐-*GOOD[5]*	☐-*RECOVERED[4]*	■-*MODERATE[2]*	☐-*RELOCATION*	☐-*ISLANDS*
☐-*LOW[2]*	■-*FAIR[3]*	☐-*RECOVERING[3]*	☐-*LOW[1]*	☐-*CANOPY REMOVAL*	☐-*LEVEED*
☐-*NONE[1]*	■-*POOR[1]*	☐-*RECENT OR NO RECOVERY[1]*		☐-*DREDGING*	☐-*BANK SHAPING*
				■-*ONE SIDE CHANNEL MODIFICATIONS*	

Channel: 13.5 Max 20

COMMENTS: _____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R Per Bank)	FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) (L R Most Predominant Per Bank)		BANK EROSION (L R Per Bank)	
☐ ☐-*WIDE > 50m[4]*	☐ ☐-*FOREST, SWAMP[3]*	☐ ☐-*CONSERVATION TILLAGE[1]*	■ ■-*NONE/LITTLE[3]*	
☐ ☐-*MODERATE 10-50m[3]*	☐ ☐-*SHRUB OR OLD FIELD [2]*	■ ■-*URBAN OR INDUSTRIAL[0]*	☐ ☐-*MODERATE[2]*	
☐ ☐-*NARROW 5-10m[2]*	☐ ☐-*RESIDENTIAL, PARK, NEW FIELD[1]*	☐ ☐-*OPEN PASTURE, ROWCROP[0]*	☐ ☐-*HEAVY/SEVERE[1]*	
■ ■-*VERY NARROW < 5m[1]*	☐ ☐-*FENCED PASTURE [1]*	☐ ☐-*MINING/CONSTRUCTION[0]*		
☐ ☐-*NONE[0]*				

Riparian: 4 Max 10

COMMENTS: _____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
■ - *> 1m [6]*
☐ - *0.7-1m[4]*
☐ - *0.4-0.7m[2]*
☐ - *0.2-0.4m[1]*
☐ - *< 0.2m [POOL=0]*

MORPHOLOGY (Check 1 or 2 & AVERAGE)
■ -*POOL WIDTH > RIFFLE WIDTH [2]*
☐ -*POOL WIDTH = RIFFLE WIDTH [1]*
☐ -*POOL WIDTH < RIFFLE W. [0]*

CURRENT VELOCITY [POOLS & RIFFLES!] (Check *All* That Apply)
■ -*EDDIES[1]*
■ -*FAST[1]*
■ -*MODERATE[1]*
■ -*SLOW[1]*
☐ -*TORRENTIAL[-1]*
☐ -*INTERSTITIAL[-1]*
☐ -*INTERMITTENT[-2]*

Pool/Current: 12 Max 12

COMMENTS: _____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH
■ - *Generally > 10 cm, MAX > 50 [4]*
☐ - *Generally > 10 cm, MAX < 50 [3]*
☐ - *Generally 5-10 cm[1]*
☐ - *Generally < 5 cm [RIFFLE=0]*

RIFFLE/RUN SUBSTRATE
☐ -*STABLE (e.g., Cobble, Boulder) [2]*
■ -*MOD. STABLE (e.g., Large Gravel) [1]*
■ -*UNSTABLE (Fine Gravel, Sand) [0]*

RIFFLE/RUN EMBEDDEDNESS
☐ - *NONE [2]*
☐ - *LOW [1]*
■ - *MODERATE [0]*
☐ - *EXTENSIVE [-1]*

☐ - *NO RIFFLE [Metric=0]*

Riffle/Run: 4.5 Max 8

Gradient: 8 Max 10

6] GRADIENT (ft/mi): 0.9 **DRAINAGE AREA (sq.mi.):** 733 %POOL: ___ %GLIDE: ___ %RIFFLE: ___ %RUN: ___

*Best areas must be large enough to support a population of riffle-obligate fish species.

ONEPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 71

River Code:_____ RM: 11.3 Stream CUYAHOGA RIVER
Date 9/25/97 Location UPSTREAM of SOUTHERLY WWTP EFFLUENT CHANNEL
Scorers Initials: JJ Comments ELECTROFISHING SITE

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR/SLBS[10]	___	___
☐ ☐-BOULDER [9]	___	✓
■ ☐-COBBLE [8]	___	✓
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	___	✓
☐ ☐-GRAVEL [7]	___	✓
■ ☐-SAND [6]	✓	✓
☐ ☐-BEDROCK[5]	___	___
☐ ☐-DETRITUS[3]	___	___
☐ ☐-ARTIFICIAL[0]	___	___

NOTE : *(Ignore sludge originating from point-sources; score on natural substrates)*
NUMBER OF SUBSTRATE TYPES: ■-*5 or More [2]* ☐-*4 or Less [0]*

SUBSTRATE ORIGIN *Check ONE (OR 2 & AVERAGE)*
☐ -*LIMESTONE [1]*
■ -*TILLS [1]*
☐ -*WETLANDS[0]*
☐ -*HARDPAN [0]*
☐ -*SANDSTONE [0]*
☐ -*RIP/RAP [0]*
☐ -*LACUSTRINE [0]*
☐ -*SHALE [-1]*
☐-*COAL FINES [-2]*

SILT:

EMBEDDEDNESS:

SUBSTRATE QUALITY *Check ONE (OR 2 & AVERAGE)*
■ -*SILT HEAVY [-2]*
■ -*SILT MODERATE [-1]*
☐ -*SILT NORMAL[0]*
☐ -*SILT FREE [1]*
☐ -*EXTENSIVE [-2]*
■ -*MODERATE [-1]*
☐ -*NORMAL [0]*
☐ -*NONE [1]*

*COMMENTS*_____

Substrate: 14.5 Max 20

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
■ -*UNDERCUT BANKS [1]*
■ -*OVERHANGING VEGETATION [1]*
☐-*SHALLOWS (IN SLOW WATER) [1]*
■-*ROOTMATS[1]*
■ -*POOLS > 70 cm [2]*
■ -*ROOTWADS [1]*
■ -*BOULDERS [1]*
☐ -*OXBOWS, BACKWATERS [1]*
■ -*AQUATIC MACROPHYTES [1]*
■ -*LOGS OR WOODY DEBRIS [1]*
COMMENTS:_____

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
■ - *EXTENSIVE > 75% [11]*
■ - *MODERATE 25-75% [7]*
☐ - *SPARSE 5-25% [3]*
☐ - *NEARLY ABSENT <5% [1]*

Cover: 18 Max 20

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-*HIGH[4]*	☐-*EXCELLENT[7]*	■-*NONE[6]*	☐-*HIGH[3]*	☐-*SNAGGING*	☐-*IMPOUND.*
☐-*MODERATE[3]*	☐-*GOOD[5]*	☐-*RECOVERED[4]*	■-*MODERATE[2]*	☐-*RELOCATION*	☐-*ISLANDS*
■-*LOW[2]*	■-*FAIR[3]*	☐-*RECOVERING[3]*	☐-*LOW[1]*	☐-*CANOPY REMOVAL*	☐-*LEVEED*
■-*NONE[1]*	■-*POOR[1]*	☐-*RECENT OR NO RECOVERY[1]*		☐-*DREDGING*	☐-*BANKSHAPING*
				☐-*ONE SIDE CHANNEL MODIFICATIONS*	

Channel: 11.5 Max 20

COMMENTS:_____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R Per Bank)	FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) (L R Most Predominant Per Bank)		BANK EROSION (L R Per Bank)	
☐ ■ -*WIDE > 50m[4]*	☐ ☐-*FOREST, SWAMP[3]*	☐ ☐-*CONSERVATION TILLAGE[1]*	■ ☐-*NONE/LITTLE[3]*	
☐ ■-*MODERATE 10-50m[3]*	☐ ☐-*SHRUB OR OLD FIELD[2]*	■ ☐-*URBAN OR INDUSTRIAL[0]*	☐ ■-*MODERATE[2]*	
☐ ☐ -*NARROW 5-10m[2]*	☐ ■-*RESIDENTIAL, PARK, NEW FIELD[1]*	☐ ☐-*OPEN PASTURE, ROW CROP[0]*	☐ ■-*HEAVY/SEVERE[1]*	
■ ☐ -*VERY NARROW <5m[1]*	☐ ☐-*FENCED PASTURE[1]*	☐ ☐-*MINING/CONSTRUCTION[0]*		
☐ ☐ -*NONE[0]*				

Riparian: 5 Max 10

COMMENTS:_____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
■ - *> 1m [6]*
☐- *0.7-1m[4]*
☐- *0.4-0.7m[2]*
☐- *0.2-0.4m[1]*
☐ - *< 0.2m [POOL=0]*

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☐ -*POOL WIDTH > RIFFLE WIDTH [2]*
☐-*POOL WIDTH = RIFFLE WIDTH[1]*
■ -*POOL WIDTH < RIFFLE W.[0]*

CURRENT VELOCITY (POOLS & RIFFLES!) (Check *All* That Apply)
■ -*EDDIES[1]*
■ -*FAST[1]*
■ -*MODERATE[1]*
☐ -*SLOW[1]*
☐ -*TORRENTIAL[-1]*
☐ -*INTERSTITIAL[-1]*
☐ -*INTERMITTENT[-2]*

Pool/Current: 9 Max 12

COMMENTS:_____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH
■ - *Generally > 10 cm, MAX > 50 [4]*
☐ - *Generally > 10 cm, MAX < 50 [3]*
☐ - *Generally 5-10 cm[1]*
☐ - *Generally < 5 cm [RIFFLE=0]*

RIFFLE/RUN SUBSTRATE
☐-*STABLE (e.g., Cobble, Boulder) [2]*
■-*MOD. STABLE (e.g., Large Gravel) [1]*
☐-*UNSTABLE (Fine Gravel, Sand) [0]*

RIFFLE/RUN EMBEDDEDNESS
☐ - *NONE [2]*
☐ - *LOW [1]*
■ - *MODERATE [0]*
☐ - *EXTENSIVE [-1]*

Riffle/Run: 5 Max 8

COMMENTS:_____ ☐ - *NO RIFFLE [Metric=0]*

Gradient: 8 Max 10

6] GRADIENT (ft/mi): 0.9 **DRAINAGE AREA** (sq.mi.): 733

%POOL: ___ %GLIDE: ___
%RIFFLE: ___ %RUN: ___

* Best areas must be large enough to support a population of riffle-obligate fish species.

OhioEPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 66.5

River Code:_____ RM: 11.3 Stream CUYAHOGA RIVER
Date 10/2/98 Location UPSTREAM of SOUTHERLY WWTP EFFLUENT CHANNEL
Scorers Initials: CZ TZ Comments ELECTROFISHING SITE

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR/SLBS[10]	___	___
☐ ☐-BOULDER [9]	✓	___
☐ ☐-COBBLE [8]	✓	___
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	✓	___
■ ☐-GRAVEL [7]	✓	✓
■ ☐-SAND [6]	✓	___
☐ ☐-BEDROCK[5]	___	___
☐ ☐-DETRITUS[3]	___	___
☐ ☐-ARTIFICIAL[0]	✓	___

NOTE : *(Ignore sludge originating from point-sources; score on natural substrates)*

NUMBER OF SUBSTRATE TYPES: ■-5 or More [2] ☐-4 or Less [0]

SUBSTRATE ORIGIN — Check ONE (OR 2 & AVERAGE)
☐-LIMESTONE [1]
■-TILLS [1]
☐-WETLANDS[0]
☐-HARDPAN [0]
☐-SANDSTONE [0]
☐-RIP/RAP [0]
☐-LACUSTRINE [0]
☐-SHALE [-1]
☐-COAL FINES [-2]

SILT: ____

EMBEDDEDNESS: ____

SUBSTRATE QUALITY — Check ONE (OR 2 & AVERAGE)
☐-SILT HEAVY [-2]
■-SILT MODERATE [-1]
☐-SILT NORMAL [0]
☐-SILT FREE [1]
☐-EXTENSIVE [-2]
■-MODERATE [-1]
☐-NORMAL [0]
☐-NONE [1]

Substrate: 14 Max 20

COMMENTS: _____

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
■-UNDERCUT BANKS [1]
☐-OVERHANGING VEGETATION [1]
■-SHALLOWS (IN SLOW WATER) [1]
■-ROOTMATS [1]
■-POOLS > 70 cm [2]
■-ROOTWADS [1]
☐-BOULDERS [1]
COMMENTS: _____
☐-OXBOWS, BACKWATERS [1]
☐-AQUATIC MACROPHYTES [1]
■-LOGS OR WOODY DEBRIS [1]

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐-EXTENSIVE > 75% [11]
■-MODERATE 25-75% [7]
■-SPARSE 5-25% [3]
☐-NEARLY ABSENT < 5% [1]

Cover: 12 Max 20

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH [4]	☐-EXCELLENT [7]	■-NONE [6]	■-HIGH [3]	☐-SNAGGING	☐-IMPOUND.
☐-MODERATE [3]	☐-GOOD [5]	☐-RECOVERED [4]	■-MODERATE [2]	☐-RELOCATION	☐-ISLANDS
■-LOW [2]	■-FAIR [3]	☐-RECOVERING [3]	☐-LOW [1]	☐-CANOPY REMOVAL	☐-LEVEED
■-NONE [1]	☐-POOR [1]	☐-RECENT OR NO RECOVERY [1]		☐-DREDGING	☐-BANKSHAPING
				☐-ONE SIDE CHANNEL MODIFICATIONS	

Channel: 13 Max 20

COMMENTS: _____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH L R (Per Bank)	FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) L R (Most Predominant Per Bank)	L R	BANK EROSION L R (Per Bank)
☐ ☐-WIDE > 50m [4]	☐ ■-FOREST, SWAMP [3]	☐ ☐-CONSERVATION TILLAGE [1]	■ ■-NONE/LITTLE [3]
☐ ■-MODERATE 10-50m [3]	☐ ☐-SHRUB OR OLD FIELD [2]	■ ■-URBAN OR INDUSTRIAL [0]	☐ ☐-MODERATE [2]
■ ■-NARROW 5-10m [2]	☐ ☐-RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐-OPEN PASTURE, ROW CROP [0]	☐ ☐-HEAVY/SEVERE [1]
☐ ☐-VERY NARROW < 5m [1]	☐ ☐-FENCED PASTURE [1]	☐ ☐-MINING/CONSTRUCTION [0]	
☐ ☐-NONE [0]			

Riparian: 6 Max 10

COMMENTS: _____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
■- > 1m [6]
☐- 0.7-1m [4]
☐- 0.4-0.7m [2]
☐- 0.2-0.4m [1]
☐- < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☐-POOL WIDTH > RIFFLE WIDTH [2]
☐-POOL WIDTH = RIFFLE WIDTH [1]
■-POOL WIDTH < RIFFLE W. [0]

CURRENT VELOCITY [POOLS & RIFFLES!] (Check *All* That Apply)
☐-EDDIES [1]
■-FAST [1]
■-MODERATE [1]
■-SLOW [1]
☐-TORRENTIAL [-1]
☐-INTERSTITIAL [-1]
☐-INTERMITTENT [-2]

Pool/Current: 9 Max 12

COMMENTS: _____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH
☐ - Generally > 10 cm, MAX > 50 [4]
■ - Generally > 10 cm, MAX < 50 [3]
☐ - Generally 5-10 cm [1]
☐ - Generally < 5 cm [RIFFLE=0]

RIFFLE/RUN SUBSTRATE
■-STABLE (e.g., Cobble, Boulder) [2]
■-MOD. STABLE (e.g., Large Gravel) [1]
☐-UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE/RUN EMBEDDEDNESS
☐ - NONE [2]
☐ - LOW [1]
■ - MODERATE [0]
☐ - EXTENSIVE [-1]

☐ - NO RIFFLE [Metric=0]

Riffle/Run: 4.5 Max 8

Gradient: 8 Max 10

6] GRADIENT (ft/mi): 0.9 DRAINAGE AREA (sq.mi.): 7.33 %POOL: ___ %GLIDE: ___ %RIFFLE: ___ %RUN: ___

* Best areas must be large enough to support a population of riffle-obligate fish species.

OhioEPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 68.75

River Code:_____ RM: 11.3 Stream CUYAHOGA RIVER
Date 10/27/98 Location SITE# 22.8 (SOUTHERLY CHLORINE ACCESS RAILROAD BRIDGE)
Scorers Initials: CZ TZ Comments_____

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR/SLBS[10]	___	___
☐ ☐-BOULDER [9]	✓	___
☐ ☐-COBBLE [8]	✓	___
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	✓	___
■ ☐-GRAVEL [7]	✓	✓
■ ☐-SAND [6]	✓	___
☐ ☐-BEDROCK[5]	___	___
☐ ☐-DETRITUS[3]	___	___
☐ ☐-ARTIFICIAL[0]	___	___

NOTE : *(Ignore sludge originating from point-sources; score on natural substrates)*
NUMBER OF SUBSTRATE TYPES: ■-*5 or More [2]* ☐-*4 or Less [0]*

SUBSTRATE ORIGIN — Check ONE (OR 2 & AVERAGE)
☐ -*LIMESTONE [1]*
■ -*TILLS [1]*
☐ -*WETLANDS[0]*
☐ -*HARDPAN [0]*
☐ -*SANDSTONE [0]*
☐ -*RIP/RAP [0]*
☐ -*LACUSTRINE [0]*
☐ -*SHALE [-1]*
☐-*COAL FINES [-2]*

SILT:

EMBEDDEDNESS:

SUBSTRATE QUALITY — Check ONE (OR 2 & AVERAGE)
☐ -*SILT HEAVY [-2]*
■ -*SILT MODERATE [-1]*
☐ -*SILT NORMAL [0]*
☐ -*SILT FREE [1]*
☐ -*EXTENSIVE [-2]*
■ -*MODERATE [-1]*
☐ -*NORMAL [0]*
☐ -*NONE [1]*

Substrate: 14 Max 20

COMMENTS_____

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
■ -*UNDERCUT BANKS [1]*
☐ -*OVERHANGING VEGETATION [1]*
■ -*SHALLOWS (IN SLOW WATER) [1]*
■ -*ROOTMATS[1]*
■ -*POOLS > 70 cm [2]*
■ -*ROOTWADS [1]*
■ -*BOULDERS [1]*
☐ -*OXBOWS, BACKWATERS [1]*
☐ -*AQUATIC MACROPHYTES [1]*
■ -*LOGS OR WOODY DEBRIS [1]*

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐ - *EXTENSIVE > 75% [11]*
■ - *MODERATE 25-75% [7]*
■ -*SPARSE 5-25% [3]*
☐ -*NEARLY ABSENT < 5% [1]*

Cover: 13 Max 20

COMMENTS:_____

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-*HIGH[4]*	☐-*EXCELLENT[7]*	■-*NONE[6]*	■-*HIGH[3]*	☐-*SNAGGING*	☐-*IMPOUND.*
☐-*MODERATE[3]*	☐-*GOOD[5]*	☐-*RECOVERED[4]*	■-*MODERATE[2]*	☐-*RELOCATION*	☐-*ISLANDS*
☐-*LOW[2]*	■-*FAIR[3]*	☐-*RECOVERING[3]*	☐-*LOW[1]*	☐-*CANOPY REMOVAL*	☐-*LEVEED*
■-*NONE[1]*	☐-*POOR[1]*	☐-*RECENT OR NO RECOVERY[1]*		☐-*DREDGING*	☐-*BANKSHAPING*
				☐-*ONE SIDE CHANNEL MODIFICATIONS*	

Channel: 12.5 Max 20

COMMENTS:_____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R Per Bank)	FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) (L R Most Predominant Per Bank)		BANK EROSION (L R Per Bank)	
☐ ☐ -*WIDE > 50m[4]*	☐ ■-*FOREST, SWAMP [3]*	☐ ☐-*CONSERVATION TILLAGE [1]*	■ ■-*NONE/LITTLE[3]*	
☐ ■-*MODERATE 10-50m[3]*	☐ ☐-*SHRUB OR OLD FIELD [2]*	■ ■-*URBAN OR INDUSTRIAL [0]*	☐ ☐-*MODERATE[2]*	
■ ☐ -*NARROW 5-10m[2]*	☐ ☐-*RESIDENTIAL, PARK, NEW FIELD [1]*	☐ ☐-*OPEN PASTURE, ROWCROP [0]*	☐ ☐-*HEAVY/SEVERE[1]*	
☐ ☐ -*VERY NARROW < 5m[1]*	☐ ☐-*FENCED PASTURE [1]*	☐ ☐-*MINING/CONSTRUCTION[0]*		
☐ ☐ -*NONE[0]*				

Riparian: 6.25 Max 10

COMMENTS:_____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)	MORPHOLOGY (Check 1 or 2 & AVERAGE)	CURRENT VELOCITY [POOLS & RIFFLES!] (Check *All* That Apply)	
■ - *> 1m [6]*	☐ -*POOL WIDTH > RIFFLE WIDTH [2]*	■ -*EDDIES[1]*	☐ -*TORRENTIAL[-1]*
☐ - *0.7-1m[4]*	☐ -*POOL WIDTH = RIFFLE WIDTH [1]*	■ -*FAST[1]*	☐ -*INTERSTITIAL[-1]*
☐ - *0.4-0.7m[2]*	■ -*POOL WIDTH < RIFFLE W. [0]*	■ -*MODERATE[1]*	☐ -*INTERMITTENT[-2]*
☐ - *0.2-0.4m[1]*		■ -*SLOW[1]*	
☐ - *< 0.2m [POOL=0]*			

Pool/Current: 10 Max 12

COMMENTS:_____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH	RIFFLE/RUN SUBSTRATE	RIFFLE/RUN EMBEDDEDNESS
■ - *Generally > 10 cm, MAX > 50 [4]*	☐-*STABLE (e.g., Cobble, Boulder) [2]*	☐ - *NONE [2]*
☐ - *Generally > 10 cm, MAX < 50 [3]*	■-*MOD. STABLE (e.g., Large Gravel) [1]*	☐ - *LOW [1]*
☐ - *Generally 5-10 cm[1]*	☐-*UNSTABLE (Fine Gravel, Sand) [0]*	■ - *MODERATE [0]*
☐ - *Generally < 5 cm [RIFFLE=0]*		☐ - *EXTENSIVE [-1]*

Riffle/Run: 5 Max 8

COMMENTS:_____ ☐ - *NO RIFFLE [Metric=0]*

Gradient: 8 Max 10

6] GRADIENT (ft/mi): 0.9 **DRAINAGE AREA (sq.mi.):** 710

%POOL: ___ %GLIDE: ___
%RIFFLE: ___ %RUN: ___

* mid: areas must be large enough to support a population of riffle-obligate fish species.

OhioEPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 62.25

River Code:_____ RM: 11.7 Stream CUYAHOGA RIVER
Date 9/29/98 Location SITE #22.9 (EAST 71ST STREET AND CANAL ROAD)
Scorers Initials: CZ TZ Comments_____

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR/SLBS[10]	___	___
☐ ☐-BOULDER [9]	___	___
☐ ☐-COBBLE [8]	✓	✓
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	✓	___
■ ☐-GRAVEL [7]	✓	✓
■ ☐-SAND [6]	✓	___
☐ ☐-BEDROCK[5]	___	___
☐ ☐-DETRITUS[3]	___	___
☐ ☐-ARTIFICIAL[0]	✓	___

NOTE : *(Ignore sludge originating from point-sources; score on natural substrates)*
NUMBER OF SUBSTRATE TYPES: ■-*5 or More [2]* ☐-*4 or Less [0]*
*COMMENTS*_____

SUBSTRATE ORIGIN — *Check ONE (OR 2 & AVERAGE)*
☐ -*LIMESTONE [1]*
■ -*TILLS [1]*
☐ -*WETLANDS[0]*
☐ -*HARDPAN [0]*
☐ -*SANDSTONE [0]*
☐ -*RIP/RAP [0]*
☐ -*LACUSTRINE [0]*
☐ -*SHALE [-1]*
☐-*COAL FINES [-2]*

SUBSTRATE QUALITY — *Check ONE (OR 2 & AVERAGE)*
SILT:
■ -*SILT HEAVY [-2]*
■ -*SILT MODERATE [-1]*
☐ -*SILT NORMAL [0]*
☐ -*SILT FREE [1]*
EMBEDDEDNESS:
☐ -*EXTENSIVE [-2]*
■ -*MODERATE [-1]*
☐ -*NORMAL [0]*
☐ -*NONE [1]*

Substrate: 14 Max 20

2] INSTREAM COVER

TYPE: **(Check *All* That Apply)**
■ -*UNDERCUT BANKS [1]*
☐ -*OVERHANGING VEGETATION [1]*
■ -*SHALLOWS (IN SLOW WATER) [1]*
■ -*ROOTMATS [1]*
☐ -*POOLS > 70 cm [2]*
■ -*ROOTWADS [1]*
☐ -*BOULDERS [1]*
☐ -*OXBOWS, BACKWATERS [1]*
☐ -*AQUATIC MACROPHYTES [1]*
■ -*LOGS OR WOODY DEBRIS [1]*

AMOUNT: **(Check *ONLY* One or check 2 and *AVERAGE*)**
☐ - *EXTENSIVE > 75% [11]*
☐ - *MODERATE 25-75% [7]*
■ -*SPARSE 5-25% [3]*
☐ -*NEARLY ABSENT < 5% [1]*

*COMMENTS:*_____

Cover: 8 Max 20

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY
☐ -*HIGH [4]*
☐ -*MODERATE [3]*
■ -*LOW [2]*
☐ -*NONE [1]*

DEVELOPMENT
☐ -*EXCELLENT [7]*
■ -*GOOD [5]*
■ -*FAIR [3]*
☐ -*POOR [1]*

CHANNELIZATION
■ -*NONE [6]*
☐ -*RECOVERED [4]*
☐ -*RECOVERING [3]*
☐ -*RECENT OR NO RECOVERY [1]*

STABILITY
☐ -*HIGH [3]*
■ -*MODERATE [2]*
☐ -*LOW [1]*

MODIFICATIONS/OTHER
☐ -*SNAGGING*
☐ -*RELOCATION*
☐ -*CANOPY REMOVAL*
☐ -*DREDGING*
☐ -*ONE SIDE CHANNEL MODIFICATIONS*
☐ -*IMPOUND.*
☐ -*ISLANDS*
☐ -*LEVEED*
☐ -*BANK SHAPING*

Channel: 14 Max 20

*COMMENTS:*_____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R (Per Bank))
■ ☐ -*WIDE > 50m [4]*
☐ ■ -*MODERATE 10-50m [3]*
☐ ☐ -*NARROW 5-10m [2]*
☐ ☐ -*VERY NARROW < 5m [1]*
☐ ☐ -*NONE [0]*

FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) (L R (Most Predominant Per Bank))
☐ ☐-*FOREST, SWAMP [3]*
☐ ☐-*SHRUB OR OLD FIELD [2]*
☐ ☐-*RESIDENTIAL, PARK, NEW FIELD [1]*
☐ ☐-*FENCED PASTURE [1]*

L R
☐ ☐-*CONSERVATION TILLAGE [1]*
■ ■-*URBAN OR INDUSTRIAL [0]*
☐ ☐-*OPEN PASTURE, ROWCROP [0]*
☐ ☐-*MINING/CONSTRUCTION [0]*

BANK EROSION (L R (Per Bank))
■ ■-*NONE/LITTLE [3]*
■ ☐-*MODERATE [2]*
☐ ☐-*HEAVY/SEVERE [1]*

Riparian: 6.25 Max 10

COM-
*MENTS:*_____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
☐ - *> 1m [6]*
■ - *0.7-1m [4]*
☐ - *0.4-0.7m [2]*
☐ - *0.2-0.4m [1]*
☐ - *< 0.2m [POOL=0]*

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☐ -*POOL WIDTH > RIFFLE WIDTH [2]*
☐ -*POOL WIDTH = RIFFLE WIDTH [1]*
■ -*POOL WIDTH < RIFFLE W. [0]*

CURRENT VELOCITY (POOLS & RIFFLES!) (Check *All* That Apply)
☐ -*EDDIES [1]*
■ -*FAST [1]*
■ -*MODERATE [1]*
■ -*SLOW [1]*
☐ -*TORRENTIAL [-1]*
☐ -*INTERSTITIAL [-1]*
☐ -*INTERMITTENT [-2]*

Pool/Current: 7 Max 12

*COMMENTS:*_____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH
■ - *Generally > 10 cm, MAX > 50 [4]*
☐ - *Generally > 10 cm, MAX < 50 [3]*
☐ - *Generally 5-10 cm [1]*
☐ - *Generally < 5 cm [RIFFLE=0]*

RIFFLE/RUN SUBSTRATE
☐-*STABLE (e.g., Cobble, Boulder) [2]*
■-*MOD. STABLE (e.g., Large Gravel) [1]*
☐-*UNSTABLE (Fine Gravel, Sand) [0]*

RIFFLE/RUN EMBEDDEDNESS
☐ - *NONE [3]*
☐ - *LOW [1]*
■ - *MODERATE [0]*
☐ - *EXTENSIVE [-1]*
☐ - *NO RIFFLE [Metric=0]*

Riffle/Run: 5 Max 8

Gradient: 8 Max 10

6] GRADIENT (ft/mi): 0.9 **DRAINAGE AREA (sq.mi.):** 710

%POOL: ____ %GLIDE: ____
%RIFFLE: ____ %RUN: ____

* Area must be large enough to support a population of riffle-obligate fish species.

OhioEPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 76.5

River Code:_____ RM: 16.8 Stream CUYAHOGA RIVER
Date 9/29/98 Location SITE #23 OLD RIVERVIEW ROAD BRIDGE
Scorers Initials: CZ TZ Comments_____

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR/SLBS[10]	___	___
☐ ☐-BOULDER [9]	✓	___
■ ☐-COBBLE [8]	___	✓
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	✓	___
☐ ☐-GRAVEL [7]	✓	✓
■ ☐-SAND [6]	✓	✓
☐ ☐-BEDROCK[5]	___	___
☐ ☐-DETRITUS[3]	___	___
☐ ☐-ARTIFICIAL[0]	___	___

NOTE : *(Ignore sludge originating from point-sources; score on natural substrates)*
NUMBER OF SUBSTRATE TYPES: ■-*5 or More [2]* ☐-*4 or Less [0]*
*COMMENTS*_____

SUBSTRATE ORIGIN — Check ONE (OR 2 & AVERAGE)
☐ -*LIMESTONE [1]*
SILT:
■ -*TILLS [1]*
☐ -*WETLANDS[0]*
☐ -*HARDPAN [0]*
☐ -*SANDSTONE [0]*
EMBEDDEDNESS:
☐ -*RIP/RAP [0]*
☐ -*LACUSTRINE [0]*
☐ -*SHALE [-1]*
☐ -*COAL FINES [-2]*

SUBSTRATE QUALITY — Check ONE (OR 2 & AVERAGE)
☐ -*SILT HEAVY [-2]*
■ -*SILT MODERATE [-1]*
☐ -*SILT NORMAL [0]*
☐ -*SILT FREE [1]*
☐ -*EXTENSIVE [-2]*
■ -*MODERATE [-1]*
■ -*NORMAL [0]*
☐ -*NONE [1]*

Substrate: 15.5 Max 20

2] INSTREAM COVER

TYPE: **(Check *All* That Apply)**
☐ -*UNDERCUT BANKS [1]*
■ -*OVERHANGING VEGETATION [1]*
■ -*SHALLOWS(IN SLOW WATER) [1]*
■ -*ROOTMATS[1]*
■ -*POOLS> 70 cm [2]*
■ -*ROOTWADS [1]*
■ -*BOULDERS[1]*
☐ -*OXBOWS, BACKWATERS [1]*
☐ -*AQUATIC MACROPHYTES [1]*
■ -*LOGS OR WOODY DEBRIS[1]*
*COMMENTS:*_____

AMOUNT: **(Check *ONLY* One or check 2 and *AVERAGE*)**
☐ - *EXTENSIVE > 75% [11]*
■ - *MODERATE 25-75% [7]*
☐ -*SPARSE 5-25% [3]*
☐ -*NEARLY ABSENT < 5% [1]*

Cover: 15 Max 20

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	*DEVELOPMENT*	*CHANNELIZATION*	*STABILITY*	*MODIFICATIONS/OTHER*	
☐-*HIGH[4]*	☐-*EXCELLENT[7]*	■-*NONE[6]*	☐-*HIGH[3]*	☐-*SNAGGING*	☐-*IMPOUND.*
☐-*MODERATE[3]*	■-*GOOD[5]*	☐-*RECOVERED[4]*	■-*MODERATE[2]*	☐-*RELOCATION*	☐-*ISLANDS*
■-*LOW[2]*	☐-*FAIR[3]*	☐-*RECOVERING[3]*	☐-*LOW[1]*	☐-*CANOPY REMOVAL*	☐-*LEVEED*
■-*NONE[1]*	☐-*POOR[1]*	☐-*RECENT OR NO RECOVERY[1]*		☐-*DREDGING*	☐-*BANK SHAPING*
				☐-*ONE SIDE CHANNEL MODIFICATIONS*	

Channel: 14.5 Max 20

*COMMENTS:*_____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH L R (Per Bank)	*FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN)* L R (Most Predominant Per Bank)	L R	*BANK EROSION* L R (Per Bank)
☐ ■ -*WIDE > 50m[4]*	■ ■-*FOREST, SWAMP [3]*	☐ ☐-*CONSERVATION TILLAGE[1]*	■ ☐-*NONE/LITTLE[3]*
☐ ☐-*MODERATE 10-50m[3]*	☐ ☐-*SHRUB OR OLD FIELD [2]*	☐ ☐-*URBAN OR INDUSTRIAL[0]*	☐ ■-*MODERATE[2]*
☐ ☐ -*NARROW 5-10m[2]*	☐ ☐-*RESIDENTIAL, PARK, NEW FIELD [1]*	☐ ☐-*OPEN PASTURE, ROWCROP [0]*	☐ ☐-*HEAVY/SEVERE[1]*
■ ☐ -*VERY NARROW <5m[1]*	☐ ☐-*FENCED PASTURE [1]*	☐ ☐-*MINING/CONSTRUCTION[0]*	
☐ ☐ -*NONE[0]*			

Riparian: 8 Max 10

COM-
*MENTS:*_____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH **(Check 1 ONLY!)**
■ - *> 1m [6]*
☐ - *0.7-1m[4]*
☐ - *0.4-0.7m[2]*
☐ - *0.2-0.4m[1]*
☐ - *< 0.2m [POOL=0]*

MORPHOLOGY **(Check 1 or 2 & AVERAGE)**
☐ -*POOL WIDTH > RIFFLE WIDTH [2]*
☐ -*POOL WIDTH = RIFFLE WIDTH [1]*
■ -*POOL WIDTH < RIFFLE W. [0]*

CURRENT VELOCITY **[POOLS & RIFFLES!] (Check *All* That Apply)**
☐ -*EDDIES[1]*
■ -*FAST[1]*
■ -*MODERATE[1]*
■ -*SLOW[1]*
☐ -*TORRENTIAL[-1]*
☐ -*INTERSTITIAL[-1]*
☐ -*INTERMITTENT[-2]*

*COMMENTS:*_____

Pool/Current: 9 Max 12

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH
☐ - *Generally > 10 cm, MAX > 50 [4]*
■ - *Generally > 10 cm, MAX < 50 [3]*
☐ - *Generally 5-10 cm[1]*
☐ - *Generally < 5 cm [RIFFLE=0]*

RIFFLE/RUN SUBSTRATE
■ -*STABLE (e.g., Cobble, Boulder) [2]*
■ -*MOD. STABLE (e.g., Large Gravel) [1]*
☐ -*UNSTABLE (Fine Gravel, Sand) [0]*

RIFFLE/RUN EMBEDDEDNESS
☐ - *NONE [2]*
☐ - *LOW [1]*
■ - *MODERATE [0]*
☐ - *EXTENSIVE [-1]*

*COMMENTS:*_____ ☐ - *NO RIFFLE [Metric=0]*

Riffle/Run: 4.5 Max 8

Gradient: 10 Max 10

6] GRADIENT (ft/mi): 5.9 **DRAINAGE AREA (sq.mi.):** 597 %POOL: ___ %GLIDE: ___ %RIFFLE: ___ %RUN: ___

* Area must be large enough to support a population of riffle-obligate fish species.

OhioEPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 71.25

River Code:_____ RM: 20.8 Stream CUYAHOGA RIVER
Date 9/29/98 Location SITE #24 STATE ROUTE 82 BRIDGE
Scorers Initials: CZ TZ Comments_____

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR/SLBS[10]	___	___
☐ ☐-BOULDER [9]	✓	___
■ ☐-COBBLE [8]	✓	✓
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	✓	___
■ ☐-GRAVEL [7]	✓	✓
☐ ☐-SAND [6]	✓	___
☐ ☐-BEDROCK[5]	___	___
☐ ☐-DETRITUS[3]	___	___
☐ ☐-ARTIFICIAL[0]	___	___

NOTE : *(Ignore sludge originating from point-sources; score on natural substrates)*

NUMBER OF SUBSTRATE TYPES: ■-*5 or More [2]* ☐-*4 or Less [0]*

*COMMENTS*_____

SUBSTRATE ORIGIN — *Check ONE (OR 2 & AVERAGE)*
☐ -*LIMESTONE [1]*
■ -*TILLS [1]*
☐ -*WETLANDS[0]*
☐ -*HARDPAN [0]*
☐ -*SANDSTONE [0]*
☐ -*RIP/RAP [0]*
☐ -*LACUSTRINE [0]*
☐ -*SHALE [-1]*
☐-*COAL FINES [-2]*

SUBSTRATE QUALITY — *Check ONE (OR 2 & AVERAGE)*
SILT:
☐ -*SILT HEAVY [-2]*
■ -*SILT MODERATE [-1]*
☐ -*SILT NORMAL [0]*
☐ -*SILT FREE [1]*
EMBEDDED NESS:
☐ -*EXTENSIVE [-2]*
■ -*MODERATE [-1]*
■ -*NORMAL [0]*
☐ -*NONE [1]*

Substrate: 16.5 Max 20

2] INSTREAM COVER

TYPE: **(Check *All* That Apply)**
☐ -*UNDERCUT BANKS [1]*
☐ -*OVERHANGING VEGETATION [1]*
■ -*SHALLOWS (IN SLOW WATER) [1]*
☐-*ROOTMATS[1]*
■ -*POOLS > 70 cm [2]*
■ -*ROOTWADS [1]*
■ -*BOULDERS[1]*
☐ -*OXBOWS, BACKWATERS [1]*
☐ -*AQUATIC MACROPHYTES [1]*
■ -*LOGS OR WOODY DEBRIS[1]*

AMOUNT: **(Check *ONLY* One or check 2 and *AVERAGE*)**
☐ - *EXTENSIVE > 75% [11]*
☐ - *MODERATE 25-75% [7]*
■ -*SPARSE 5-25% [3]*
☐-*NEARLY ABSENT < 5% [1]*

*COMMENTS:*_____

Cover: 9 Max 20

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	*DEVELOPMENT*	*CHANNELIZATION*	*STABILITY*	*MODIFICATIONS/OTHER*	
☐-*HIGH[4]*	☐ - *EXCELLENT [7]*	■-*NONE[6]*	■-*HIGH[3]*	☐-*SNAGGING*	☐-*IMPOUND.*
☐-*MODERATE[3]*	■-*GOOD[5]*	☐ - *RECOVERED [4]*	■-*MODERATE[2]*	☐-*RELOCATION*	☐ - *ISLANDS*
■-*LOW[2]*	☐ - *FAIR [3]*	☐ - *RECOVERING[3]*	☐-*LOW[1]*	☐-*CANOPY REMOVAL*	☐ - *LEVEED*
■-*NONE[1]*	☐-*POOR[1]*	☐ - *RECENT OR NO RECOVERY[1]*		☐-*DREDGING*	☐-*BANKSHAPING*
				☐-*ONE SIDE CHANNEL MODIFICATIONS*	

Channel: 15 Max 20

*COMMENTS:*_____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH L R (Per Bank)	*FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN)* L R (Most Predominant Per Bank)	L R	*BANK EROSION* L R (Per Bank)
☐ ☐ -*WIDE > 50m[4]*	■ ■-*FOREST, SWAMP [3]*	☐ ☐-*CONSERVATION TILLAGE [1]*	■ ■-*NONE/LITTLE[3]*
☐ ☐-*MODERATE 10-50m[3]*	☐ ☐-*SHRUB OR OLD FIELD [2]*	☐ ☐-*URBAN OR INDUSTRIAL [0]*	■ ☐-*MODERATE[2]*
☐ ☐ -*NARROW 5-10m[2]*	☐ ☐-*RESIDENTIAL, PARK, NEW FIELD [1]*	☐ ☐-*OPEN PASTURE, ROWCROP [0]*	☐ ☐-*HEAVY/SEVERE[1]*
■ ■ -*VERY NARROW < 5m[1]*	☐ ☐-*FENCED PASTURE [1]*	☐ ☐-*MINING/CONSTRUCTION[0]*	
☐ ☐ -*NONE[0]*			

Riparian: 6.75 Max 10

*COMMENTS:*_____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH **(Check 1 ONLY!)**
■ - *> 1m [6]*
☐ - *0.7-1m[4]*
☐ - *0.4-0.7m[2]*
☐ - *0.2-0.4m[1]*
☐ - *< 0.2m [POOL=0]*

MORPHOLOGY **(Check 1 or 2 & AVERAGE)**
☐ -*POOL WIDTH > RIFFLE WIDTH [2]*
☐-*POOL WIDTH = RIFFLE WIDTH [1]*
■ -*POOL WIDTH < RIFFLE W. [0]*

CURRENT VELOCITY **[POOLS & RIFFLES!] (Check *All* That Apply)**
☐ -*EDDIES[1]*
■ -*FAST[1]*
■ -*MODERATE[1]*
■ -*SLOW[1]*
☐ -*TORRENTIAL[-1]*
☐ -*INTERSTITIAL[-1]*
☐ -*INTERMITTENT[-2]*

Pool/Current: 9 Max 12

*COMMENTS:*_____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH
■ - *Generally > 10 cm, MAX > 50 [4]*
■ - *Generally > 10 cm, MAX < 50 [3]*
☐ - *Generally 5-10 cm[1]*
☐ - *Generally < 5 cm [RIFFLE=0]*

RIFFLE/RUN SUBSTRATE
■ -*STABLE (e.g., Cobble, Boulder) [2]*
☐-*MOD. STABLE (e.g., Large Gravel) [1]*
☐-*UNSTABLE (Fine Gravel, Sand) [0]*

RIFFLE/RUN EMBEDDEDNESS
☐ - *NONE [2]*
☐ - *LOW [1]*
■ - *MODERATE [0]*
☐ - *EXTENSIVE [-1]*

☐ - *NO RIFFLE [Metric=0]*

Riffle/Run: 5 Max 8

*COMMENTS:*_____

Gradient: 10 Max 10

6] GRADIENT (ft/mi): 5.9 **DRAINAGE AREA (sq.mi.):** 583

%POOL: ___ %GLIDE: ___
%RIFFLE: ___ %RUN: ___

* Area must be large enough to support a population of life-cycle fish species.

OhioEPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 60

River Code:_____ RM: 33.2 Stream CUYAHOGA RIVER
Date 9/29/98 Location SITE # 24.5 BOLANZ ROAD BRIDGE
Scorers Initials: CZ TZ Comments_____

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR/SLBS[10]	___	___
☐ ☐-BOULDER [9]	✓	___
☐ ☐-COBBLE [8]	✓	___
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	✓	___
■ ☐-GRAVEL [7]	✓	✓
■ ☐-SAND [6]	✓	✓
☐ ☐-BEDROCK[5]	___	___
☐ ☐-DETRITUS[3]	___	___
☐ ☐-ARTIFICIAL[0]	___	___

NOTE : *(Ignore sludge originating from point-sources; score on natural substrates)*

NUMBER OF SUBSTRATE TYPES: ■-*5 or More [2]* ☐-*4 or Less [0]*

SUBSTRATE ORIGIN — Check ONE (OR 2 & AVERAGE)
☐ -*LIMESTONE [1]*
■ -*TILLS [1]*
☐ -*WETLANDS[0]*
☐ -*HARDPAN [0]*
☐ -*SANDSTONE [0]*
☐ -*RIP/RAP [0]*
☐ -*LACUSTRINE [0]*
☐ -*SHALE [-1]*
☐ -*COAL FINES [-2]*

SUBSTRATE QUALITY — Check ONE (OR 2 & AVERAGE)
SILT:
☐ -*SILT HEAVY [-2]*
■ -*SILT MODERATE [-1]*
☐ -*SILT NORMAL [0]*
☐ -*SILT FREE [1]*
EMBEDDEDNESS:
☐ -*EXTENSIVE [-2]*
■ -*MODERATE [-1]*
☐ -*NORMAL [0]*
☐ -*NONE [1]*

Substrate: 14 Max 20

COMMENTS_____

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
☐ -*UNDERCUT BANKS [1]*
■ -*OVERHANGING VEGETATION [1]*
☐ -*SHALLOWS (IN SLOW WATER) [1]*
☐ -*ROOTMATS [1]*
■ -*POOLS > 70 cm [2]*
■ -*ROOTWADS [1]*
■ -*BOULDERS [1]*
☐ -*OXBOWS, BACKWATERS [1]*
☐ -*AQUATIC MACROPHYTES [1]*
■ -*LOGS OR WOODY DEBRIS [1]*
COMMENTS:_____

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐ - *EXTENSIVE > 75% [11]*
☐ - *MODERATE 25-75% [7]*
■ -*SPARSE 5-25% [3]*
☐ -*NEARLY ABSENT < 5% [1]*

Cover: 9 Max 20

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	*DEVELOPMENT*	*CHANNELIZATION*	*STABILITY*	*MODIFICATIONS/OTHER*	
☐-*HIGH [4]*	☐-*EXCELLENT [7]*	■-*NONE [6]*	☐-*HIGH [3]*	☐-*SNAGGING*	☐-*IMPOUND.*
☐-*MODERATE [3]*	☐-*GOOD [5]*	☐-*RECOVERED [4]*	■-*MODERATE [2]*	☐-*RELOCATION*	☐-*ISLANDS*
■-*LOW [2]*	■-*FAIR [3]*	☐-*RECOVERING [3]*	☐-*LOW [1]*	☐-*CANOPY REMOVAL*	☐-*LEVEED*
☐-*NONE [1]*	■-*POOR [1]*	☐-*RECENT OR NO RECOVERY [1]*		☐-*DREDGING*	☐-*BANK SHAPING*
				☐-*ONE SIDE CHANNEL MODIFICATIONS*	

Channel: 12 Max 20

COMMENTS:_____

4]. RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R Per Bank)	*FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN)* (L R Most Predominant Per Bank)	L R	*BANK EROSION* (L R Per Bank)
☐ ☐-*WIDE > 50m [4]*	☐ ☐-*FOREST, SWAMP [3]*	☐ ☐-*CONSERVATION TILLAGE [1]*	■ ■-*NONE/LITTLE [3]*
☐ ☐-*MODERATE 10-50m [3]*	☐ ☐-*SHRUB OR OLD FIELD [2]*	☐ ☐-*URBAN OR INDUSTRIAL [0]*	■ ☐-*MODERATE [2]*
☐ ☐-*NARROW 5-10m [2]*	☐ ☐-*RESIDENTIAL, PARK, NEW FIELD [1]*	■ ■-*OPEN PASTURE, ROWCROP [0]*	☐ ☐-*HEAVY/SEVERE [1]*
■ ■-*VERY NARROW < 5m [1]*	☐ ☐-*FENCED PASTURE [1]*	☐ ☐-*MINING/CONSTRUCTION [0]*	
■ ☐-*NONE [0]*			

Riparian: 4 Max 10

COMMENTS:_____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
■ - *> 1m [6]*
☐ - *0.7-1m [4]*
☐ - *0.4-0.7m [2]*
☐ - *0.2-0.4m [1]*
☐ - *< 0.2m [POOL=0]*

MORPHOLOGY (Check 1 or 2 & AVERAGE)
■ -*POOL WIDTH > RIFFLE WIDTH [2]*
☐ -*POOL WIDTH = RIFFLE WIDTH [1]*
☐ -*POOL WIDTH < RIFFLE W. [0]*

CURRENT VELOCITY [POOLS & RIFFLES!] (Check *All* That Apply)
☐ -*EDDIES [1]*
☐ -*FAST [1]*
■ -*MODERATE [1]*
■ -*SLOW [1]*
☐ -*TORRENTIAL [-1]*
☐ -*INTERSTITIAL [-1]*
☐ -*INTERMITTENT [-2]*

Pool/Current: 10 Max 12

COMMENTS:_____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH
☐ - *Generally > 10 cm, MAX > 50 [4]*
☐ - *Generally > 10 cm, MAX < 50 [3]*
■ - *Generally 5-10 cm [1]*
☐ - *Generally < 5 cm [RIFFLE=0]*

RIFFLE/RUN SUBSTRATE
☐ -*STABLE (e.g., Cobble, Boulder) [2]*
☐ -*MOD. STABLE (e.g., Large Gravel) [1]*
■ -*UNSTABLE (Fine Gravel, Sand) [0]*

RIFFLE/RUN EMBEDDEDNESS
☐ - *NONE [2]*
☐ - *LOW [1]*
■ - *MODERATE [0]*
☐ - *EXTENSIVE [-1]*

☐ - *NO RIFFLE [Metric=0]*

Riffle/Run: 1 Max 8

Gradient: 10 Max 10

COMMENTS:_____

6] GRADIENT (ft/mi): 4.7 **DRAINAGE AREA (sq.mi.):** 480 %POOL: ___ %GLIDE: ___ %RIFFLE: ___ %RUN: ___

* Must drain enough to support a population of riffle-obligate fish species.

ChicEPA Qualitative Habitat Evaluation Index Field Sheet *QHEI Score:* 62.25

River Code____ River Mile 0.2 Stream BIG CREEK
Date 6/25/97 Location SITE #25 (JENNINGS ROAD)
Scorers Initials: JJ Comments:____

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR /SLBS[10]	___	___
☐ ☐-BOULDER [9]	✓	✓
☐ ☐-COBBLE [8]	✓	✓
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	✓	✓
■ ■-GRAVEL [7]	✓	✓
☐ ☐-SAND [6]	✓	✓
☐ ☐-BEDROCK[5]	___	___
☐ ☐-DETRITUS[3]	___	___
☐ ☐-ARTIFICIAL[0]	✓	✓

NOTE : *(Ignore sludge originating from point-sources; score on natural substrates)*
NUMBER OF SUBSTRATE TYPES: ■-5 or More [2] ☐-4 or Less [0]

SUBSTRATE ORIGIN — Check ONE (OR 2 & AVERAGE)
☐ -LIMESTONE [1]
■ -TILLS [1]
☐ -WETLANDS[0]
☐ -HARDPAN [0]
☐ -SANDSTONE [0]
☐ -RIP/RAP [0]
☐ -LACUSTRINE [0]
☐ -SHALE [-1]
☐-COAL FINES [-2]

SILT:
EMBEDDEDNESS:

SUBSTRATE QUALITY — Check ONE (OR 2 & AVERAGE)
■ -SILT HEAVY [-2]
■ -SILT MODERATE [-1]
☐ -SILT NORMAL [0]
☐ -SILT FREE [1]
☐ -EXTENSIVE [-2]
■ -MODERATE [-1]
☐ -NORMAL [0]
☐ -NONE [1]

Substrate: 14.5 Max 20

COMMENTS____

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
☐-UNDERCUT BANKS [1]
☐-OVERHANGING VEGETATION [1]
■-SHALLOWS (IN SLOW WATER) [1]
■-ROOTMATS [1]
■-DEEP POOLS > 70cm [2]
■-ROOTWADS [1]
■-BOULDERS [1]
☐-OXBOWS [1]
☐-AQUATIC MACROPHYTES [1]
☐-LOGS OR WOODY DEBRIS [1]

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐-EXTENSIVE > 75% [11]
☐-MODERATE 25-75% [7]
■-SPARSE 5-25% [3]
☐-NEARLY ABSENT < 5% [1]

Cover: 9 Max 20

COMMENTS:____

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH [4]	☐-EXCELLENT [7]	☐-NONE [6]	☐-HIGH [3]	☐-SNAGGING	☐-IMPOUND.
■-MODERATE [3]	■-GOOD [5]	☐-RECOVERED [4]	■-MODERATE [2]	☐-RELOCATION	☐-ISLANDS
■-LOW [2]	■-FAIR [3]	■-RECOVERING [3]	■-LOW [1]	☐-CANOPY REMOVAL	☐-LEVEED
☐-NONE [1]	☐-POOR [1]	☐-RECENT OR NO RECOVERY [1]		☐-DREDGING	■-BANK SHAPING
				■-ONE SIDE CHANNEL MODIFICATIONS	

Channel: 11 Max 20

COMMENTS:____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R Per Bank)	FLOOD PLAIN QUALITY (PAST 100 FOOT RIPARIAN) (L R Most Predominant Per Bank)		BANK EROSION (L R Per Bank)	
☐ ☐-WIDE > 50m [4]	☐ ☐-FOREST, SWAMP [3]	☐ ☐-CONSERVATION TILLAGE [1]	■ ☐-NONE/LITTLE [3]	
☐ ☐-MODERATE 10-50m [3]	☐ ☐-SHRUB OR OLD FIELD [2]	■ ■-URBAN OR INDUSTRIAL [0]	☐ ■-MODERATE [2]	
☐ ☐-NARROW 5-10m [2]	☐ ☐-RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐-OPEN PASTURE, ROWCROP [0]	☐ ☐-HEAVY/SEVERE [1]	
■ ■-VERY NARROW < 5m [1]	☐ ☐-FENCED PASTURE [1]	☐ ☐-MINING/CONSTRUCTION [0]		
■ ☐-NONE [0]				

Riparian: 3.25 Max 10

COMMENTS:____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
■ - > 1m [6]
☐-0.7-1m [4]
☐-0.4-0.7m [2]
☐-0.2-0.4m [1]
☐ - < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☐-POOL WIDTH > RIFFLE WIDTH [2]
■-POOL WIDTH = RIFFLE WIDTH [1]
☐-POOL WIDTH < RIFFLE W. [0]

CURRENT VELOCITY [POOL & RIFFLES!] (Check *All* That Apply)
■-EDDIES [1]
■-FAST [1]
■-MODERATE [1]
■-SLOW [1]
☐-TORRENTIAL [-1]
☐-INTERSTITIAL [-1]
☐-INTERMITTENT [-2]

Pool/Glide: 11 Max 12

COMMENTS:____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE /RUN DEPTH
☐ - GENERALLY > 10 cm; MAX > 50 [4]
■ - GENERALLY > 10 cm; MAX < 50 [3]
☐ - GENERALLY 5-10 cm [1]
☐-GENERALLY < 5cm [RIFFLE=0]

RIFFLE/RUN SUBSTRATE
☐-STABLE (e.g., Cobble, Boulder) [2]
■-MOD. STABLE (e.g., Large Gravel) [1]
■-UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE/RUN EMBEDDEDNESS
☐ - NONE [2]
☐ - LOW [1]
■ - MODERATE [0]
☐-EXTENSIVE [-1]

☐- NO RIFFLE [Metric=0]

Riffle/Run: 3.5 Max 8

Gradient: 10 Max 10

COMMENTS:____

6] GRADIENT (ft/mi): 17.6 DRAINAGE AREA (sq.mi.): 38.6 %POOL: ____ %GLIDE: ____ %RIFFLE: ____ %RUN: ____

OhioEPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 55

River Code _____ River Mile 4.4 Stream BIG CREEK
Date 6/25/97 Location SITE #26 (EAST BRANCH, UPSTREAM OF CONFLUENCE)
Scorers Initials: JJS Comments: _____

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE	TYPE	POOL	RIFFLE
☐ ☐-BLDR /SLBS[10]	___	✓	■ ☐-GRAVEL [7]	___	✓
☐ ☐-BOULDER [9]	___	✓	☐ ☐-SAND [6]	___	✓
■ ☐-COBBLE [8]	___	✓	☐ ☐-BEDROCK[5]	___	✓
☐ ☐-HARDPAN [4]	___	___	☐ ☐-DETRITUS[3]	___	___
☐ ☐-MUCK [2]	___	___	☐ ☐-ARTIFICIAL[0]	___	✓
☐ ☐-SILT [2]	___	___			

NOTE : (Ignore sludge originating from point-sources; score on natural substrates)
NUMBER OF SUBSTRATE TYPES: ■-5 or More [2] ☐-4 or Less [0]

SUBSTRATE ORIGIN (Check ONE (OR 2 & AVERAGE))
☐ -LIMESTONE [1]
SILT: ■ -TILLS [1]
☐ -WETLANDS[0]
☐ -HARDPAN [0]
☐ -SANDSTONE [0]
EMBEDDED NESS: ☐ -RIP/RAP [0]
☐ -LACUSTRINE [0]
☐ -SHALE [-1]
☐-COAL FINES [-2]

SUBSTRATE QUALITY (Check ONE (OR 2 & AVERAGE))
☐ -SILT HEAVY [-2]
☐ -SILT MODERATE [-1]
■ -SILT NORMAL [0]
☐ -SILT FREE [1]
☐ -EXTENSIVE [-2]
☐ -MODERATE [-1]
■ -NORMAL [0]
☐ -NONE [1]

COMMENTS: _____

Substrate: 18 (Max 20)

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
☐-UNDERCUT BANKS [1]
☐-OVERHANGING VEGETATION [1]
■-SHALLOWS (IN SLOW WATER) [1]
☐-ROOTMATS [1]
☐-DEEP POOLS > 70cm [2]
☐-ROOTWADS [1]
■-BOULDERS [1]
☐-OXBOWS [1]
■-AQUATIC MACROPHYTES [1]
☐-LOGS OR WOODY DEBRIS [1]
COMMENTS: _____

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐-EXTENSIVE > 75% [11]
☐-MODERATE 25-75% [7]
■-SPARSE 5-25% [3]
☐-NEARLY ABSENT < 5% [1]

Cover: 6 (Max 20)

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH [4]	☐-EXCELLENT [7]	☐-NONE [6]	☐-HIGH [3]	☐-SNAGGING	☐-IMPOUND.
☐-MODERATE [3]	☐-GOOD [5]	☐-RECOVERED [4]	■-MODERATE [2]	☐-RELOCATION	☐-ISLANDS
☐-LOW [2]	☐-FAIR [3]	■-RECOVERING [3]	■-LOW [1]	☐-CANOPY REMOVAL	☐-LEVEED
■-NONE [1]	■-POOR [1]	■-RECENT OR NO RECOVERY [1]		☐-DREDGING	■-BANK SHAPING
				■-ONE SIDE CHANNEL MODIFICATIONS	

Channel: 7.5 (Max 20)

COMMENTS: _____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R Per Bank)	FLOOD PLAIN QUALITY (PAST 100 FOOT RIPARIAN) (L R Most Predominant Per Bank)		BANK EROSION (L R Per Bank)
☐ ■ -WIDE > 50m [4]	☐ ■-FOREST, SWAMP [3]	☐ ☐-CONSERVATION TILLAGE [1]	■ ■-NONE/LITTLE [3]
☐ ■ -MODERATE 10-50m [3]	☐ ☐-SHRUB OR OLD FIELD [2]	☐ ☐-URBAN OR INDUSTRIAL [0]	☐ ☐-MODERATE [2]
☐ ☐ -NARROW 5-10m [2]	■ ■-RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐-OPEN PASTURE, ROWCROP [0]	☐ ☐-HEAVY/SEVERE [1]
■ ☐ -VERY NARROW < 5m [1]	☐ ☐-FENCED PASTURE [1]	☐ ☐-MINING/CONSTRUCTION [0]	
■ ☐ -NONE [0]			

Riparian: 6.5 (Max 10)

COMMENTS: _____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
☐ - > 1m [6]
☐ - 0.7-1m [4]
☐ - 0.4-0.7m [2]
☐ - 0.2-0.4m [1]
■ - < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☐ -POOL WIDTH > RIFFLE WIDTH [2]
☐ -POOL WIDTH = RIFFLE WIDTH [1]
■ -POOL WIDTH < RIFFLE W. [0]

CURRENT VELOCITY (POOL & RIFFLES!) (Check *All* That Apply)
■ -EDDIES [1]
☐ -FAST [1]
■ -MODERATE [1]
■ -SLOW [1]
☐ -TORRENTIAL [-1]
☐ -INTERSTITIAL [-1]
☐ -INTERMITTENT [-2]

Pool/Glide: 3 (Max 12)

COMMENTS: _____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE /RUN DEPTH
☐ - GENERALLY > 10 cm; MAX > 50 [4]
■ - GENERALLY > 10 cm; MAX < 50 [3]
☐ - GENERALLY 5-10 cm [1]
☐ - GENERALLY < 5 cm [RIFFLE=0]

RIFFLE/RUN SUBSTRATE
☐ -STABLE (e.g., Cobble, Boulder) [2]
■ -MOD. STABLE (e.g., Large Gravel) [1]
■ -UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE/RUN EMBEDDEDNESS
☐ - NONE [2]
■ - LOW [1]
■ - MODERATE [0]
☐ - EXTENSIVE [-1]

Riffle/Run: 4 (Max 8)

COMMENTS: _____ ☐ - NO RIFFLE [Metric=0]

Gradient: 10 (Max 10)

6] GRADIENT (ft/mi): 17.6 **DRAINAGE AREA (sq.mi.):** 21.1

%POOL: ___ %GLIDE: ___
%RIFFLE: ___ %RUN: ___

ChioEPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 59.75

River Code_____ River Mile_____ Stream BIG CREEK
Date 6/25/97 Location SITE #27 (WEST BRANCH, UPSTREAM of CONFLUENCE)
Scorers Initials: JJ Comments:

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR /SLBS[10]	___	✓
☐ ☐-BOULDER [9]	___	✓
☐ ☐-COBBLE [8]	✓	✓
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	✓	___
■ ■-GRAVEL [7]	✓	✓
☐ ☐-SAND [6]	___	✓
☐ ☐-BEDROCK[5]	___	✓
☐ ☐-DETRITUS[3]	___	___
☐ ☐-ARTIFICIAL[0]	___	✓

NOTE : (Ignore sludge originating from point-sources; score on natural substrates)
NUMBER OF SUBSTRATE TYPES: ■-5 or More [2] ☐-4 or Less [0]

Check ONE (OR 2 & AVERAGE)
☐ -LIMESTONE [1]
■ -TILLS [1]
☐ -WETLANDS[0]
☐ -HARDPAN [0]
☐ -SANDSTONE [0]
☐ -RIP/RAP [0]
☐ -LACUSTRINE [0]
☐ -SHALE [-1]
☐-COAL FINES [-2]

SILT:
EMBEDDEDNESS:

SUBSTRATE QUALITY
Check ONE (OR 2 & AVERAGE)
■ -SILT HEAVY [-2]
■ -SILT MODERATE [-1]
☐ -SILT NORMAL [0]
☐ -SILT FREE [1]
■ -EXTENSIVE [-2]
■ -MODERATE [-1]
☐ -NORMAL [0]
☐ -NONE [1]

Substrate: 14 Max 20

COMMENTS

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
☐-UNDERCUT BANKS [1]
■-OVERHANGING VEGETATION [1]
■-SHALLOWS (IN SLOW WATER) [1]
■-ROOTMATS [1]
☐-DEEP POOLS > 70cm [2]
☐-ROOTWADS [1]
☐-BOULDERS [1]
☐-OXBOWS [1]
■-AQUATIC MACROPHYTES [1]
☐-LOGS OR WOODY DEBRIS [1]

COMMENTS:

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐-EXTENSIVE > 75% [11]
■-MODERATE 25-75% [7]
■-SPARSE 5-25% [3]
☐-NEARLY ABSENT < 5% [1]

Cover: 9 Max 20

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH [4]	☐-EXCELLENT [7]	☐-NONE [6]	■-HIGH [3]	☐-SNAGGING	☐-IMPOUND.
☐-MODERATE [3]	☐-GOOD [5]	■-RECOVERED [4]	■-MODERATE [2]	☐-RELOCATION	☐-ISLANDS
■-LOW [2]	☐-FAIR [3]	■-RECOVERING [3]	☐-LOW [1]	☐-CANOPY REMOVAL	☐-LEVEED
■-NONE [1]	■-POOR [1]	☐-RECENT OR NO RECOVERY [1]		☐-DREDGING	■-BANKSHAPING
				■-ONE SIDE CHANNEL MODIFICATIONS	

Channel: 11 Max 20

COMMENTS:

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R Per Bank)	FLOOD PLAIN QUALITY (PAST 100 FOOT RIPARIAN) (L R Most Predominant Per Bank)		BANK EROSION (L R Per Bank)	
■ ☐-WIDE > 50m [4]	■ ☐-FOREST, SWAMP [3]	☐ ☐-CONSERVATION TILLAGE [1]	■ ■-NONE/LITTLE [3]	
☐ ☐-MODERATE 10-50m [3]	☐ ☐-SHRUB OR OLD FIELD [2]	■ ☐-URBAN OR INDUSTRIAL [0]	☐ ☐-MODERATE [2]	
☐ ■-NARROW 5-10m [2]	☐ ■-RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐-OPEN PASTURE, ROWCROP [0]	☐ ☐-HEAVY/SEVERE [1]	
☐ ☐-VERY NARROW < 5m [1]	☐ ☐-FENCED PASTURE [1]	☐ ☐-MINING/CONSTRUCTION [0]		
☐ ☐-NONE [0]				

Riparian: 7.25 Max 10

COMMENTS:

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
☐ - > 1m [6]
☐-0.7-1m [4]
■- 0.4-0.7m [2]
☐-0.2-0.4m [1]
☐ - < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☐-POOL WIDTH > RIFFLE WIDTH [2]
■-POOL WIDTH = RIFFLE WIDTH [1]
☐-POOL WIDTH < RIFFLE W. [0]

CURRENT VELOCITY (POOL & RIFFLES!) (Check *All* That Apply)
■-EDDIES [1]
☐-FAST [1]
■-MODERATE [1]
■-SLOW [1]
☐-TORRENTIAL [-1]
☐-INTERSTITIAL [-1]
☐-INTERMITTENT [-2]

Pool/Glide: 6 Max 12

COMMENTS:

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE /RUN DEPTH
☐ - GENERALLY > 10 cm; MAX > 50 [4]
■ - GENERALLY > 10 cm; MAX < 50 [3]
☐ - GENERALLY 5-10 cm [1]
☐-GENERALLY < 5cm [RIFFLE=0]

RIFFLE/RUN SUBSTRATE
☐-STABLE (e.g., Cobble, Boulder) [2]
☐-MOD. STABLE (e.g., Large Gravel) [1]
■-UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE/RUN EMBEDDEDNESS
☐ - NONE [2]
☐ - LOW [1]
■ - MODERATE [0]
■ - EXTENSIVE [-1]

☐- NO RIFFLE [Metric=0]

Riffle/Run: 2.5 Max 8

Gradient: 10 Max 10

6] GRADIENT (ft/mi): 13.2 **DRAINAGE AREA (sq.mi.):** 12.9 %POOL: ___ %GLIDE: ___ %RIFFLE: ___ %RUN: ___

OhioEPA Qualitative Habitat Evaluation Index Field Sheet *QHEI Score:* 25

River Code____ River Mile 3.4 Stream BIG CREEK
Date 6/27/97 Location SITE #28 (WEST BRANCH, UPSTREAM OF PUBLITAS AVENUE)
Scorers Initials: JS Comments:____

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR /SLBS[10]	___	___
☐ ☐-BOULDER [9]	___	___
☐ ☐-COBBLE [8]	___	✓
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	___	___
☐ ☐-GRAVEL [7]	___	___
☐ ☐-SAND [6]	___	✓
☐ ☐-BEDROCK[5]	___	___
☐ ☐-DETRITUS[3]	___	___
■ ■-ARTIFICIAL[0]	___	✓

NOTE : (Ignore sludge originating from point-sources; score on natural substrates)
NUMBER OF SUBSTRATE TYPES: ☐-5 or More [2] ■-4 or Less [0]

SUBSTRATE ORIGIN — Check ONE (OR 2 & AVERAGE)
☐ -LIMESTONE [1]
☐ -TILLS [1]
☐ -WETLANDS[0]
☐ -HARDPAN [0]
☐ -SANDSTONE [0]
■ -RIP/RAP [0]
☐ -LACUSTRINE [0]
☐ -SHALE [-1]
☐-COAL FINES [-2]

SILT:
☐ -SILT HEAVY [-2]
■ -SILT MODERATE [-1]
■ -SILT NORMAL [0]
☐ -SILT FREE [1]

EMBEDDEDNESS:
■ -EXTENSIVE [-2]
☐ -MODERATE [-1]
☐ -NORMAL [0]
☐ -NONE [1]

SUBSTRATE QUALITY — Check ONE (OR 2 & AVERAGE)

Substrate: -2.5 Max 20

COMMENTS:____

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
☐-UNDERCUT BANKS [1]
☐-OVERHANGING VEGETATION [1]
☐-SHALLOWS (IN SLOW WATER) [1]
☐-ROOTMATS [1]
☐-DEEP POOLS > 70cm [2]
☐-ROOTWADS [1]
☐-BOULDERS [1]
☐-OXBOWS [1]
■-AQUATIC MACROPHYTES [1]
☐-LOGS OR WOODY DEBRIS [1]

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐-EXTENSIVE > 75% [11]
☐-MODERATE 25-75% [7]
☐-SPARSE 5-25% [3]
■-NEARLY ABSENT < 5% [1]

Cover: 2 Max 20

COMMENTS:____

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH [4]	☐-EXCELLENT [7]	☐-NONE [6]	■-HIGH [3]	☐-SNAGGING	☐-IMPOUND.
☐-MODERATE [3]	☐-GOOD [5]	☐-RECOVERED [4]	☐-MODERATE [2]	☐-RELOCATION	☐-ISLANDS
☐-LOW [2]	☐-FAIR [3]	☐-RECOVERING [3]	☐-LOW [1]	☐-CANOPY REMOVAL	☐-LEVEED
■-NONE [1]	■-POOR [1]	■-RECENT OR NO RECOVERY [1]		☐-DREDGING	☐-BANK SHAPING
				☐-ONE SIDE CHANNEL MODIFICATIONS	

Channel: 6 Max 20

COMMENTS:____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R Per Bank)	FLOOD PLAIN QUALITY (PAST 100 FOOT RIPARIAN) (L R Most Predominant Per Bank)		BANK EROSION (L R Per Bank)
☐ ■'-WIDE > 50m [4]	☐ ☐-FOREST, SWAMP [3]	☐ ☐-CONSERVATION TILLAGE [1]	■ ■-NONE/LITTLE [3]
■ ☐-MODERATE 10-50m [3]	☐ ☐-SHRUB OR OLD FIELD [2]	☐ ■-URBAN OR INDUSTRIAL [0]	☐ ☐-MODERATE [2]
☐ ☐'-NARROW 5-10m [2]	■ ☐-RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐-OPEN PASTURE, ROWCROP [0]	☐ ☐-HEAVY/SEVERE [1]
☐ ☐'-VERY NARROW < 5m [1]	☐ ☐-FENCED PASTURE [1]	☐ ☐-MINING/CONSTRUCTION [0]	
☐ ☐'-NONE [0]			

Riparian: 7 Max 10

COMMENTS:____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
☐ - > 1m [6]
☐- 0.7-1m [4]
☐- 0.4-0.7m [2]
☐- 0.2-0.4m [1]
■ - < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☐'-POOL WIDTH > RIFFLE WIDTH [2]
☐-POOL WIDTH = RIFFLE WIDTH [1]
■'-POOL WIDTH < RIFFLE W. [0]

CURRENT VELOCITY [POOL & RIFFLES!] (Check *All* That Apply)
☐'-EDDIES [1]
☐'-FAST [1]
■'-MODERATE [1]
☐'-SLOW [1]
☐'-TORRENTIAL [-1]
☐'-INTERSTITIAL [-1]
☐'-INTERMITTENT [-2]

Pool/Glide: 1 Max 12

COMMENTS:____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE /RUN DEPTH
☐ - GENERALLY > 10 cm; MAX > 50 [4]
☐ - GENERALLY > 10 cm; MAX < 50 [3]
■ - GENERALLY 5-10 cm [1]
☐-GENERALLY < 5cm [RIFFLE=0]

RIFFLE/RUN SUBSTRATE
■-STABLE (e.g., Cobble, Boulder) [2]
☐-MOD. STABLE (e.g., Large Gravel) [1]
☐-UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE/RUN EMBEDDEDNESS
☐ - NONE [2]
■ - LOW [1]
■ - MODERATE [0]
☐-EXTENSIVE [-1]

☐- NO RIFFLE [Metric=0]

Riffle/Run: 3.5 Max 8

COMMENTS:____

Gradient: 8 Max 10

6] GRADIENT (ft/mi): 14.6 **DRAINAGE AREA (sq.mi.):** 7.2 %POOL: ____ %GLIDE: ____ %RIFFLE: ____ %RUN: ____

OhioEPA Qualitative Habitat Evaluation Index Field Sheet *QHEI Score:* 64.25

River Code ____ River Mile 7.4 Stream BIG CREEK
Date 6/25/97 Location SITE #29 (EAST BRANCH, FERNHILL PICNIC AREA)
Scorers Initials: JJ Comments: ____

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR /SLBS[10]	___	___
☐ ☐-BOULDER [9]	✓	___
☐ ☐-COBBLE [8]	✓	✓
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	✓	✓
■ ☐-GRAVEL [7]	✓	✓
☐ ☐-SAND [6]	✓	✓
■ ☐-BEDROCK[5]	✓	✓
☐ ☐-DETRITUS[3]	___	___
☐ ☐-ARTIFICIAL[0]	___	___

NOTE : *(Ignore sludge originating from point-sources; score on natural substrates)*
NUMBER OF SUBSTRATE TYPES: ■-5 or More [2] ☐-4 or Less [0]

SUBSTRATE ORIGIN — Check ONE (OR 2 & AVERAGE)
☐ -LIMESTONE [1]
■ -TILLS [1]
☐ -WETLANDS[0]
☐ -HARDPAN [0]
☐ -SANDSTONE [0]
☐ -RIP/RAP [0]
☐ -LACUSTRINE [0]
■ -SHALE [-1]
☐-COAL FINES [-2]

SILT: / EMBEDDEDNESS:
■ -SILT HEAVY [-2]
☐ -SILT MODERATE [-1]
☐ -SILT NORMAL [0]
☐ -SILT FREE [1]
☐ -EXTENSIVE [-2]
■ -MODERATE [-1]
■ -NORMAL [0]
☐ -NONE [1]

SUBSTRATE QUALITY — Check ONE (OR 2 & AVERAGE)

Substrate: 11.5 Max 20

COMMENTS ____

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
☐-UNDERCUT BANKS [1]
■-OVERHANGING VEGETATION [1]
■-SHALLOWS (IN SLOW WATER) [1]
■-ROOTMATS [1]
■-DEEP POOLS > 70 cm [2]
■-ROOTWADS [1]
☐-BOULDERS [1]
■-OXBOWS [1]
■-AQUATIC MACROPHYTES [1]
☐-LOGS OR WOODY DEBRIS [1]
COMMENTS: ____

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
■-EXTENSIVE > 75% [11]
■-MODERATE 25-75% [7]
☐-SPARSE 5-25% [3]
☐-NEARLY ABSENT < 5% [1]

Cover: 17 Max 20

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH [4]	☐-EXCELLENT [7]	☐-NONE [6]	☐-HIGH [3]	☐-SNAGGING	☐-IMPOUND.
☐-MODERATE [3]	☐-GOOD [5]	☐-RECOVERED [4]	■-MODERATE [2]	☐-RELOCATION	☐-ISLANDS
■-LOW [2]	■-FAIR [3]	■-RECOVERING [3]	☐-LOW [1]	☐-CANOPY REMOVAL	☐-LEVEED
■-NONE [1]	☐-POOR [1]	■-RECENT OR NO RECOVERY [1]		☐-DREDGING	☐-BANKSHAPING
				☐-ONE SIDE CHANNEL MODIFICATIONS	

Channel: 10.5 Max 20

COMMENTS: ____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R Per Bank)	FLOOD PLAIN QUALITY (PAST 100 FOOT RIPARIAN) (L R Most Predominant Per Bank)	BANK EROSION (L R Per Bank)
☐ ☐-WIDE > 50m [4]	☐ ☐-FOREST, SWAMP [3]	■ ■-NONE/LITTLE [3]
☐ ☐-MODERATE 10-50m [3]	☐ ☐-SHRUB OR OLD FIELD [2]	☐ ☐-MODERATE [2]
■ ☐-NARROW 5-10m [2]	■ ■-RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐-HEAVY/SEVERE [1]
■ ■-VERY NARROW < 5m [1]	☐ ☐-FENCED PASTURE [1]	
☐ ☐-NONE [0]	☐ ☐-CONSERVATION TILLAGE [1]	
	☐ ☐-URBAN OR INDUSTRIAL [0]	
	☐ ☐-OPEN PASTURE, ROW CROP [0]	
	☐ ☐-MINING/CONSTRUCTION [0]	

Riparian: 5.25 Max 10

COMMENTS: ____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
☐ - > 1m [6]
■-0.7-1m [4]
☐-0.4-0.7m [2]
☐-0.2-0.4m [1]
☐ - < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
■ -POOL WIDTH > RIFFLE WIDTH [2]
☐-POOL WIDTH = RIFFLE WIDTH [1]
☐ -POOL WIDTH < RIFFLE W. [0]

CURRENT VELOCITY (POOL & RIFFLES!) (Check *All* That Apply)
■ -EDDIES [1]
■ -FAST [1]
■ -MODERATE [1]
■ -SLOW [1]
☐ -TORRENTIAL [-1]
☐ -INTERSTITIAL [-1]
☐ -INTERMITTENT [-2]

Pool/Glide: 10 Max 12

COMMENTS: ____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE /RUN DEPTH	RIFFLE/RUN SUBSTRATE	RIFFLE/RUN EMBEDDEDNESS
☐ - GENERALLY > 10 cm; MAX > 50 [4]	☐-STABLE (e.g., Cobble, Boulder) [2]	☐ - NONE [2]
☐ - GENERALLY > 10 cm; MAX < 50 [3]	■-MOD. STABLE (e.g., Large Gravel) [1]	☐ - LOW [1]
■ - GENERALLY 5-10 cm [1]	☐-UNSTABLE (Fine Gravel, Sand) [0]	■ - MODERATE [0]
☐-GENERALLY < 5 cm [RIFFLE=0]		☐-EXTENSIVE [-1]

COMMENTS: ____ ☐- NO RIFFLE [Metric=0]

Riffle/Run: 2 Max 8
Gradient: 8 Max 10

6] GRADIENT (ft/mi): 22.9 **DRAINAGE AREA (sq.mi.):** 12.5

%POOL: ____ %GLIDE: ____
%RIFFLE: ____ %RUN: ____

OhioEPA Qualitative Habitat Evaluation Index Field Sheet *QHEI Score:* 48

River Code_____ River Mile_____ Stream BIG CREEK
Date 6/25/97 Location SITE # 30 (STICKNEY CREEK)
Scorers Initials: JS Comments:_____

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR /SLBS[10]	____	____
☐ ☐-BOULDER [9]	____	____
☐ ☐-COBBLE [8]	____	✓
☐ ☐-HARDPAN [4]	____	____
☐ ☐-MUCK [2]	____	____
☐ ☐-SILT [2]	____	____

	POOL	RIFFLE
☐ ☐-GRAVEL [7]	____	✓
☐ ☐-SAND [6]	____	✓
■ ■-BEDROCK[5]	____	✓
☐ ☐-DETRITUS[3]	____	____
☐ ☐-ARTIFICIAL[0]	____	____

NOTE : (Ignore sludge originating from point-sources; score on natural substrates)

NUMBER OF SUBSTRATE TYPES: ☐-5 or More [2] ■-4 or Less [0]

COMMENTS_____

SUBSTRATE ORIGIN — Check ONE (OR 2 & AVERAGE)
☐ -LIMESTONE [1]
☐ -TILLS [1]
☐ -WETLANDS[0]
☐ -HARDPAN [0]
☐ -SANDSTONE [0]
☐ -RIP/RAP [0]
☐ -LACUSTRINE [0]
■ -SHALE [-1]
☐-COAL FINES [-2]

SUBSTRATE QUALITY — Check ONE (OR 2 & AVERAGE)

SILT:
☐ -SILT HEAVY [-2]
☐ -SILT MODERATE [-1]
■ -SILT NORMAL [0]
☐ -SILT FREE [1]

EMBEDDED NESS:
■ -EXTENSIVE [-2]
☐ -MODERATE [-1]
☐ -NORMAL [0]
☐ -NONE [1]

Substrate: 7 / Max 20

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
■-UNDERCUT BANKS [1]
■-OVERHANGING VEGETATION [1]
■-SHALLOWS (IN SLOW WATER) [1]
☐-ROOTMATS [1]
☐-DEEP POOLS > 70cm [2]
☐-ROOTWADS [1]
☐-BOULDERS [1]
☐-OXBOWS [1]
■-AQUATIC MACROPHYTES [1]
☐-LOGS OR WOODY DEBRIS [1]

COMMENTS:_____

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐-EXTENSIVE > 75% [11]
☐-MODERATE 25-75% [7]
■-SPARSE 5-25% [3]
☐-NEARLY ABSENT < 5% [1]

Cover: 7 / Max 20

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY
☐-HIGH [4]
☐-MODERATE [3]
■-LOW [2]
■-NONE [1]

DEVELOPMENT
☐-EXCELLENT [7]
☐-GOOD [5]
☐-FAIR [3]
■-POOR [1]

CHANNELIZATION
■-NONE [6]
☐-RECOVERED [4]
☐-RECOVERING [3]
☐-RECENT OR NO RECOVERY [1]

STABILITY
■-HIGH [3]
■-MODERATE [2]
☐-LOW [1]

MODIFICATIONS/OTHER
☐-SNAGGING ☐-IMPOUND.
☐-RELOCATION ☐-ISLANDS
☐-CANOPY REMOVAL ☐-LEVEED
☐-DREDGING ☐-BANK SHAPING
☐-ONE SIDE CHANNEL MODIFICATIONS

Channel: 11 / Max 20

COMMENTS:_____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R Per Bank)
■ ■-WIDE > 50m [4]
☐ ☐-MODERATE 10-50m [3]
☐ ☐-NARROW 5-10m [2]
☐ ☐-VERY NARROW < 5m [1]
☐ ☐-NONE [0]

FLOOD PLAIN QUALITY (PAST 100 FOOT RIPARIAN) (L R Most Predominant Per Bank)
■ ■-FOREST, SWAMP [3]
☐ ☐-SHRUB OR OLD FIELD [2]
■ ■-RESIDENTIAL, PARK, NEW FIELD [1]
☐ ☐-FENCED PASTURE [1]
☐ ☐-CONSERVATION TILLAGE [1]
☐ ☐-URBAN OR INDUSTRIAL [0]
☐ ☐-OPEN PASTURE, ROWCROP [0]
☐ ☐-MINING/CONSTRUCTION [0]

BANK EROSION (L R Per Bank)
☐ ☐-NONE/LITTLE [3]
■ ■-MODERATE [2]
☐ ☐-HEAVY/SEVERE [1]

Riparian: 8 / Max 10

COMMENTS:_____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
☐ - > 1m [6]
☐-0.7-1m [4]
☐-0.4-0.7m [2]
■-0.2-0.4m [1]
☐ - < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☐-POOL WIDTH > RIFFLE WIDTH [2]
■-POOL WIDTH = RIFFLE WIDTH [1]
☐-POOL WIDTH < RIFFLE W. [0]

CURRENT VELOCITY [POOL & RIFFLES!] (Check *All* That Apply)
■-EDDIES [1]
☐-FAST [1]
■-MODERATE [1]
■-SLOW [1]
☐-TORRENTIAL [-1]
☐-INTERSTITIAL [-1]
☐-INTERMITTENT [-2]

Pool/Glide: 5 / Max 12

COMMENTS:_____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE /RUN DEPTH
☐ - GENERALLY > 10 cm; MAX > 50 [4]
☐ - GENERALLY > 10 cm; MAX < 50 [3]
☐ - GENERALLY 5-10 cm [1]
■-GENERALLY < 5cm [RIFFLE=0]

RIFFLE/RUN SUBSTRATE
☐-STABLE (e.g., Cobble, Boulder) [2]
☐-MOD. STABLE (e.g., Large Gravel) [1]
☐-UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE/RUN EMBEDDEDNESS
☐ - NONE [2]
☐ - LOW [1]
☐ - MODERATE [0]
☐-EXTENSIVE [-1]

■- NO RIFFLE [Metric=0]

Riffle/Run: 0 / Max 8

COMMENTS:_____

Gradient: 10 / Max 10

6] GRADIENT (ft/mi): 26.9 **DRAINAGE AREA** (sq.mi.): 4.1

%POOL: ____ %GLIDE: ____
%RIFFLE: ____ %RUN: ____

Ohio EPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 68.75

River Code:_____ RM:_____ Stream Mill Creek
Date 7/17/98 Location Site #31 (Canal Road)
Scorers Initials: CZ JJ Comments:

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR/SLBS[10]	___	___
☐ ☐-BOULDER [9]	___	✓
☐ ☐-COBBLE [8]	___	✓
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	✓	✓
■ ☐-GRAVEL [7]	✓	✓
■ ☐-SAND [6]	✓	✓
☐ ☐-BEDROCK[5]	___	___
☐ ☐-DETRITUS[3]	___	___
☐ ☐-ARTIFICIAL[0]	✓	✓

NOTE : *(Ignore sludge originating from point-sources; score on natural substrates)*
NUMBER OF SUBSTRATE TYPES: ■-*5 or More [2]* ☐-*4 or Less [0]*

SUBSTRATE ORIGIN — *Check ONE (OR 2 & AVERAGE)*
☐ -*LIMESTONE [1]*
■ -*TILLS [1]*
☐ -*WETLANDS[0]*
☐ -*HARDPAN [0]*
☐ -*SANDSTONE [0]*
☐ -*RIP/RAP [0]*
☐ -*LACUSTRINE [0]*
☐ -*SHALE [-1]*
☐-*COAL FINES [-2]*

SUBSTRATE QUALITY — *Check ONE (OR 2 & AVERAGE)*
SILT:
■ -*SILT HEAVY [-2]*
■ -*SILT MODERATE [-1]*
☐ -*SILT NORMAL [0]*
☐ -*SILT FREE [1]*
EMBEDDEDNESS:
☐ -*EXTENSIVE [-2]*
■ -*MODERATE [-1]*
☐ -*NORMAL [0]*
☐ -*NONE [1]*

Substrate: 13.5 Max 20

COMMENTS

2] INSTREAM COVER

TYPE: **(Check *All* That Apply)**
■ -*UNDERCUT BANKS [1]*
■ -*OVERHANGING VEGETATION [1]*
■ -*SHALLOWS (IN SLOW WATER) [1]*
■ -*ROOTMATS [1]*
■ -*POOLS > 70 cm [2]*
☐ -*ROOTWADS [1]*
■ -*BOULDERS [1]*
☐ -*OXBOWS, BACKWATERS [1]*
☐ -*AQUATIC MACROPHYTES [1]*
☐ -*LOGS OR WOODY DEBRIS [1]*

AMOUNT: **(Check *ONLY* One or check 2 and *AVERAGE*)**
☐ - *EXTENSIVE > 75% [11]*
☐ - *MODERATE 25-75% [7]*
■ - *SPARSE 5-25% [3]*
☐ - *NEARLY ABSENT < 5% [1]*

Cover: 10 Max 20

COMMENTS:

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY
☐-*HIGH [4]*
■-*MODERATE [3]*
☐-*LOW [2]*
☐-*NONE [1]*

DEVELOPMENT
☐ - *EXCELLENT [7]*
■ -*GOOD [5]*
■ - *FAIR [3]*
☐ -*POOR [1]*

CHANNELIZATION
■ -*NONE [6]*
☐ - *RECOVERED [4]*
☐ - *RECOVERING [3]*
☐ - *RECENT OR NO RECOVERY [1]*

STABILITY
☐ -*HIGH [3]*
■ -*MODERATE [2]*
☐ -*LOW [1]*

MODIFICATIONS/OTHER
☐ -*SNAGGING*
☐ -*RELOCATION*
☐ -*CANOPY REMOVAL*
☐ -*DREDGING*
■ -*ONE SIDE CHANNEL MODIFICATIONS*
☐ -*IMPOUND.*
☐ -*ISLANDS*
☐ - *LEVEED*
☐ - *BANK SHAPING*

Channel: 15 Max 20

COMMENTS:

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH — L R (Per Bank)
■ ☐ -*WIDE > 50m [4]*
☐ ☐ -*MODERATE 10-50m [3]*
☐ ■ -*NARROW 5-10m [2]*
☐ ☐ -*VERY NARROW < 5m [1]*
☐ ☐ -*NONE [0]*

FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) — L R (Most Predominant Per Bank)
☐ ☐-*FOREST, SWAMP [3]*
☐ ☐-*SHRUB OR OLD FIELD [2]*
☐ ■-*RESIDENTIAL, PARK, NEW FIELD [1]*
☐ ☐-*FENCED PASTURE [1]*

L R
☐ ☐-*CONSERVATION TILLAGE [1]*
■ ■-*URBAN OR INDUSTRIAL [0]*
☐ ☐-*OPEN PASTURE, ROWCROP [0]*
☐ ☐-*MINING/CONSTRUCTION [0]*

BANK EROSION — L R (Per Bank)
☐ ■-*NONE/LITTLE [3]*
■ ☐-*MODERATE [2]*
☐ ☐-*HEAVY/SEVERE [1]*

Riparian: 5.75 Max 10

COMMENTS:

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
■ - *> 1m [6]*
☐ - *0.7-1m [4]*
☐ - *0.4-0.7m [2]*
☐ - *0.2-0.4m [1]*
☐ - *< 0.2m [POOL=0]*

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☐ -*POOL WIDTH > RIFFLE WIDTH [2]*
■ -*POOL WIDTH = RIFFLE WIDTH [1]*
☐ -*POOL WIDTH < RIFFLE W. [0]*

CURRENT VELOCITY [POOLS & RIFFLES!] (Check *All* That Apply)
☐ -*EDDIES [1]*
■ -*FAST [1]*
■ -*MODERATE [1]*
■ -*SLOW [1]*
☐ -*TORRENTIAL [-1]*
☐ -*INTERSTITIAL [-1]*
☐ -*INTERMITTENT [-2]*

Pool/Current: 10 Max 12

COMMENTS:

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH
☐ - *Generally > 10 cm, MAX > 50 [4]*
■ - *Generally > 10 cm, MAX < 50 [3]*
☐ - *Generally 5-10 cm [1]*
☐ - *Generally < 5 cm [RIFFLE=0]*

RIFFLE/RUN SUBSTRATE
☐-*STABLE (e.g., Cobble, Boulder) [2]*
■-*MOD. STABLE (e.g., Large Gravel) [1]*
☐-*UNSTABLE (Fine Gravel, Sand) [0]*

RIFFLE/RUN EMBEDDEDNESS
☐ - *NONE [3]*
■ - *LOW [1]*
■ - *MODERATE [0]*
☐ - *EXTENSIVE [-1]*

☐ - *NO RIFFLE [Metric=0]*

Riffle/Run: 4.5 Max 8

Gradient: 10 Max 10

COMMENTS:

6] GRADIENT (ft/mi): 11.9 **DRAINAGE AREA (sq.mi.):** 18.1 %POOL: ___ %GLIDE: ___ %RIFFLE: ___ %RUN: ___

* must drain enough to support a population of riffle-obligate fish species.

ONEPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 70.25

River Code:_____ RM: ____ Stream Mill Creek
Date 7/17/98 Location Site #32 (Warner Road Branch)
Scorers Initials: CZ JS Comments

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR /SLBS[10]	____	____
☐ ☐-BOULDER [9]	✓	____
■ ☐-COBBLE [8]	✓	✓
☐ ☐-HARDPAN [4]	____	____
☐ ☐-MUCK [2]	____	____
☐ ☐-SILT [2]	✓	✓
■ ☐-GRAVEL [7]	✓	✓
☐ ☐-SAND [6]	✓	✓
☐ ☐-BEDROCK[5]	____	____
☐ ☐-DETRITUS[3]	____	____
☐ ☐-ARTIFICIAL[0]	✓	✓

NOTE : *(Ignore sludge originating from point-sources; score on natural substrates)*

NUMBER OF SUBSTRATE TYPES: ■-*5 or More [2]* ☐-*4 or Less [0]*

*COMMENTS*_____

SUBSTRATE ORIGIN *Check ONE (OR 2 & AVERAGE)*
☐ -*LIMESTONE [1]*
■ -*TILLS [1]*
☐ -*WETLANDS[0]*
☐ -*HARDPAN [0]*
☐ -*SANDSTONE [0]*
☐ -*RIP/RAP [0]*
☐ -*LACUSTRINE [0]*
☐ -*SHALE [-1]*
☐-*COAL FINES [-2]*

SILT:
☐ -*SILT HEAVY [-2]*
■ -*SILT MODERATE [-1]*
■ -*SILT NORMAL [0]*
☐ -*SILT FREE [1]*

EMBEDDEDNESS:
☐ -*EXTENSIVE [-2]*
☐ -*MODERATE [-1]*
■ -*NORMAL [0]*
☐ -*NONE [1]*

SUBSTRATE QUALITY *Check ONE (OR 2 & AVERAGE)*

Substrate: 17.5 Max 20

2] INSTREAM COVER

TYPE: **(Check *All* That Apply)**
■ -*UNDERCUT BANKS [1]*
■ -*OVERHANGING VEGETATION [1]*
☐-*SHALLOWS (IN SLOW WATER) [1]*
■-*ROOTMATS[1]*
■ -*POOLS > 70 cm [2]*
☐ -*ROOTWADS [1]*
■-*BOULDERS[1]*
☐ -*OXBOWS, BACKWATERS [1]*
☐ -*AQUATIC MACROPHYTES [1]*
☐-*LOGS OR WOODY DEBRIS[1]*

AMOUNT: **(Check *ONLY* One or check 2 and *AVERAGE*)**
☐ - *EXTENSIVE > 75% [11]*
■ - *MODERATE 25-75% [7]*
☐-*SPARSE 5-25% [3]*
☐-*NEARLY ABSENT < 5% [1]*

*COMMENTS:*_____

Cover: 13 Max 20

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-*HIGH[4]*	☐-*EXCELLENT[7]*	■-*NONE[6]*	☐-*HIGH[3]*	☐-*SNAGGING*	☐-*IMPOUND.*
■-*MODERATE[3]*	■-*GOOD[5]*	☐-*RECOVERED[4]*	■-*MODERATE[2]*	☐-*RELOCATION*	☐-*ISLANDS*
☐-*LOW[2]*	☐-*FAIR[3]*	☐-*RECOVERING[3]*	☐-*LOW[1]*	☐-*CANOPY REMOVAL*	☐-*LEVEED*
☐-*NONE[1]*	☐-*POOR[1]*	☐-*RECENT OR NO RECOVERY[1]*		☐-*DREDGING*	☐-*BANKSHAPING*
				☐-*ONE SIDE CHANNEL MODIFICATIONS*	

*COMMENTS:*_____

Channel: 16 Max 20

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R Per Bank)	FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) (L R Most Predominant Per Bank)		BANK EROSION (L R Per Bank)	
☐ ■ -*WIDE > 50m[4]*	☐ ■-*FOREST, SWAMP [3]*	☐ ☐-*CONSERVATION TILLAGE[1]*	■ ■-*NONE/LITTLE[3]*	
☐ ☐-*MODERATE 10-50m[3]*	☐ ☐-*SHRUB OR OLD FIELD[2]*	■ ☐-*URBAN OR INDUSTRIAL[0]*	☐ ☐-*MODERATE[2]*	
■ ☐ -*NARROW 5-10m[2]*	☐ ☐-*RESIDENTIAL, PARK, NEW FIELD[1]*	☐ ☐-*OPEN PASTURE, ROWCROP[0]*	☐ ☐-*HEAVY/SEVERE[1]*	
■ ☐ -*VERY NARROW < 5m[1]*	☐ ☐-*FENCED PASTURE[1]*	☐ ☐-*MINING/CONSTRUCTION[0]*		
☐ ☐ -*NONE[0]*				

Riparian: 7.25 Max 10

COM-
*MENTS:*_____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
■ - *> 1m [6]*
☐- *0.7-1m[4]*
☐- *0.4-0.7m[2]*
☐- *0.2-0.4m[1]*
☐ - *< 0.2m [POOL=0]*

MORPHOLOGY (Check 1 or 2 & AVERAGE)
■ -*POOL WIDTH > RIFFLE WIDTH [2]*
■-*POOL WIDTH = RIFFLE WIDTH [1]*
☐ -*POOL WIDTH < RIFFLE W. [0]*

CURRENT VELOCITY [POOLS & RIFFLES!] (Check *All* That Apply)
☐ -*EDDIES[1]*
☐ -*FAST[1]*
■ -*MODERATE[1]*
■ -*SLOW[1]*
☐ -*TORRENTIAL[-1]*
☐ -*INTERSTITIAL[-1]*
☐ -*INTERMITTENT[-2]*

*COMMENTS:*_____

Pool/Current: 9.5 Max 12

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH
☐ - *Generally > 10 cm, MAX > 50 [4]*
☐ - *Generally > 10 cm, MAX < 50 [3]*
■ - *Generally 5-10 cm[1]*
☐ - *Generally < 5 cm [RIFFLE=0]*

RIFFLE/RUN SUBSTRATE
☐-*STABLE (e.g., Cobble, Boulder) [2]*
■-*MOD. STABLE (e.g., Large Gravel) [1]*
☐-*UNSTABLE (Fine Gravel, Sand) [0]*

RIFFLE/RUN EMBEDDEDNESS
☐ - *NONE [1]*
■ - *LOW [1]*
☐ - *MODERATE [0]*
☐ - *EXTENSIVE [-1]*

*COMMENTS:*_____ ☐ - *NO RIFFLE [Metric=0]*

Riffle/Run: 3 Max 8

Gradient: 4 Max 10

6] GRADIENT (ft/mi): 81.2 **DRAINAGE AREA (sq.mi.):** 2.4

%POOL: ____ %GLIDE: ____
%RIFFLE: ____ %RUN: ____

* mst areas must be large enough to support a population of riffle-obligate fish species.

Ohio EPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 68.5

River Code: ____ RM: ____ Stream WOLF CREEK
Date 7/17/98 Location SITE #33 (GARFIELD PARK RESERVATION)
Scorers Initials: CZ JS Comments ____

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR /SLBS[10]	____	____
☐ ☐-BOULDER [9]	✓	✓
■ ☐-COBBLE [8]	✓	✓
☐ ☐-HARDPAN [4]	✓	✓
☐ ☐-MUCK [2]	____	____
☐ ☐-SILT [2]	____	____
☐ ☐-GRAVEL [7]	✓	✓
■ ☐-SAND [6]	✓	✓
☐ ☐-BEDROCK[5]	____	____
☐ ☐-DETRITUS[3]	____	____
☐ ☐-ARTIFICIAL[0]	✓	✓

NOTE : *(Ignore sludge originating from point-sources; score on natural substrates)*

NUMBER OF SUBSTRATE TYPES: ■-*5 or More [2]* ☐-*4 or Less [0]*

COMMENTS ____

SUBSTRATE ORIGIN — Check ONE (OR 2 & AVERAGE)
☐ -*LIMESTONE [1]*
■ -*TILLS [1]*
☐ -*WETLANDS[0]*
☐ -*HARDPAN [0]*
☐ -*SANDSTONE [0]*
☐ -*RIP/RAP [0]*
☐ -*LACUSTRINE [0]*
☐ -*SHALE [-1]*
☐ -*COAL FINES [-2]*

SUBSTRATE QUALITY — Check ONE (OR 2 & AVERAGE)

SILT:
☐ -*SILT HEAVY [-2]*
■ -*SILT MODERATE [-1]*
☐ -*SILT NORMAL [0]*
☐ -*SILT FREE [1]*

EMBEDDEDNESS:
☐ -*EXTENSIVE [-2]*
☐ -*MODERATE [-1]*
■ -*NORMAL [0]*
☐ -*NONE [1]*

Substrate: 15.5 Max 20

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
☐ -*UNDERCUT BANKS [1]*
■ -*OVERHANGING VEGETATION [1]*
■ -*SHALLOWS (IN SLOW WATER) [1]*
■ -*ROOTMATS [1]*
■ -*POOLS > 70 cm [2]*
☐ -*ROOTWADS [1]*
■ -*BOULDERS [1]*
☐ -*OXBOWS, BACKWATERS [1]*
☐ -*AQUATIC MACROPHYTES [1]*
■ -*LOGS OR WOODY DEBRIS [1]*

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐ - *EXTENSIVE > 75% [11]*
☐ - *MODERATE 25-75% [7]*
■ -*SPARSE 5-25% [3]*
☐ -*NEARLY ABSENT < 5% [1]*

Cover: 10 Max 20

COMMENTS: ____

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	*DEVELOPMENT*	*CHANNELIZATION*	*STABILITY*	*MODIFICATIONS/OTHER*	
☐-*HIGH [4]*	☐-*EXCELLENT [7]*	☐-*NONE [6]*	■-*HIGH [3]*	☐-*SNAGGING*	☐-*IMPOUND.*
☐-*MODERATE [3]*	☐-*GOOD [5]*	■-*RECOVERED [4]*	■-*MODERATE [2]*	☐-*RELOCATION*	☐-*ISLANDS*
■-*LOW [2]*	■-*FAIR [3]*	☐-*RECOVERING [3]*	☐-*LOW [1]*	☐-*CANOPY REMOVAL*	☐-*LEVEED*
☐-*NONE [1]*	■-*POOR [1]*	☐-*RECENT OR NO RECOVERY [1]*		☐-*DREDGING*	☐-*BANKSHAPING*
				☐-*ONE SIDE CHANNEL MODIFICATIONS*	

Channel: 10.5 Max 20

COMMENTS: ____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH L R (Per Bank)	*FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN)* L R (Most Predominant Per Bank)	L R	*BANK EROSION* L R (Per Bank)
■ ■-*WIDE > 50m [4]*	■ ■-*FOREST, SWAMP [3]*	☐ ☐-*CONSERVATION TILLAGE [1]*	■ ■-*NONE/LITTLE [3]*
☐ ☐-*MODERATE 10-50m [3]*	☐ ☐-*SHRUB OR OLD FIELD [2]*	☐ ☐-*URBAN OR INDUSTRIAL [0]*	☐ ☐-*MODERATE [2]*
☐ ☐-*NARROW 5-10m [2]*	■ ■-*RESIDENTIAL, PARK, NEW FIELD [1]*	☐ ☐-*OPEN PASTURE, ROWCROP [0]*	☐ ☐-*HEAVY/SEVERE [1]*
☐ ☐-*VERY NARROW < 5m [1]*	☐ ☐-*FENCED PASTURE [1]*	☐ ☐-*MINING/CONSTRUCTION [0]*	
☐ ☐-*NONE [0]*			

Riparian: 9 Max 10

COMMENTS: ____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
■ - *> 1m [6]*
☐ - *0.7-1m [4]*
☐ - *0.4-0.7m [2]*
☐ - *0.2-0.4m [1]*
☐ - *< 0.2m [POOL=0]*

MORPHOLOGY (Check 1 or 2 & AVERAGE)
■ -*POOL WIDTH > RIFFLE WIDTH [2]*
☐ -*POOL WIDTH = RIFFLE WIDTH [1]*
☐ -*POOL WIDTH < RIFFLE W. [0]*

CURRENT VELOCITY [POOLS & RIFFLES!] (Check *All* That Apply)
☐ -*EDDIES [1]*
☐ -*FAST [1]*
■ -*MODERATE [1]*
■ -*SLOW [1]*
☐ -*TORRENTIAL [-1]*
☐ -*INTERSTITIAL [-1]*
☐ -*INTERMITTENT [-2]*

Pool/Current: 10 Max 12

COMMENTS: ____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH
☐ - *Generally > 10 cm, MAX > 50 [4]*
☐ - *Generally > 10 cm, MAX < 50 [3]*
■ - *Generally 5-10 cm [1]*
☐ - *Generally < 5 cm [RIFFLE=0]*

RIFFLE/RUN SUBSTRATE
■ -*STABLE (e.g., Cobble, Boulder) [2]*
■ -*MOD. STABLE (e.g., Large Gravel) [1]*
☐ -*UNSTABLE (Fine Gravel, Sand) [0]*

RIFFLE/RUN EMBEDDEDNESS
☐ - *NONE [2]*
■ - *LOW [1]*
☐ - *MODERATE [0]*
☐ - *EXTENSIVE [-1]*

☐ - *NO RIFFLE [Metric=0]*

Riffle/Run: 3.5 Max 8

Gradient: 10 Max 10

COMMENTS: ____

6] GRADIENT (ft/mi): 27.7 **DRAINAGE AREA (sq.mi.):** 1.5 %POOL: ____ %GLIDE: ____ %RIFFLE: ____ %RUN: ____

* Pool areas must be large enough to support a population of fish species.

OhioEPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 66.25

River Code:_____ RM: _____ Stream Mill Creek
Date 7/27/98 Location SITE # 33.5 (MAPLETOWN BRANCH)
Scorers Initials: CZ Comments

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR/SLBS[10]	___	___
☐ ☐-BOULDER [9]	___	✓
■ ☐-COBBLE [8]	✓	✓
☐ ☐-HARDPAN [4]	✓	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	✓	___
■ ☐-GRAVEL [7]	✓	✓
☐ ☐-SAND [6]	___	___
☐ ☐-BEDROCK[5]	___	___
☐ ☐-DETRITUS[3]	___	___
☐ ☐-ARTIFICIAL[0]	✓	___

NOTE : *(Ignore sludge originating from point-sources; score on natural substrates)*
NUMBER OF SUBSTRATE TYPES: ■-*5 or More [2]* ☐-*4 or Less [0]*

SUBSTRATE ORIGIN — Check ONE (OR 2 & AVERAGE)
☐ -LIMESTONE [1]
■ -TILLS [1]
☐ -WETLANDS[0]
☐ -HARDPAN [0]
☐ -SANDSTONE [0]
☐ -RIP/RAP [0]
☐ -LACUSTRINE [0]
☐ -SHALE [-1]
☐-COAL FINES [-2]

SUBSTRATE QUALITY — Check ONE (OR 2 & AVERAGE)
SILT:
☐ -SILT HEAVY [-2]
☐ -SILT MODERATE [-1]
■ -SILT NORMAL [0]
☐ -SILT FREE [1]
EMBEDDEDNESS:
☐ -EXTENSIVE [-2]
■ -MODERATE [-1]
■ -NORMAL [0]
☐ -NONE [1]

Substrate: 17.5 Max 20

COMMENTS:

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
■ -UNDERCUT BANKS [1]
☐ -OVERHANGING VEGETATION [1]
■ -SHALLOWS (IN SLOW WATER) [1]
■ -ROOTMATS [1]
☐ -POOLS > 70 cm [2]
■ -ROOTWADS [1]
■ -BOULDERS [1]
☐ -OXBOWS, BACKWATERS [1]
☐ -AQUATIC MACROPHYTES [1]
■ -LOGS OR WOODY DEBRIS [1]

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐ - EXTENSIVE > 75% [11]
■ - MODERATE 25-75% [7]
■ -SPARSE 5-25% [3]
☐ -NEARLY ABSENT < 5% [1]

Cover: 11 Max 20

COMMENTS:

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH [4]	☐-EXCELLENT [7]	■-NONE [6]	■-HIGH [3]	☐-SNAGGING	☐-IMPOUND.
☐-MODERATE [3]	■-GOOD [5]	☐-RECOVERED [4]	■-MODERATE [2]	☐-RELOCATION	☐-ISLANDS
■-LOW [2]	■-FAIR [3]	☐-RECOVERING [3]	☐-LOW [1]	☐-CANOPY REMOVAL	☐-LEVEED
☐-NONE [1]	☐-POOR [1]	☐-RECENT OR NO RECOVERY [1]		☐-DREDGING	☐-BANK SHAPING
				☐-ONE SIDE CHANNEL MODIFICATIONS	

Channel: 14.5 Max 20

COMMENTS:

4]. RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R Per Bank)	FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) (L R Most Predominant Per Bank)		BANK EROSION (L R Per Bank)	
☐ ☐-WIDE > 50m [4]	☐ ☐-FOREST, SWAMP [3]	☐ ☐-CONSERVATION TILLAGE [1]	■ ■-NONE/LITTLE [3]	
☐ ☐-MODERATE 10-50m [3]	☐ ☐-SHRUB OR OLD FIELD [2]	■ ■-URBAN OR INDUSTRIAL [0]	■ ☐-MODERATE [2]	
■ ■-NARROW 5-10m [2]	☐ ☐-RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐-OPEN PASTURE, ROWCROP [0]	☐ ☐-HEAVY/SEVERE [1]	
☐ ☐-VERY NARROW < 5m [1]	☐ ☐-FENCED PASTURE [1]	☐ ☐-MINING/CONSTRUCTION [0]		
☐ ☐-NONE [0]				

Riparian: 4.75 Max 10

COMMENTS:

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
☐ - > 1m [6]
☐ - 0.7-1m [4]
■ - 0.4-0.7m [2]
☐ - 0.2-0.4m [1]
☐ - < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
■ -POOL WIDTH > RIFFLE WIDTH [2]
☐-POOL WIDTH = RIFFLE WIDTH [1]
☐ -POOL WIDTH < RIFFLE W. [0]

CURRENT VELOCITY (POOLS & RIFFLES!) (Check *All* That Apply)
☐ -EDDIES [1]
☐ -FAST [1]
■ -MODERATE [1]
■ -SLOW [1]
☐ -TORRENTIAL [-1]
☐ -INTERSTITIAL [-1]
☐ -INTERMITTENT [-2]

Pool/Current: 6 Max 12

COMMENTS:

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH
☐ - Generally > 10 cm, MAX > 50 [4]
■ - Generally > 10 cm, MAX < 50 [3]
☐ - Generally 5-10 cm [1]
☐ - Generally < 5 cm [RIFFLE=0]

RIFFLE/RUN SUBSTRATE
■ -STABLE (e.g., Cobble, Boulder) [2]
☐ -MOD. STABLE (e.g., Large Gravel) [1]
☐ -UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE/RUN EMBEDDEDNESS
☐ - NONE [2]
☐ - LOW [1]
■ - MODERATE [0]
■ - EXTENSIVE [-1]

☐ - NO RIFFLE [Metric=0]

Riffle/Run: 4.5 Max 8

COMMENTS:

6] GRADIENT (ft/mi): 36.4 DRAINAGE AREA (sq.mi.): 1.8

%POOL: ___ %GLIDE: ___
%RIFFLE: ___ %RUN: ___

Gradient: 8 Max 10

* Any stream must be large enough to support a population of riffle-obligate fish species.

OhioEPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 51.25

River Code:_____ RM: ____ Stream Mill Creek
Date 7/27/98 Location Site # 34 (Rex Ave. and Glenburn Ave.)
Scorers Initials: CZ Comments

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR/SLBS[10]	___	___
☐ ☐-BOULDER [9]	✓	✓
☐ ☐-COBBLE [8]	✓	___
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	___	___
■ ☐-GRAVEL [7]	✓	✓
■ ☐-SAND [6]	✓	✓
☐ ☐-BEDROCK[5]	___	___
☐ ☐-DETRITUS[3]	___	___
☐ ☐-ARTIFICIAL[0]	___	___

NOTE : (Ignore sludge originating from point-sources; score on natural substrates)
NUMBER OF SUBSTRATE TYPES: ☐-5 or More [2] ■-4 or Less [0]

SUBSTRATE ORIGIN — Check ONE (OR 2 & AVERAGE)
☐ -LIMESTONE [1]
■ -TILLS [1]
☐ -WETLANDS[0]
☐ -HARDPAN [0]
☐ -SANDSTONE [0]
☐ -RIP/RAP [0]
☐ -LACUSTRINE [0]
☐ -SHALE [-1]
☐-COAL FINES [-2]

SUBSTRATE QUALITY — Check ONE (OR 2 & AVERAGE)
SILT:
☐ -SILT HEAVY [-2]
☐ -SILT MODERATE [-1]
■ -SILT NORMAL [0]
☐ -SILT FREE [1]
EMBEDDEDNESS:
☐ -EXTENSIVE [-2]
■ -MODERATE [-1]
☐ -NORMAL [0]
☐ -NONE [1]

Substrate: 13 Max 20

COMMENTS:

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
☐ -UNDERCUT BANKS [1]
☐ -OVERHANGING VEGETATION [1]
■ -SHALLOWS (IN SLOW WATER) [1]
■ -ROOTMATS[1]
☐ -POOLS > 70 cm [2]
☐ -ROOTWADS [1]
■ -BOULDERS [1]
☐ -OXBOWS, BACKWATERS [1]
☐ -AQUATIC MACROPHYTES [1]
☐ -LOGS OR WOODY DEBRIS [1]

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐ - EXTENSIVE > 75% [11]
☐ - MODERATE 25-75% [7]
■ -SPARSE 5-25% [3]
☐ -NEARLY ABSENT < 5% [1]

Cover: 6 Max 20

COMMENTS:

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH[4]	☐- EXCELLENT [7]	■-NONE[6]	☐-HIGH[3]	☐-SNAGGING	☐-IMPOUND.
☐-MODERATE[3]	☐-GOOD[5]	☐- RECOVERED[4]	■-MODERATE[2]	☐-RELOCATION	☐-ISLANDS
■-LOW[2]	■- FAIR[3]	☐- RECOVERING[3]	■-LOW[1]	☐-CANOPY REMOVAL	☐- LEVEED
☐-NONE[1]	■-POOR[1]	☐- RECENT OR NO RECOVERY[1]		☐-DREDGING	☐- BANKSHAPING
				☐-ONE SIDE CHANNEL MODIFICATIONS	

Channel: 11.5 Max 20

COMMENTS:

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R Per Bank)	FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) (L R Most Predominant Per Bank)		BANK EROSION (L R Per Bank)	
☐ ☐ -WIDE >50m[4]	■ ☐-FOREST, SWAMP [3]	☐ ☐-CONSERVATION TILLAGE [1]	■ ■-NONE/LITTLE[3]	
■ ☐-MODERATE 10-50m[3]	☐ ☐-SHRUB OR OLD FIELD [2]	☐ ☐-URBAN OR INDUSTRIAL [0]	■ ☐-MODERATE[2]	
☐ ■ -NARROW 5-10m[2]	■ ■-RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐-OPEN PASTURE, ROWCROP [0]	☐ ☐-HEAVY/SEVERE[1]	
☐ ☐ -VERY NARROW <5m[1]	☐ ☐-FENCED PASTURE [1]	☐ ☐-MINING/CONSTRUCTION[0]		
☐ ☐ -NONE[0]				

Riparian: 6.75 Max 10

COMMENTS:

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
☐ - >1m [6]
☐ - 0.7-1m[4]
☐ - 0.4-0.7m[2]
■ - 0.2-0.4m[1]
☐ - < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☐ -POOL WIDTH > RIFFLE WIDTH [2]
☐-POOL WIDTH = RIFFLE WIDTH[1]
■ -POOL WIDTH < RIFFLE W.[0]

CURRENT VELOCITY [POOLS & RIFFLES!] (Check *All* That Apply)
☐ -EDDIES[1]
☐ -FAST[1]
■ -MODERATE[1]
■ -SLOW[1]
☐ -TORRENTIAL[-1]
☐ -INTERSTITIAL[-1]
☐ -INTERMITTENT[-2]

Pool/Current: 3 Max 12

COMMENTS:

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH
☐ - Generally > 10 cm, MAX > 50 [4]
☐ - Generally > 10 cm, MAX < 50 [3]
■ - Generally 5-10 cm[1]
☐ - Generally < 5 cm (RIFFLE=0]

RIFFLE/RUN SUBSTRATE
■-STABLE (e.g., Cobble, Boulder) [2]
■-MOD. STABLE (e.g., Large Gravel) [1]
☐-UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE/RUN EMBEDDEDNESS
☐ - NONE [3]
■ - LOW [1]
■ - MODERATE [0]
☐ - EXTENSIVE [-1]

Riffle/Run: 3 Max 8

COMMENTS: ☐ - NO RIFFLE [Metric=0]

Gradient: 8 Max 10

6] GRADIENT (ft/mi): 26.9 DRAINAGE AREA (sq.mi.): 16 %POOL: %GLIDE: %RIFFLE: %RUN:

* (Headwater streams must be large enough to support a population of riffle-obligate fish species.)

OhioEPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 68

River Code:_____ RM: _____ Stream Mill Creek
Date 7/27/98 Location Site #35 (Northland Road)
Scorers Initials: CZ Comments_____

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR/SLBS[10]	___	___
☐ ☐-BOULDER [9]	___	___
☐ ☐-COBBLE [8]	✓	✓
☐ ☐-HARDPAN [4]	✓	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	✓	___
■ ☐-GRAVEL [7]	✓	✓
■ ☐-SAND [6]	✓	✓
☐ ☐-BEDROCK[5]	___	___
☐ ☐-DETRITUS[3]	___	___
☐ ☐-ARTIFICIAL[0]	___	___

NOTE : (Ignore sludge originating from point-sources; score on natural substrates)
NUMBER OF SUBSTRATE TYPES: ■-5 or More [2] ☐-4 or Less [0]

SUBSTRATE ORIGIN (Check ONE (OR 2 & AVERAGE))
☐ -LIMESTONE [1]
■ -TILLS [1]
☐ -WETLANDS[0]
☐ -HARDPAN [0]
☐ -SANDSTONE [0]
☐ -RIP/RAP [0]
☐ -LACUSTRINE [0]
☐ -SHALE [-1]
☐-COAL FINES [-2]

SILT:
☐ -SILT HEAVY [-2]
☐ -SILT MODERATE [-1]
■ -SILT NORMAL [0]
☐ -SILT FREE [1]

EMBEDDEDNESS:
☐ -EXTENSIVE [-2]
☐ -MODERATE [-1]
■ -NORMAL [0]
☐ -NONE [1]

SUBSTRATE QUALITY (Check ONE (OR 2 & AVERAGE))

Substrate: 16 / Max 20

COMMENTS_____

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
■ -UNDERCUT BANKS [1]
☐ -OVERHANGING VEGETATION [1]
■ -SHALLOWS (IN SLOW WATER) [1]
■ -ROOTMATS [1]
■ -POOLS > 70 cm [2]
■ -ROOTWADS [1]
☐ -BOULDERS [1]
☐ -OXBOWS, BACKWATERS [1]
☐ -AQUATIC MACROPHYTES [1]
■ -LOGS OR WOODY DEBRIS [1]
COMMENTS:_____

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐ - EXTENSIVE > 75% [11]
■ - MODERATE 25-75% [7]
☐ - SPARSE 5-25% [3]
☐ - NEARLY ABSENT < 5% [1]

Cover: 14 / Max 20

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH [4]	☐ - EXCELLENT [7]	■-NONE [6]	☐-HIGH [3]	☐-SNAGGING	☐-IMPOUND.
■-MODERATE [3]	■-GOOD [5]	☐- RECOVERED [4]	■-MODERATE [2]	☐- RELOCATION	■-ISLANDS
■-LOW [2]	■- FAIR [3]	☐- RECOVERING [3]	■- LOW [1]	☐- CANOPY REMOVAL	☐- LEVEED
☐-NONE [1]	☐-POOR [1]	☐- RECENT OR NO RECOVERY [1]		☐-DREDGING	☐-BANK SHAPING
				☐-ONE SIDE CHANNEL MODIFICATIONS	

Channel: 14 / Max 20

COMMENTS:_____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R Per Bank)	FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) (L R Most Predominant Per Bank)		BANK EROSION (L R Per Bank)	
■ ☐-WIDE > 50m [4]	■ ☐-FOREST, SWAMP [3]	☐ ☐-CONSERVATION TILLAGE [1]	■ ☐-NONE/LITTLE [3]	
☐ ☐-MODERATE 10-50m [3]	☐ ☐-SHRUB OR OLD FIELD [2]	☐ ☐-URBAN OR INDUSTRIAL [0]	■ ■-MODERATE [2]	
☐ ☐-NARROW 5-10m [2]	☐ ■-RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐-OPEN PASTURE, ROWCROP [0]	☐ ■-HEAVY/SEVERE [1]	
☐ ■-VERY NARROW < 5m [1]	☐ ☐-FENCED PASTURE [1]	☐ ☐-MINING/CONSTRUCTION [0]		
☐ ☐-NONE [0]				

Riparian: 6.5 / Max 10

COMMENTS:_____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)	MORPHOLOGY (Check 1 or 2 & AVERAGE)	CURRENT VELOCITY [POOLS & RIFFLES!] (Check *All* That Apply)	
■ - > 1m [6]	■-POOL WIDTH > RIFFLE WIDTH [2]	☐-EDDIES [1]	☐-TORRENTIAL [-1]
☐ - 0.7-1m [4]	☐-POOL WIDTH = RIFFLE WIDTH [1]	☐-FAST [1]	☐-INTERSTITIAL [-1]
☐ - 0.4-0.7m [2]	☐-POOL WIDTH < RIFFLE W. [0]	☐-MODERATE [1]	☐-INTERMITTENT [-2]
☐ - 0.2-0.4m [1]		■-SLOW [1]	
☐ - < 0.2m [POOL=0]			

Pool/Current: 9 / Max 12

COMMENTS:_____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH	RIFFLE/RUN SUBSTRATE	RIFFLE/RUN EMBEDDEDNESS
☐ - Generally > 10 cm, MAX > 50 [4]	☐-STABLE (e.g., Cobble, Boulder) [2]	☐ - NONE [2]
☐ - Generally > 10 cm, MAX < 50 [3]	■-MOD. STABLE (e.g., Large Gravel) [1]	■ - LOW [1]
■ - Generally 5-10 cm [1]	■-UNSTABLE (Fine Gravel, Sand) [0]	☐ - MODERATE [0]
☐ - Generally < 5 cm [RIFFLE=0]		☐ - EXTENSIVE [-1]

Riffle/Run: 2.5 / Max 8

COMMENTS:_____ ☐ - NO RIFFLE [Metric=0]

Gradient: 6 / Max 10

6] GRADIENT (ft/mi): 22.9 DRAINAGE AREA (sq.mi.): 9.3 %POOL: ___ %GLIDE: ___ %RIFFLE: ___ %RUN: ___

* Most areas must be large enough to support a population of riffle-obligate fish species.

OhioEPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 52.5

River Code:______ RM: 0.1 Stream West Creek
Date 7/27/98 Location Site # 36 (Granger Road)
Scorers Initials: CZ Comments

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES*; Estimate % present);

TYPE POOL RIFFLE / POOL RIFFLE / SUBSTRATE ORIGIN / SUBSTRATE QUALITY

- BLDR /SLBS[10] / GRAVEL [7] ✓ ✓ / Check ONE (OR 2 & AVERAGE) / Check ONE (OR 2 & AVERAGE)
- BOULDER [9] ✓ / SAND [6] ✓ / -LIMESTONE [1] / SILT: -SILT HEAVY [-2]
- COBBLE [8] ✓ / BEDROCK[5] / -TILLS [1] / -SILT MODERATE [-1]
- HARDPAN [4] / DETRITUS[3] / -WETLANDS[0] / -SILT NORMAL [0]
- MUCK [2] / ARTIFICIAL[0] ✓ / -HARDPAN [0] / -SILT FREE [1]
- SILT [2] ✓ / -SANDSTONE [0] / EMBEDDEDNESS: -EXTENSIVE [-2]
- -RIP/RAP [0] / -MODERATE [-1]
- -LACUSTRINE [0] / -NORMAL [0]
- -SHALE [-1] / -NONE [1]
- -COAL FINES [-2]

NOTE : (Ignore sludge originating from point-sources; score on natural substrates)
NUMBER OF SUBSTRATE TYPES: -5 or More [2] / -4 or Less [0]
COMMENTS

Substrate 15.5 Max 20

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
- -UNDERCUT BANKS [1] / -POOLS> 70 cm [2] / -OXBOWS, BACKWATERS [1]
- -OVERHANGING VEGETATION [1] / -ROOTWADS [1] / -AQUATIC MACROPHYTES [1]
- -SHALLOWS(IN SLOW WATER) [1] / -BOULDERS[1] / -LOGS OR WOODY DEBRIS[1]
- -ROOTMATS[1] COMMENTS:

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
- - EXTENSIVE > 75% [11]
- - MODERATE 25-75% [7]
- -SPARSE 5-25% [3]
- -NEARLY ABSENT < 5%[1]

Cover 8 Max 20

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
-HIGH[4]	-EXCELLENT[7]	-NONE[6]	-HIGH[3]	-SNAGGING	-IMPOUND.
-MODERATE[3]	-GOOD[5]	-RECOVERED[4]	-MODERATE[2]	-RELOCATION	-ISLANDS
-LOW[2]	-FAIR[3]	-RECOVERING[3]	-LOW[1]	-CANOPY REMOVAL	-LEVEED
-NONE[1]	-POOR[1]	-RECENT OR NO RECOVERY[1]		-DREDGING	-BANKSHAPING
				-ONE SIDE CHANNEL MODIFICATIONS	

COMMENTS:

Channel 12 Max 20

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH L R (Per Bank)	FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) L R (Most Predominant Per Bank)	L R	BANK EROSION L R (Per Bank)
-WIDE >50m[4]	-FOREST, SWAMP[3]	-CONSERVATION TILLAGE[1]	-NONE/LITTLE[3]
-MODERATE 10-50m[3]	-SHRUB OR OLD FIELD[2]	-URBAN OR INDUSTRIAL[0]	-MODERATE[2]
-NARROW 5-10m[2]	-RESIDENTIAL, PARK, NEW FIELD[1]	-OPEN PASTURE, ROWCROP[0]	-HEAVY/SEVERE[1]
-VERY NARROW <5m[1]	-FENCED PASTURE[1]	-MINING/CONSTRUCTION[0]	
-NONE[0]			

COMMENTS:

Riparian 4 Max 10

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
- - >1m [6]
- -0.7-1m[4]
- -0.4-0.7m[2]
- -0.2-0.4m[1]
- - < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
- -POOL WIDTH > RIFFLE WIDTH [2]
- -POOL WIDTH = RIFFLE WIDTH[1]
- -POOL WIDTH < RIFFLE W. [0]

CURRENT VELOCITY [POOLS & RIFFLES!] (Check *All* That Apply)
- -EDDIES[1] / -TORRENTIAL[-1]
- -FAST[1] / -INTERSTITIAL[-1]
- -MODERATE[1] / -INTERMITTENT[-2]
- -SLOW[1]

COMMENTS:

Pool/Current 4 Max 12

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH
- - Generally >10 cm, MAX > 50 [4]
- - Generally > 10 cm, MAX < 50 [3]
- - Generally 5-10 cm[1]
- - Generally < 5 cm [RIFFLE=0]

RIFFLE/RUN SUBSTRATE
- -STABLE (e.g.,Cobble, Boulder) [2]
- -MOD. STABLE (e.g.,Large Gravel) [1]
- -UNSTABLE (Fine Gravel,Sand) [0]

RIFFLE/RUN EMBEDDEDNESS
- - NONE [2]
- - LOW [1]
- - MODERATE [0]
- - EXTENSIVE [-1]

COMMENTS: - NO RIFFLE [Metric=0]

Riffle/Run 3 Max 8

Gradient 6 Max 10

6] GRADIENT (ft/mi): 22.9 DRAINAGE AREA (sq.mi.): 13.2 %POOL: %GLIDE: %RIFFLE: %RUN:

* Best areas must be large enough to support a population of riffle-obligate fish species.

EPA 4520 7/24/97

Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 43

River Code:_____ RM: 3.6 Stream WEST CREEK
Date 7/28/98 Location SITE #37 (BROADVIEW ROAD)
Scorers Initials: CZ Comments

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR /SLBS[10]	___	___
☐ ☐-BOULDER [9]	✓	___
☐ ☐-COBBLE [8]	___	___
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	___	___
☐ ☐-GRAVEL [7]	✓	___
☐ ☐-SAND [6]	✓	___
■ ■-BEDROCK[5]	✓	✓
☐ ☐-DETRITUS[3]	___	___
☐ ☐-ARTIFICIAL[0]	___	___

NOTE : *(Ignore sludge originating from point-sources; score on natural substrates)*
NUMBER OF SUBSTRATE TYPES: ☐-5 or More [2] ■-4 or Less [0]

SUBSTRATE ORIGIN *Check ONE (OR 2 & AVERAGE)*
☐ -LIMESTONE [1]
☐ -TILLS [1]
☐ -WETLANDS[0]
☐ -HARDPAN [0]
☐ -SANDSTONE [0]
☐ -RIP/RAP [0]
☐ -LACUSTRINE [0]
■ -SHALE [-1]
☐-COAL FINES [-2]

SILT:
☐ -SILT HEAVY [-2]
■ -SILT MODERATE [-1]
■ -SILT NORMAL [0]
☐ -SILT FREE [1]

EMBEDDEDNESS:
■ -EXTENSIVE [-2]
☐ -MODERATE [-1]
☐ -NORMAL [0]
☐ -NONE [1]

SUBSTRATE QUALITY *Check ONE (OR 2 & AVERAGE)*

Substrate: 6.5 / Max 20

COMMENTS:

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
☐ -UNDERCUT BANKS [1]
☐ -OVERHANGING VEGETATION [1]
■ -SHALLOWS (IN SLOW WATER) [1]
■ -ROOTMATS [1]
☐ -POOLS > 70 cm [2]
☐ -ROOTWADS [1]
■ -BOULDERS [1]
☐ -OXBOWS, BACKWATERS [1]
☐ -AQUATIC MACROPHYTES [1]
■ -LOGS OR WOODY DEBRIS [1]
COMMENTS:

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐ - EXTENSIVE > 75% [11]
☐ - MODERATE 25-75% [7]
■ - SPARSE 5-25% [3]
☐ - NEARLY ABSENT < 5% [1]

Cover: 7 / Max 20

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH [4]	☐ - EXCELLENT [7]	■-NONE [6]	■-HIGH [3]	☐-SNAGGING	☐-IMPOUND.
☐-MODERATE [3]	☐-GOOD [5]	☐ - RECOVERED [4]	☐-MODERATE [2]	☐-RELOCATION	☐-ISLANDS
■-LOW [2]	■ - FAIR [3]	☐ - RECOVERING [3]	☐-LOW [1]	☐-CANOPY REMOVAL	☐ - LEVEED
■-NONE [1]	■-POOR [1]	☐ - RECENT OR NO RECOVERY [1]		☐-DREDGING	☐-BANKSHAPING
				☐-ONE SIDE CHANNEL MODIFICATIONS	

Channel: 12.5 / Max 20

COMMENTS:

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R Per Bank)	FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) (L R Most Predominant Per Bank)		BANK EROSION (L R Per Bank)
☐ ☐ -WIDE > 50m [4]	☐ ☐-FOREST, SWAMP [3]	☐ ☐-CONSERVATION TILLAGE [1]	■ ■-NONE/LITTLE [3]
☐ ■-MODERATE 10-50m [3]	☐ ☐-SHRUB OR OLD FIELD [2]	■ ■-URBAN OR INDUSTRIAL [0]	■ ☐-MODERATE [2]
■ ☐ -NARROW 5-10m [2]	■ ■-RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐-OPEN PASTURE, ROWCROP [0]	☐ ☐-HEAVY/SEVERE [1]
■ ☐ -VERY NARROW < 5m [1]	☐ ☐-FENCED PASTURE [1]	☐ ☐-MINING/CONSTRUCTION [0]	
☐ ☐ -NONE [0]			

Riparian: 5 / Max 10

COMMENTS:

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)	MORPHOLOGY (Check 1 or 2 & AVERAGE)	CURRENT VELOCITY [POOLS & RIFFLES!] (Check *All* That Apply)	
☐ - > 1m [6]	☐ -POOL WIDTH > RIFFLE WIDTH [2]	☐ -EDDIES [1]	☐ -TORRENTIAL [-1]
☐ - 0.7-1m [4]	■-POOL WIDTH = RIFFLE WIDTH [1]	■ -FAST [1]	☐ -INTERSTITIAL [-1]
■ - 0.4-0.7m [2]	☐ -POOL WIDTH < RIFFLE W. [0]	■ -MODERATE [1]	☐ -INTERMITTENT [-2]
☐ - 0.2-0.4m [1]		■ -SLOW [1]	
☐ - < 0.2m [POOL=0]			

Pool/Current: 6 / Max 12

COMMENTS:

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH	RIFFLE/RUN SUBSTRATE	RIFFLE/RUN EMBEDDEDNESS
☐ - Generally > 10 cm, MAX > 50 [4]	■-STABLE (e.g., Cobble, Boulder) [2]	☐ - NONE [2]
☐ - Generally > 10 cm, MAX < 50 [3]	☐-MOD. STABLE (e.g., Large Gravel) [1]	☐ - LOW [1]
■ - Generally 5-10 cm [1]	☐-UNSTABLE (Fine Gravel, Sand) [0]	☐ - MODERATE [0]
☐ - Generally < 5 cm [RIFFLE=0]		■ - EXTENSIVE [-1]

Riffle/Run: 2 / Max 8

COMMENTS: ☐ - NO RIFFLE [Metric=0]

Gradient: 4 / Max 10

6] GRADIENT (ft/mi): 66 **DRAINAGE AREA (sq.mi.):** 6.5 %POOL: ___ %GLIDE: ___ %RIFFLE: ___ %RUN: ___

*Headwater areas must be large enough to support a population of riffle-obligate fish species.

Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 48.5

River Code:_____ RM: 5.4 Stream WEST CREEK
Date 7/28/98 Location SITE #38 (RIDGEWOOD DRIVE BRIDGE)
Scorers Initials: CZ Comments

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR/SLBS[10]	___	___
☐ ☐-BOULDER [9]	✓	___
☐ ☐-COBBLE [8]	✓	___
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	✓	___
☐ ☐-GRAVEL [7]	✓	✓
■ ☐-SAND [6]	✓	___
■ ☐-BEDROCK[5]	✓	✓
☐ ☐-DETRITUS[3]	___	___
☐ ☐-ARTIFICIAL[0]	___	___

NOTE : (Ignore sludge originating from point-sources: score on natural substrates)
NUMBER OF SUBSTRATE TYPES: ☐-4 or Less [0] ■-5 or More [2]
COMMENTS_____

SUBSTRATE ORIGIN (Check ONE (OR 2 & AVERAGE)): ☐-LIMESTONE [1] ■-TILLS [1] ☐-WETLANDS[0] ☐-HARDPAN [0] ☐-SANDSTONE [0] ☐-RIP/RAP [0] ☐-LACUSTRINE [0] ■-SHALE [-1] ☐-COAL FINES [-2]

SUBSTRATE QUALITY (Check ONE (OR 2 & AVERAGE))
SILT: ☐-SILT HEAVY [-2] ■-SILT MODERATE [-1] ☐-SILT NORMAL [0] ☐-SILT FREE [1]
EMBEDDEDNESS: ■-EXTENSIVE [-2] ☐-MODERATE [-1] ■-NORMAL [0] ☐-NONE [1]

Substrate: 11 Max 20

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
☐-UNDERCUT BANKS [1] ☐-OVERHANGING VEGETATION [1] ■-SHALLOWS(IN SLOW WATER) [1] ☐-ROOTMATS[1]
☐-POOLS> 70 cm [2] ☐-ROOTWADS [1] ☐-BOULDERS[1]
☐-OXBOWS, BACKWATERS [1] ☐-AQUATIC MACROPHYTES [1] ■-LOGS OR WOODY DEBRIS[1]
COMMENTS:_____

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐-EXTENSIVE > 75% [11] ☐-MODERATE 25-75% [7] ■-SPARSE 5-25% [3] ☐-NEARLY ABSENT < 5%[1]

Cover: 5 Max 20

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH[4]	☐-EXCELLENT[7]	■-NONE[6]	■-HIGH[3]	☐-SNAGGING	☐-IMPOUND.
☐-MODERATE[3]	☐-GOOD[5]	☐-RECOVERED[4]	■-MODERATE[2]	☐-RELOCATION	☐-ISLANDS
■-LOW[2]	■-FAIR[3]	☐-RECOVERING[3]	☐-LOW[1]	☐-CANOPY REMOVAL	☐-LEVEED
☐-NONE[1]	■-POOR[1]	☐-RECENT OR NO RECOVERY[1]		☐-DREDGING	☐-BANKSHAPING
				☐-ONE SIDE CHANNEL MODIFICATIONS	

Channel: 12.5 Max 20

COMMENTS:_____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R Per Bank)	FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) (L R Most Predominant Per Bank)		BANK EROSION (L R Per Bank)
☐ ■ -WIDE > 50m[4]	■ ■-FOREST, SWAMP[3]	☐ ☐-CONSERVATION TILLAGE[1]	■ ■-NONE/LITTLE[3]
☐ ☐-MODERATE 10-50m[3]	☐ ☐-SHRUB OR OLD FIELD[2]	☐ ☐-URBAN OR INDUSTRIAL[0]	☐ ☐-MODERATE[2]
■ ☐ -NARROW 5-10m[2]	■ ■-RESIDENTIAL, PARK, NEW FIELD[1]	☐ ☐-OPEN PASTURE, ROWCROP[0]	☐ ■-HEAVY/SEVERE[1]
☐ ☐ -VERY NARROW <5m[1]	☐ ☐-FENCED PASTURE[1]	☐ ☐-MINING/CONSTRUCTION[0]	
☐ ■ -NONE[0]			

Riparian: 6.5 Max 10

COMMENTS:_____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
☐ - > 1m [6]
☐ - 0.7-1m[4]
☐ - 0.4-0.7m[2]
☐ - 0.2-0.4m[1]
■ - < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☐ -POOL WIDTH > RIFFLE WIDTH [2]
☐-POOL WIDTH = RIFFLE WIDTH[1]
■ -POOL WIDTH < RIFFLE W.[0]

CURRENT VELOCITY [POOLS & RIFFLES!] (Check *All* That Apply)
☐ -EDDIES[1] ☐ -TORRENTIAL[-1]
☐ -FAST[1] ☐ -INTERSTITIAL[-1]
☐ -MODERATE[1] ☐ -INTERMITTENT[-2]
■ -SLOW[1]

Pool/Current: 1 Max 12

COMMENTS:_____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH
☐ - Generally > 10 cm, MAX > 50 [4]
☐ - Generally > 10 cm, MAX < 50 [3]
■ - Generally 5-10 cm[1]
☐ - Generally < 5 cm [RIFFLE=0]

RIFFLE/RUN SUBSTRATE
☐-STABLE (e.g., Cobble, Boulder) [2]
■-MOD. STABLE (e.g., Large Gravel) [1]
☐-UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE/RUN EMBEDDEDNESS
☐ - NONE [2]
■ - LOW [1]
■ - MODERATE [0]
☐ - EXTENSIVE [-1]

☐ - NO RIFFLE [Metric=0]

Riffle/Run: 2.5 Max 8

Gradient: 10 Max 10

6] GRADIENT (ft/mi): 27.8 **DRAINAGE AREA (sq.mi.):** 4.0 %POOL: ___ %GLIDE: ___ %RIFFLE: ___ %RUN: ___

* Headwater streams must be large enough to support a population of riffle-obligate fish species.

OhioEPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 71.25

River Code:_____ RM: 0.1 Stream TINKERS CREEK
Date 9/14/98 Location SITE #39 (OHIO CANAL VIADUCT)
Scorers Initials: CZ Comments_____

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR/SLBS[10]	___	___
☐ ☐-BOULDER [9]	___	___
■ ☐-COBBLE [8]	✓	✓
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	✓	___
☐ ☐-GRAVEL [7]	✓	✓
■ ☐-SAND [6]	✓	___
☐ ☐-BEDROCK[5]	___	___
☐ ☐-DETRITUS[3]	✓	___
☐ ☐-ARTIFICIAL[0]	___	___

NOTE : (Ignore sludge originating from point-sources; score on natural substrates)
NUMBER OF SUBSTRATE TYPES: ■-5 or More [2] ☐-4 or Less [0]

SUBSTRATE ORIGIN — Check ONE (OR 2 & AVERAGE)
☐ -LIMESTONE [1]
■ -TILLS [1]
☐ -WETLANDS[0]
☐ -HARDPAN [0]
☐ -SANDSTONE [0]
☐ -RIP/RAP [0]
☐ -LACUSTRINE [0]
☐ -SHALE [-1]
☐-COAL FINES [-2]

SILT:
☐ -SILT HEAVY [-2]
■ -SILT MODERATE [-1]
☐ -SILT NORMAL [0]
☐ -SILT FREE [1]

EMBEDDEDNESS:
☐ -EXTENSIVE [-2]
■ -MODERATE [-1]
■ -NORMAL [0]
☐ -NONE [1]

SUBSTRATE QUALITY — Check ONE (OR 2 & AVERAGE)

Substrate: 15.5 Max 20

COMMENTS_____

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
■ -UNDERCUT BANKS [1]
■ -OVERHANGING VEGETATION [1]
■ -SHALLOWS (IN SLOW WATER) [1]
☐-ROOTMATS[1]
■ -POOLS > 70 cm [2]
■ -ROOTWADS [1]
☐ -BOULDERS [1]
☐ -OXBOWS, BACKWATERS [1]
☐ -AQUATIC MACROPHYTES [1]
■ -LOGS OR WOODY DEBRIS [1]

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐ - EXTENSIVE > 75% [11]
■ - MODERATE 25-75% [7]
■ - SPARSE 5-25% [3]
☐ - NEARLY ABSENT < 5% [1]

Cover: 12 Max 20

COMMENTS:_____

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH[4]	☐-EXCELLENT[7]	■-NONE[6]	☐-HIGH[3]	☐-SNAGGING	☐-IMPOUND.
☐-MODERATE[3]	■-GOOD[5]	☐-RECOVERED[4]	■-MODERATE[2]	☐-RELOCATION	☐-ISLANDS
■-LOW[2]	☐-FAIR[3]	☐-RECOVERING[3]	■-LOW[1]	☐-CANOPY REMOVAL	☐-LEVEED
☐-NONE[1]	☐-POOR[1]	☐-RECENT OR NO RECOVERY[1]		☐-DREDGING	☐-BANKSHAPING
				☐-ONESIDE CHANNEL MODIFICATIONS	

Channel: 14.5 Max 20

COMMENTS:_____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH L R (Per Bank)	FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) L R (Most Predominant Per Bank)	L R	BANK EROSION L R (Per Bank)
■ ■-WIDE > 50m[4]	■ ■-FOREST, SWAMP[3]	☐ ☐-CONSERVATION TILLAGE[1]	☐ ■-NONE/LITTLE[3]
☐ ☐-MODERATE 10-50m[3]	☐ ☐-SHRUB OR OLD FIELD[2]	☐ ☐-URBAN OR INDUSTRIAL[0]	■ ☐-MODERATE[2]
☐ ☐-NARROW 5-10m[2]	☐ ☐-RESIDENTIAL, PARK, NEW FIELD[1]	☐ ☐-OPEN PASTURE, ROWCROP[0]	■ ☐-HEAVY/SEVERE[1]
☐ ☐-VERY NARROW < 5m[1]	☐ ☐-FENCED PASTURE[1]	☐ ☐-MINING/CONSTRUCTION[0]	
☐ ☐-NONE[0]			

Riparian: 9.25 Max 10

COMMENTS:_____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
■ - > 1m [6]
☐ - 0.7-1m[4]
☐ - 0.4-0.7m[2]
☐ - 0.2-0.4m[1]
☐ - < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☐-POOL WIDTH > RIFFLE WIDTH [2]
☐-POOL WIDTH = RIFFLE WIDTH [1]
■-POOL WIDTH < RIFFLE W. [0]

CURRENT VELOCITY [POOLS & RIFFLES!] (Check *All* That Apply)
☐-EDDIES[1]
■-FAST[1]
■-MODERATE[1]
■-SLOW[1]
☐-TORRENTIAL[-1]
☐-INTERSTITIAL[-1]
☐-INTERMITTENT[-2]

Pool/Current: 9 Max 12

COMMENTS:_____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH
☐ - Generally > 10 cm, MAX > 50 [4]
■ - Generally > 10 cm, MAX < 50 [3]
☐ - Generally 5-10 cm[1]
☐ - Generally < 5 cm [RIFFLE=0]

RIFFLE/RUN SUBSTRATE
■-STABLE (e.g., Cobble, Boulder) [2]
☐-MOD. STABLE (e.g., Large Gravel) [1]
☐-UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE/RUN EMBEDDEDNESS
☐ - NONE [2]
☐ - LOW [1]
■ - MODERATE [0]
☐ - EXTENSIVE [-1]

☐ - NO RIFFLE [Metric=0]

Riffle/Run: 5 Max 8

Gradient: 6 Max 10

COMMENTS:_____

6] GRADIENT (ft/mi): 20.3 DRAINAGE AREA (sq.mi.): 96

%POOL: ____ %GLIDE: ____
%RIFFLE: ____ %RUN: ____

* Best areas must be large enough to support a population of riffle-obligate fish species.

Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 54.75

River Code:_____ RM: 6.6 Stream TINKERS CREEK
Date 9/15/98 Location SITE # 40 (NORTHFIELD ROAD BRIDGE)
Scorers Initials: CZ Comments_____

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR/SLBS[10]	✓	✓
☐ ☐-BOULDER [9]	✓	✓
☐ ☐-COBBLE [8]	✓	
☐ ☐-HARDPAN [4]		
☐ ☐-MUCK [2]		
☐ ☐-SILT [2]	✓	
☐ ☐-GRAVEL [7]	✓	✓
☐ ☐-SAND [6]		
■ ■-BEDROCK[5]	✓	✓
☐ ☐-DETRITUS[3]		
☐ ☐-ARTIFICIAL[0]		

NOTE : *(Ignore sludge originating from point-sources; score on natural substrates)*
NUMBER OF SUBSTRATE TYPES: ■-*5 or More [2]* ☐-*4 or Less [0]*
*COMMENTS*_____

SUBSTRATE ORIGIN (Check ONE (OR 2 & AVERAGE))
☐ -*LIMESTONE [1]*
☐ -*TILLS [1]*
☐ -*WETLANDS[0]*
☐ -*HARDPAN [0]*
☐ -*SANDSTONE [0]*
☐ -*RIP/RAP [0]*
☐ -*LACUSTRINE [0]*
■ -*SHALE [-1]*
☐-*COAL FINES [-2]*

SILT:
☐ -*SILT HEAVY [-2]*
■ -*SILT MODERATE [-1]*
☐ -*SILT NORMAL [0]*
☐ -*SILT FREE [1]*

EMBEDDEDNESS:
■ -*EXTENSIVE [-2]*
☐ -*MODERATE [-1]*
☐ -*NORMAL [0]*
☐ -*NONE [1]*

SUBSTRATE QUALITY (Check ONE (OR 2 & AVERAGE))

Substrate: 8 Max 20

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
☐ -*UNDERCUT BANKS [1]*
☐ -*OVERHANGING VEGETATION [1]*
■ -*SHALLOWS (IN SLOW WATER) [1]*
☐ -*ROOTMATS[1]*
☐ -*POOLS > 70 cm [2]*
☐ -*ROOTWADS [1]*
■ -*BOULDERS[1]*
COMMENTS:_____
☐ -*OXBOWS, BACKWATERS [1]*
☐ -*AQUATIC MACROPHYTES [1]*
☐ -*LOGS OR WOODY DEBRIS [1]*

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐ - *EXTENSIVE > 75% [11]*
■ - *MODERATE 25-75% [7]*
■ -*SPARSE 5-25% [3]*
☐ -*NEARLY ABSENT < 5% [1]*

Cover: 7 Max 20

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	*DEVELOPMENT*	*CHANNELIZATION*	*STABILITY*	*MODIFICATIONS/OTHER*	
☐-*HIGH[4]*	☐-*EXCELLENT[7]*	■-*NONE[6]*	■-*HIGH[3]*	☐-*SNAGGING*	☐-*IMPOUND.*
■-*MODERATE[3]*	■-*GOOD[5]*	☐-*RECOVERED[4]*	☐-*MODERATE[2]*	☐-*RELOCATION*	☐-*ISLANDS*
■-*LOW[2]*	☐-*FAIR[3]*	☐-*RECOVERING[3]*	☐-*LOW[1]*	☐-*CANOPY REMOVAL*	☐-*LEVEED*
☐-*NONE[1]*	☐-*POOR[1]*	☐-*RECENT OR NO RECOVERY[1]*		☐-*DREDGING*	☐-*BANKSHAPING*
				☐-*ONE SIDE CHANNEL MODIFICATIONS*	

Channel: 16.5 Max 20

COMMENTS:_____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH L R (Per Bank)	*FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN)* L R (Most Predominant Per Bank)	L R	*BANK EROSION* L R (Per Bank)
☐ ☐-*WIDE > 50m[4]*	■ ■-*FOREST, SWAMP[3]*	☐ ☐-*CONSERVATION TILLAGE[1]*	■ ■-*NONE/LITTLE[3]*
☐ ■-*MODERATE 10-50m[3]*	☐ ☐-*SHRUB OR OLD FIELD[2]*	☐ ☐-*URBAN OR INDUSTRIAL[0]*	☐ ■-*MODERATE[2]*
■ ☐-*NARROW 5-10m[2]*	■ ☐-*RESIDENTIAL, PARK, NEW FIELD[1]*	☐ ☐-*OPEN PASTURE, ROWCROP[0]*	☐ ☐-*HEAVY/SEVERE[1]*
☐ ☐-*VERY NARROW < 5m[1]*	☐ ☐-*FENCED PASTURE[1]*	☐ ☐-*MINING/CONSTRUCTION[0]*	
☐ ☐-*NONE[0]*			

Riparian: 7.75 Max 10

COMMENTS:_____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
☐ - *> 1m [6]*
☐ - *0.7-1m[4]*
■ - *0.4-0.7m[2]*
☐ - *0.2-0.4m[1]*
☐ - *< 0.2m [POOL=0]*

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☐ -*POOL WIDTH > RIFFLE WIDTH [2]*
■ -*POOL WIDTH = RIFFLE WIDTH [1]*
☐ -*POOL WIDTH < RIFFLE W. [0]*

CURRENT VELOCITY [POOLS & RIFFLES!] (Check *All* That Apply)
☐ -*EDDIES[1]*
■ -*FAST[1]*
■ -*MODERATE[1]*
■ -*SLOW[1]*
☐ -*TORRENTIAL[-1]*
☐ -*INTERSTITIAL[-1]*
☐ -*INTERMITTENT[-2]*

Pool/Current: 6 Max 12

COMMENTS:_____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH
☐ - *Generally > 10 cm, MAX > 50 [4]*
■ - *Generally > 10 cm, MAX < 50 [3]*
☐ - *Generally 5-10 cm[1]*
☐ - *Generally < 5 cm [RIFFLE=0]*

RIFFLE/RUN SUBSTRATE
■ -*STABLE (e.g., Cobble, Boulder) [2]*
☐ -*MOD. STABLE (e.g., Large Gravel) [1]*
☐ -*UNSTABLE (Fine Gravel, Sand) [0]*

RIFFLE/RUN EMBEDDEDNESS
☐ - *NONE [2]*
■ - *LOW [1]*
■ - *MODERATE [0]*
☐ - *EXTENSIVE [-1]*

☐ - *NO RIFFLE [Metric=0]*

Riffle/Run: 5.5 Max 8

Gradient: 4 Max 10

6] GRADIENT (ft/mi): 43.9 **DRAINAGE AREA (sq.mi.):** 84

%POOL: ____ %GLIDE: ____
%RIFFLE: ____ %RUN: ____

* Fast riffles must be large enough to support a population of riffle-obligate fish species.

OhioEPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 66.5

River Code:_____ RM: 9.0 Stream Tinkers Creek
Date 9/15/98 Location Site #41 (Richmond Road Bridge)
Scorers Initials: CZ Comments

1] SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % present);

TYPE	POOL	RIFFLE	TYPE	POOL	RIFFLE
☐ ☐-BLDR /SLBS[10]			■ ☐-GRAVEL [7]	✓	
☐ ☐-BOULDER [9]			■ ☐-SAND [6]	✓	
☐ ☐-COBBLE [8]	✓		☐ ☐-BEDROCK[5]		
☐ ☐-HARDPAN [4]			☐ ☐-DETRITUS[3]		
☐ ☐-MUCK [2]			☐ ☐-ARTIFICIAL[0]		
☐ ☐-SILT [2]	✓				

NOTE : (Ignore sludge originating from point-sources; score on natural substrates) ☐-5 or More [2]
NUMBER OF SUBSTRATE TYPES: ■-4 or Less [0]
COMMENTS

SUBSTRATE ORIGIN
Check ONE (OR 2 & AVERAGE)
☐ -LIMESTONE [1]
■ -TILLS [1]
☐ -WETLANDS[0]
☐ -HARDPAN [0]
☐ -SANDSTONE [0]
☐ -RIP/RAP [0]
☐ -LACUSTRINE [0]
☐ -SHALE [-1]
☐-COAL FINES [-2]

SUBSTRATE QUALITY
Check ONE (OR 2 & AVERAGE)
SILT: ■ -SILT HEAVY [-2]
■ -SILT MODERATE [-1]
☐ -SILT NORMAL [0]
☐ -SILT FREE [1]
EMBEDDEDNESS: ■ -EXTENSIVE [-2]
■ -MODERATE [-1]
☐ -NORMAL [0]
☐ -NONE [1]

Substrate 11 Max 20

2] INSTREAM COVER
TYPE: (Check All That Apply)
■ -UNDERCUT BANKS [1]
■ -OVERHANGING VEGETATION [1]
■-SHALLOWS (IN SLOW WATER) [1]
■-ROOTMATS [1]
■ -POOLS > 70 cm [2]
■ -ROOTWADS [1]
☐-BOULDERS [1]
☐ -OXBOWS, BACKWATERS [1]
☐ -AQUATIC MACROPHYTES [1]
■-LOGS OR WOODY DEBRIS [1]
COMMENTS:

AMOUNT: (Check ONLY One or check 2 and AVERAGE)
☐ - EXTENSIVE > 75% [11]
■ - MODERATE 25-75% [7]
☐-SPARSE 5-25% [3]
☐-NEARLY ABSENT < 5% [1]

Cover 15 Max 20

3] CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH [4]	☐-EXCELLENT [7]	■-NONE [6]	■-HIGH [3]	☐-SNAGGING	☐-IMPOUND.
■-MODERATE [3]	■-GOOD [5]	☐-RECOVERED [4]	■-MODERATE [2]	☐-RELOCATION	☐-ISLANDS
■-LOW [2]	☐-FAIR [3]	☐-RECOVERING [3]	☐-LOW [1]	☐-CANOPY REMOVAL	☐-LEVEED
☐-NONE [1]	■-POOR [1]	☐-RECENT OR NO RECOVERY [1]		☐-DREDGING	☐-BANK SHAPING
				☐-ONE SIDE CHANNEL MODIFICATIONS	

COMMENTS:

Channel 14 Max 20

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH
L R (Per Bank)
☐ ■ -WIDE > 50m [4]
☐ ☐-MODERATE 10-50m [3]
■ ☐ -NARROW 5-10m [2]
☐ ■ -VERY NARROW < 5m [1]
☐ ☐ -NONE [0]

FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN)
L R (Most Predominant Per Bank)
☐ ■-FOREST, SWAMP [3]
☐ ☐-SHRUB OR OLD FIELD [2]
■ ☐-RESIDENTIAL, PARK, NEW FIELD [1]
☐ ☐-FENCED PASTURE [1]

L R
☐ ☐-CONSERVATION TILLAGE [1]
☐ ■-URBAN OR INDUSTRIAL [0]
☐ ☐-OPEN PASTURE, ROWCROP [0]
☐ ☐-MINING/CONSTRUCTION [0]

BANK EROSION
L R (Per Bank)
■ ■-NONE/LITTLE [3]
☐ ☐-MODERATE [2]
☐ ☐-HEAVY/SEVERE [1]

Riparian 6.5 Max 10

COMMENTS:

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH
(Check 1 ONLY!)
■ - > 1m [6]
☐- 0.7-1m [4]
☐- 0.4-0.7m [2]
☐- 0.2-0.4m [1]
☐ - < 0.2m [POOL=0]

MORPHOLOGY
(Check 1 or 2 & AVERAGE)
■ -POOL WIDTH > RIFFLE WIDTH [2]
☐-POOL WIDTH = RIFFLE WIDTH [1]
☐ -POOL WIDTH < RIFFLE W. [0]

CURRENT VELOCITY [POOLS & RIFFLES!]
(Check All That Apply)
☐ -EDDIES [1]
☐ -FAST [1]
■ -MODERATE [1]
■ -SLOW [1]
☐ -TORRENTIAL [-1]
☐ -INTERSTITIAL [-1]
☐ -INTERMITTENT [-2]

COMMENTS:

Pool/ Current 10 Max 12

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH
☐ - Generally > 10 cm, MAX > 50 [4]
☐ - Generally > 10 cm, MAX < 50 [3]
☐ - Generally 5-10 cm [1]
☐ - Generally < 5 cm [RIFFLE=0]

RIFFLE/RUN SUBSTRATE
☐-STABLE (e.g., Cobble, Boulder) [2]
☐-MOD. STABLE (e.g., Large Gravel) [1]
☐-UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE/RUN EMBEDDEDNESS
☐ - NONE [2]
☐ - LOW [1]
☐ - MODERATE [0]
☐ - EXTENSIVE [-1]

COMMENTS: ■ - NO RIFFLE [Metric=0]

Riffle/Run 0 Max 8

6] GRADIENT (ft/mi): 10.7 DRAINAGE AREA (sq.mi.): 74

%POOL: %GLIDE:
%RIFFLE: %RUN:

Gradient 10 Max 10

*Best areas must be large enough to support a population of riffle-obligate species.

EPA 4520 7/24/97

Ohio EPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 70.25

River Code:_____ RM: 13.4 Stream TINKERS CREEK
Date 9/16/98 Location SITE # 42 (GLENWOOD DRIVE BRIDGE)
Scorers Initials: CZ Comments_____

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR /SLBS[10]	___	___
☐ ☐-BOULDER [9]	✓	___
☐ ☐-COBBLE [8]	✓	✓
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	✓	___
■ ☐-GRAVEL [7]	✓	✓
■ ☐-SAND [6]	✓	___
☐ ☐-BEDROCK[5]	___	___
☐ ☐-DETRITUS[3]	___	___
☐ ☐-ARTIFICIAL[0]	___	___

NOTE : (Ignore sludge originating from point-sources; score on natural substrates)
NUMBER OF SUBSTRATE TYPES: ■-5 or More [2] ☐-4 or Less [0]

SUBSTRATE ORIGIN — Check ONE (OR 2 & AVERAGE)
☐ -LIMESTONE [1]
SILT: ■ -TILLS [1]
☐ -WETLANDS[0]
☐ -HARDPAN [0]
☐ -SANDSTONE [0]
EMBEDDEDNESS: ☐ -RIP/RAP [0]
☐ -LACUSTRINE [0]
☐ -SHALE [-1]
☐ -COAL FINES [-2]

SUBSTRATE QUALITY — Check ONE (OR 2 & AVERAGE)
■ -SILT HEAVY [-2]
■ -SILT MODERATE [-1]
☐ -SILT NORMAL [0]
☐ -SILT FREE [1]
☐ -EXTENSIVE [-2]
☐ -MODERATE [-1]
■ -NORMAL [0]
☐ -NONE [1]

Substrate: 14.5 Max 20

COMMENTS_____

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
■ -UNDERCUT BANKS [1]
■ -OVERHANGING VEGETATION [1]
■ -SHALLOWS (IN SLOW WATER) [1]
■ -ROOTMATS [1]
■ -POOLS > 70 cm [2]
■ -ROOTWADS [1]
■ -BOULDERS [1]
☐ -OXBOWS, BACKWATERS [1]
☐ -AQUATIC MACROPHYTES [1]
■ -LOGS OR WOODY DEBRIS [1]

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐ - EXTENSIVE > 75% [11]
■ - MODERATE 25-75% [7]
☐ -SPARSE 5-25% [3]
☐ -NEARLY ABSENT < 5% [1]

Cover: 16 Max 20

COMMENTS:_____

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐ -HIGH [4]	☐ - EXCELLENT [7]	■ -NONE [6]	■ -HIGH [3]	☐ -SNAGGING	☐ -IMPOUND.
■ -MODERATE [3]	■ -GOOD [5]	☐ -RECOVERED [4]	■ -MODERATE [2]	☐ -RELOCATION	☐ -ISLANDS
■ -LOW [2]	■ - FAIR [3]	☐ -RECOVERING [3]	☐ -LOW [1]	☐ -CANOPY REMOVAL	☐ -LEVEED
☐ -NONE [1]	☐ -POOR [1]	☐ - RECENT OR NO RECOVERY [1]		☐ -DREDGING	☐ -BANKSHAPING
				☐ -ONE SIDE CHANNEL MODIFICATIONS	

Channel: 15 Max 20

COMMENTS:_____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R Per Bank)	FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) (L R Most Predominant Per Bank)		BANK EROSION (L R Per Bank)	
☐ ☐ -WIDE > 50m [4]	■ ☐ -FOREST, SWAMP [3]	☐ ☐ -CONSERVATION TILLAGE [1]	■ ■ -NONE/LITTLE [3]	
■ ☐ -MODERATE 10-50m [3]	☐ ☐ -SHRUB OR OLD FIELD [2]	☐ ☐ -URBAN OR INDUSTRIAL [0]	☐ ☐ -MODERATE [2]	
■ ■ -NARROW 5-10m [2]	■ ■ -RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐ -OPEN PASTURE, ROWCROP [0]	☐ ☐ -HEAVY/SEVERE [1]	
☐ ☐ -VERY NARROW < 5m [1]	☐ ☐ -FENCED PASTURE [1]	☐ ☐ -MINING/CONSTRUCTION [0]		
☐ ☐ -NONE [0]				

Riparian: 7.25 Max 10

COMMENTS:_____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
☐ - > 1m [6]
■ - 0.7-1m [4]
☐ - 0.4-0.7m [2]
☐ - 0.2-0.4m [1]
☐ - < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
■ -POOL WIDTH > RIFFLE WIDTH [2]
☐ -POOL WIDTH = RIFFLE WIDTH [1]
☐ -POOL WIDTH < RIFFLE W. [0]

CURRENT VELOCITY [POOLS & RIFFLES!] (Check *All* That Apply)
☐ -EDDIES [1]
☐ -FAST [1]
■ -MODERATE [1]
■ -SLOW [1]
☐ -TORRENTIAL [-1]
☐ -INTERSTITIAL [-1]
☐ -INTERMITTENT [-2]

Pool/Current: 8 Max 12

COMMENTS:_____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH
☐ - Generally > 10 cm, MAX > 50 [4]
■ - Generally > 10 cm, MAX < 50 [3]
☐ - Generally 5-10 cm [1]
☐ - Generally < 5 cm [RIFFLE=0]

RIFFLE/RUN SUBSTRATE
■ -STABLE (e.g., Cobble, Boulder) [2]
☐ -MOD. STABLE (e.g., Large Gravel) [1]
☐ -UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE/RUN EMBEDDEDNESS
☐ - NONE [3]
■ - LOW [1]
■ - MODERATE [0]
☐ - EXTENSIVE [-1]

☐ - NO RIFFLE [Metric=0]

Riffle/Run: 5.5 Max 8

Gradient: 4 Max 10

6] GRADIENT (ft/mi): 2.2 DRAINAGE AREA (sq.mi.): 64

%POOL: ___ %GLIDE: ___
%RIFFLE: ___ %RUN: ___

* Habitat must be large enough to support a population of riffle-obligate fish species.

OhioEPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 62.5

River Code:_____ RM: 0.6 Stream CHIPPEWA CREEK
Date 8/14/98 Location SITE # 43 (CHIPPEWA CREEK DRIVE FORD)
Scorers Initials: CZ Comments

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR/SLBS[10]	___	___
☐ ☐-BOULDER [9]	✓	___
■ ☐-COBBLE [8]	✓	✓
☐ ☐-HARDPAN [4]	✓	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	___	___
☐ ☐-GRAVEL [7]	✓	✓
■ ☐-SAND [6]	✓	___
☐ ☐-BEDROCK[5]	___	___
☐ ☐-DETRITUS[3]	___	___
☐ ☐-ARTIFICIAL[0]	___	___

NOTE : (Ignore sludge originating from point-sources; score on natural substrates)
NUMBER OF SUBSTRATE TYPES: ■-5 or More [2] ☐-4 or Less [0]

SUBSTRATE ORIGIN (Check ONE (OR 2 & AVERAGE))
☐ -LIMESTONE [1]
■ -TILLS [1]
☐ -WETLANDS[0]
☐ -HARDPAN [0]
☐ -SANDSTONE [0]
☐ -RIP/RAP [0]
☐ -LACUSTRINE [0]
☐ -SHALE [-1]
☐-COAL FINES [-2]

SILT:
☐ -SILT HEAVY [-2]
☐ -SILT MODERATE [-1]
■ -SILT NORMAL [0]
☐ -SILT FREE [1]

EMBEDDEDNESS:
☐ -EXTENSIVE [-2]
■ -MODERATE [-1]
■ -NORMAL [0]
☐ -NONE [1]

SUBSTRATE QUALITY (Check ONE (OR 2 & AVERAGE))

Substrate: 16.5 Max 20

COMMENTS:

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
☐ -UNDERCUT BANKS [1]
☐ -OVERHANGING VEGETATION [1]
■ -SHALLOWS (IN SLOW WATER) [1]
☐ -ROOTMATS [1]
■ -POOLS > 70 cm [2]
☐ -ROOTWADS [1]
■ -BOULDERS [1]
☐ -OXBOWS, BACKWATERS [1]
☐ -AQUATIC MACROPHYTES [1]
■ -LOGS OR WOODY DEBRIS [1]

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐ - EXTENSIVE > 75% [11]
☐ - MODERATE 25-75% [7]
■ - SPARSE 5-25% [3]
☐ - NEARLY ABSENT < 5% [1]

COMMENTS:

Cover: 8 Max 20

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐ -HIGH [4]	☐ - EXCELLENT [7]	☐ -NONE [6]	■ -HIGH [3]	☐ -SNAGGING	☐ -IMPOUND.
☐ -MODERATE [3]	☐ -GOOD [5]	☐ - RECOVERED [4]	■ -MODERATE [2]	☐ -RELOCATION	☐ -ISLANDS
■ -LOW [2]	■ - FAIR [3]	■ -RECOVERING [3]	☐ -LOW [1]	☐ -CANOPY REMOVAL	☐ - LEVEED
☐ -NONE [1]	☐ -POOR [1]	☐ - RECENT OR NO RECOVERY [1]		☐ -DREDGING	☐ -BANK SHAPING
				☐ -ONE SIDE CHANNEL MODIFICATIONS	

Channel: 10.5 Max 20

COMMENTS:

4]. RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R Per Bank)	FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) (L R Most Predominant Per Bank)		BANK EROSION (L R Per Bank)	
☐ ■ -WIDE > 50m [4]	■ ■ -FOREST, SWAMP [3]	☐ ☐ -CONSERVATION TILLAGE [1]	■ ■ -NONE/LITTLE [3]	
■ ☐ -MODERATE 10-50m [3]	☐ ☐ -SHRUB OR OLD FIELD [2]	☐ ☐ -URBAN OR INDUSTRIAL [0]	☐ ☐ -MODERATE [2]	
☐ ☐ -NARROW 5-10m [2]	☐ ☐ -RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐ -OPEN PASTURE, ROWCROP [0]	☐ ☐ -HEAVY/SEVERE [1]	
☐ ☐ -VERY NARROW < 5m [1]	☐ ☐ -FENCED PASTURE [1]	☐ ☐ -MINING/CONSTRUCTION [0]		
☐ ☐ -NONE [0]				

Riparian: 9.5 Max 10

COMMENTS:

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
■ - > 1m [6]
☐ - 0.7-1m [4]
☐ - 0.4-0.7m [2]
☐ - 0.2-0.4m [1]
☐ - < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
■ -POOL WIDTH > RIFFLE WIDTH [2]
☐ -POOL WIDTH = RIFFLE WIDTH [1]
☐ -POOL WIDTH < RIFFLE W. [0]

CURRENT VELOCITY [POOLS & RIFFLES!] (Check *All* That Apply)
☐ -EDDIES [1]
☐ -FAST [1]
☐ -MODERATE [1]
■ -SLOW [1]
☐ -TORRENTIAL [-1]
☐ -INTERSTITIAL [-1]
☐ -INTERMITTENT [-2]

Pool/Current: 9 Max 12

COMMENTS:

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH
☐ - Generally > 10 cm, MAX > 50 [4]
☐ - Generally > 10 cm, MAX < 50 [3]
■ - Generally 5-10 cm [1]
☐ - Generally < 5 cm [RIFFLE=0]

RIFFLE/RUN SUBSTRATE
■ -STABLE (e.g., Cobble, Boulder) [2]
■ -MOD. STABLE (e.g., Large Gravel) [1]
☐ -UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE/RUN EMBEDDEDNESS
☐ - NONE [3]
■ - LOW [1]
■ - MODERATE [0]
☐ - EXTENSIVE [-1]

☐ - NO RIFFLE [Metric=0]

Riffle/Run: 3 Max 8

COMMENTS:

Gradient: 6 Max 10

6] GRADIENT (ft/mi): 35.2 DRAINAGE AREA (sq.mi.): 16 %POOL: ___ %GLIDE: ___ %RIFFLE: ___ %RUN: ___

* Headwaters must be large enough to support a population of fifteen gate fish species.

OhioEPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 42.5

River Code:_____ RM: _____ Stream CHIPPEWA CREEK
Date 8/14/98 Location SITE # 43.5 (BRAMBLEWOOD BRANCH)
Scorers Initials: CZ Comments_____

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR /SLBS[10]	___	___
☐ ☐-BOULDER [9]	✓	___
☐ ☐-COBBLE [8]	✓	✓
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	___	___
☐ ☐-GRAVEL [7]	✓	___
☐ ☐-SAND [6]	✓	___
■ ■-BEDROCK[5]	✓	✓
☐ ☐-DETRITUS[3]	___	___
☐ ☐-ARTIFICIAL[0]	___	___

NOTE : (Ignore sludge originating from point-sources; score on natural substrates)
NUMBER OF SUBSTRATE TYPES: ☐-4 or Less [0] ■-5 or More [2]

SUBSTRATE ORIGIN — Check ONE (OR 2 & AVERAGE)
☐ -LIMESTONE [1]
☐ -TILLS [1]
☐ -WETLANDS[0]
☐ -HARDPAN [0]
☐ -SANDSTONE [0]
☐ -RIP/RAP [0]
☐ -LACUSTRINE [0]
■ -SHALE [-1]
☐-COAL FINES [-2]

SILT:
☐ -SILT HEAVY [-2]
☐ -SILT MODERATE [-1]
■ -SILT NORMAL [0]
☐ -SILT FREE [1]

EMBEDDEDNESS:
■ -EXTENSIVE [-2]
☐ -MODERATE [-1]
☐ -NORMAL [0]
☐ -NONE [1]

SUBSTRATE QUALITY — Check ONE (OR 2 & AVERAGE)

Substrate: 9 / Max 20

COMMENTS_____

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
☐ -UNDERCUT BANKS [1]
☐ -OVERHANGING VEGETATION [1]
☐ -SHALLOWS (IN SLOW WATER) [1]
☐ -ROOTMATS [1]
☐ -POOLS > 70 cm [2]
☐ -ROOTWADS [1]
■ -BOULDERS [1]
COMMENTS:_____
☐ -OXBOWS, BACKWATERS [1]
☐ -AQUATIC MACROPHYTES [1]
☐ -LOGS OR WOODY DEBRIS [1]

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐ - EXTENSIVE > 75% [11]
☐ - MODERATE 25-75% [7]
☐ -SPARSE 5-25% [3]
■ -NEARLY ABSENT < 5% [1]

Cover: 2 / Max 20

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH [4]	☐ - EXCELLENT [7]	■-NONE [6]	■-HIGH [3]	☐-SNAGGING	☐-IMPOUND.
■-MODERATE [3]	☐-GOOD [5]	☐ - RECOVERED [4]	☐-MODERATE [2]	☐-RELOCATION	☐-ISLANDS
☐-LOW [2]	☐ - FAIR [3]	☐ - RECOVERING [3]	☐-LOW [1]	☐-CANOPY REMOVAL	☐ - LEVEED
☐-NONE [1]	■-POOR [1]	☐ - RECENT OR NO RECOVERY [1]		☐-DREDGING	☐-BANKSHAPING
				☐-ONE SIDE CHANNEL MODIFICATIONS	

Channel: 13 / Max 20

COMMENTS:_____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R Per Bank)	FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) (L R Most Predominant Per Bank)		BANK EROSION (L R Per Bank)	
■ ☐ -WIDE > 50m [4]	■ ☐-FOREST, SWAMP [3]	☐ ☐-CONSERVATION TILLAGE [1]	■ ☐-NONE/LITTLE [3]	
☐ ☐-MODERATE 10-50m [3]	☐ ■-SHRUB OR OLD FIELD [2]	☐ ☐-URBAN OR INDUSTRIAL [0]	☐ ■-MODERATE [2]	
☐ ■ -NARROW 5-10m [2]	☐ ☐-RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐-OPEN PASTURE, ROWCROP [0]	☐ ■-HEAVY/SEVERE [1]	
☐ ■ -VERY NARROW < 5m [1]	☐ ☐-FENCED PASTURE [1]	☐ ☐-MINING/CONSTRUCTION [0]		
☐ ☐ -NONE [0]				

Riparian: 7.5 / Max 10

COMMENTS:_____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
☐ - > 1m [6]
☐ - 0.7-1m [4]
☐ - 0.4-0.7m [2]
■ - 0.2-0.4m [1]
☐ - < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☐ -POOL WIDTH > RIFFLE WIDTH [2]
☐ -POOL WIDTH = RIFFLE WIDTH [1]
■ -POOL WIDTH < RIFFLE W. [0]

CURRENT VELOCITY [POOLS & RIFFLES!] (Check *All* That Apply)
☐ -EDDIES [1]
■ -FAST [1]
■ -MODERATE [1]
■ -SLOW [1]
☐ -TORRENTIAL [-1]
☐ -INTERSTITIAL [-1]
☐ -INTERMITTENT [-2]

Pool/Current: 4 / Max 12

COMMENTS:_____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH
☐ - Generally > 10 cm, MAX > 50 [4]
☐ - Generally > 10 cm, MAX < 50 [3]
■ - Generally 5-10 cm [1]
☐ - Generally < 5 cm [RIFFLE=0]

RIFFLE/RUN SUBSTRATE
■ -STABLE (e.g., Cobble, Boulder) [2]
☐ -MOD. STABLE (e.g., Large Gravel) [1]
☐ -UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE/RUN EMBEDDEDNESS
☐ - NONE [2]
■ - LOW [1]
☐ - MODERATE [0]
■ - EXTENSIVE [-1]

☐ - NO RIFFLE [Metric=0]

Riffle/Run: 3 / Max 8

Gradient: 4 / Max 10

6] GRADIENT (ft/mi): 87.9 DRAINAGE AREA (sq.mi.): 2.3 %POOL: ___ %GLIDE: ___ %RIFFLE: ___ %RUN: ___

* Headwater streams must be large enough to support a population of riffle-dwelling darter fish species.

Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 67.25

River Code:_____ RM: 5.8 Stream CHIPPEWA CREEK
Date 8/14/98 Location SITE #44 (AVERY ROAD BRIDGE)
Scorers Initials: CZ Comments_____

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR/SLBS[10]	✓	
☐ ☐-BOULDER [9]	✓	✓
■ ☐-COBBLE [8]	✓	✓
☐ ☐-HARDPAN [4]		
☐ ☐-MUCK [2]		
☐ ☐-SILT [2]		
☐ ☐-GRAVEL [7]	✓	✓
■ ☐-SAND [6]	✓	
☐ ☐-BEDROCK[5]		
☐ ☐-DETRITUS[3]		
☐ ☐-ARTIFICIAL[0]		

NOTE : *(Ignore sludge originating from point-sources; score on natural substrates)*
NUMBER OF SUBSTRATE TYPES: ■-*5 or More [2]* ☐-*4 or Less [0]*

SUBSTRATE ORIGIN (Check ONE (OR 2 & AVERAGE)): ☐-*LIMESTONE [1]*; ■-*TILLS [1]*; ☐-*WETLANDS[0]*; ☐-*HARDPAN [0]*; ☐-*SANDSTONE [0]*; ☐-*RIP/RAP [0]*; ☐-*LACUSTRINE [0]*; ☐-*SHALE [-1]*; ☐-*COAL FINES [-2]*

SUBSTRATE QUALITY (Check ONE (OR 2 & AVERAGE)) — SILT: ☐-*SILT HEAVY [-2]*; ☐-*SILT MODERATE [-1]*; ■-*SILT NORMAL [0]*; ☐-*SILT FREE [1]*
EMBEDDEDNESS: ☐-*EXTENSIVE [-2]*; ■-*MODERATE [-1]*; ■-*NORMAL [0]*; ☐-*NONE [1]*

COMMENTS_____

Substrate: 16.5 Max 20

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
☐-*UNDERCUT BANKS [1]*; ☐-*POOLS> 70 cm [2]*; ☐-*OXBOWS, BACKWATERS [1]*; ■-*OVERHANGING VEGETATION [1]*; ■-*ROOTWADS [1]*; ■-*AQUATIC MACROPHYTES [1]*; ■-*SHALLOWS(IN SLOWWATER) [1]*; ■-*BOULDERS[1]*; ■-*LOGSORWOODYDEBRIS[1]*; ■-*ROOTMATS[1]*

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐-*EXTENSIVE > 75% [11]*; ☐-*MODERATE 25-75% [7]*; ☐-*SPARSE 5-25% [3]*; ☐-*NEARLY ABSENT < 5% [1]*

COMMENTS:_____

Cover: 14 Max 20

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-*HIGH[4]*	☐-*EXCELLENT[7]*	■-*NONE[6]*	■-*HIGH[3]*	☐-*SNAGGING*	☐-*IMPOUND.*
■-*MODERATE[3]*	■-*GOOD[5]*	☐-*RECOVERED[4]*	☐-*MODERATE[2]*	☐-*RELOCATION*	☐-*ISLANDS*
☐-*LOW[2]*	☐-*FAIR[3]*	☐-*RECOVERING[3]*	☐-*LOW[1]*	☐-*CANOPYREMOVAL*	☐-*LEVEED*
☐-*NONE[1]*	☐-*POOR[1]*	☐-*RECENT ORNO RECOVERY[1]*		☐-*DREDGING*	☐-*BANKSHAPING*
				☐-*ONESIDECHANNELMODIFICATIONS*	

COMMENTS:_____

Channel: 17 Max 20

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R Per Bank)	FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) (L R Most Predominant Per Bank)		BANK EROSION (L R Per Bank)	
☐ ☐-*WIDE>50m[4]*	☐ ☐-*FOREST,SWAMP[3]*	☐ ☐-*CONSERVATIONTILLAGE[1]*	■ ■-*NONE/LITTLE[3]*	
■ ■-*MODERATE 10-50m[3]*	☐ ☐-*SHRUB OR OLD FIELD[2]*	☐ ☐-*URBANORINDUSTRIAL[0]*	☐ ☐-*MODERATE[2]*	
☐ ☐-*NARROW 5-10m[2]*	■ ■-*RESIDENTIAL,PARK,NEWFIELD[1]*	☐ ☐-*OPEN PASTURE,ROWCROP[0]*	☐ ☐-*HEAVY/SEVERE[1]*	
☐ ☐-*VERY NARROW <5m[1]*	☐ ☐-*FENCED PASTURE[1]*	☐ ☐-*MINING/CONSTRUCTION[0]*		
■ ☐-*NONE[0]*				

COMMENTS:_____

Riparian: 6.25 Max 10

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
☐-*>1m [6]*; ☐-*0.7-1m[4]*; ■-*0.4-0.7m[2]*; ☐-*0.2-0.4m[1]*; ☐-*< 0.2m [POOL=0]*

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☐-*POOL WIDTH > RIFFLE WIDTH [2]*; ■-*POOLWIDTH=RIFFLEWIDTH[1]*; ☐-*POOLWIDTH<RIFFLEW.[0]*

CURRENT VELOCITY (POOLS & RIFFLES!) (Check *All* That Apply)
☐-*EDDIES[1]*; ☐-*TORRENTIAL[-1]*; ■-*FAST[1]*; ☐-*INTERSTITIAL[-1]*; ■-*MODERATE[1]*; ☐-*INTERMITTENT[-2]*; ■-*SLOW[1]*

COMMENTS:_____

Pool/Current: 6 Max 12

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH
☐-*Generally >10 cm, MAX > 50 [4]*; ☐-*Generally > 10 cm, MAX < 50 [3]*; ■-*Generally 5-10 cm[1]*; ☐-*Generally < 5 cm [RIFFLE=0]*

RIFFLE/RUN SUBSTRATE
■-*STABLE (e.g.,Cobble, Boulder) [2]*; ☐-*MOD. STABLE (e.g.,Large Gravel) [1]*; ☐-*UNSTABLE (Fine Gravel,Sand) [0]*

RIFFLE/RUN EMBEDDEDNESS
☐-*NONE [3]*; ■-*LOW [1]*; ■-*MODERATE [0]*; ☐-*EXTENSIVE [-1]*

☐-*NO RIFFLE [Metric=0]*

COMMENTS:_____

Riffle/Run: 3.5 Max 8

Gradient: 4 Max 10

6] GRADIENT (ft/mi): 58.6 DRAINAGE AREA (sq.mi.): 6.3 %POOL: %GLIDE: %RIFFLE: %RUN:

* Test areas must be large enough to support a population of riffle-obligate fish species.

ChioEPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 45.5

River Code_____ River Mile_____ Stream BURKE BROOK
Date 7/1/97 Location SITE #48.1 (EAST of T. 77, SOUTH of FLEET AVENUE)
Scorers Initials: CZ Comments:_____

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR /SLBS[10]	___	___
☐ ☐-BOULDER [9]	___	✓
■ ☐-COBBLE [8]	✓	✓
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	___	___
☐ ☐-GRAVEL [7]	___	✓
☐ ☐-SAND [6]	✓	___
☐ ☐-BEDROCK[5]	___	___
☐ ☐-DETRITUS[3]	___	___
■ ☐-ARTIFICIAL[0]	✓	✓

NOTE : (Ignore sludge originating from point-sources; score on natural substrates)
NUMBER OF SUBSTRATE TYPES: ■-5 or More [2] ☐-4 or Less [0]

SUBSTRATE ORIGIN (Check ONE (OR 2 & AVERAGE)): ☐ -LIMESTONE [1] ■ -TILLS [1] ☐ -WETLANDS[0] ☐ -HARDPAN [0] ☐ -SANDSTONE [0] ■ -RIP/RAP [0] ☐ -LACUSTRINE [0] ☐ -SHALE [-1] ☐-COAL FINES [-2]

SILT: ☐ -SILT HEAVY [-2] ☐ -SILT MODERATE [-1] ■ -SILT NORMAL [0] ☐ -SILT FREE [1]

EMBEDDEDNESS: ■ -EXTENSIVE [-2] ☐ -MODERATE [-1] ■ -NORMAL [0] ☐ -NONE [1]

SUBSTRATE QUALITY (Check ONE (OR 2 & AVERAGE))

Substrate: 9.5 Max 20

COMMENTS_____

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
☐-UNDERCUT BANKS [1] ■-OVERHANGING VEGETATION [1] ☐-SHALLOWS (IN SLOW WATER) [1] ■-ROOTMATS [1]
☐-DEEP POOLS > 70cm [2] ☐-ROOTWADS [1] ■-BOULDERS [1]
☐-OXBOWS [1] ■-AQUATIC MACROPHYTES [1] ☐-LOGS OR WOODY DEBRIS [1]

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐-EXTENSIVE > 75% [11] ■-MODERATE 25-75% [7] ■-SPARSE 5-25% [3] ☐-NEARLY ABSENT < 5% [1]

Cover: 9 Max 20

COMMENTS:_____

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH [4]	☐-EXCELLENT [7]	☐-NONE [6]	■-HIGH [3]	☐-SNAGGING	☐-IMPOUND.
☐-MODERATE [3]	☐-GOOD [5]	☐-RECOVERED [4]	☐-MODERATE [2]	☐-RELOCATION	☐-ISLANDS
■-LOW [2]	■-FAIR [3]	■-RECOVERING [3]	☐-LOW [1]	☐-CANOPY REMOVAL	☐-LEVEED
☐-NONE [1]	■-POOR [1]	☐-RECENT OR NO RECOVERY [1]		☐-DREDGING	■-BANK SHAPING
				☐-ONE SIDE CHANNEL MODIFICATIONS	

Channel: 10 Max 20

COMMENTS:_____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R (Per Bank))	FLOOD PLAIN QUALITY (PAST 100 FOOT RIPARIAN) (L R (Most Predominant Per Bank))		BANK EROSION (L R (Per Bank))
☐ ☐-WIDE > 50m [4]	☐ ■-FOREST, SWAMP [3]	☐ ☐-CONSERVATION TILLAGE [1]	■ ■-NONE/LITTLE [3]
☐ ■-MODERATE 10-50m [3]	☐ ☐-SHRUB OR OLD FIELD [2]	■ ☐-URBAN OR INDUSTRIAL [0]	☐ ☐-MODERATE [2]
■ ☐-NARROW 5-10m [2]	☐ ■-RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐-OPEN PASTURE, ROW CROP [0]	☐ ☐-HEAVY/SEVERE [1]
☐ ☐-VERY NARROW < 5m [1]	☐ ☐-FENCED PASTURE [1]	☐ ☐-MINING/CONSTRUCTION [0]	
☐ ☐-NONE [0]			

Riparian: 6.5 Max 10

COMMENTS:_____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
☐ - > 1m [6]
☐ - 0.7-1m [4]
☐ - 0.4-0.7m [2]
■ - 0.2-0.4m [1]
☐ - < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☐ -POOL WIDTH > RIFFLE WIDTH [2]
■ -POOL WIDTH = RIFFLE WIDTH [1]
☐ -POOL WIDTH < RIFFLE W. [0]

CURRENT VELOCITY [POOL & RIFFLES!] (Check *All* That Apply)
☐ -EDDIES [1] ☐ -FAST [1] ■ -MODERATE [1] ■ -SLOW [1]
☐ -TORRENTIAL [-1] ☐ -INTERSTITIAL [-1] ☐ -INTERMITTENT [-2]

Pool/Glide: 4 Max 12

COMMENTS:_____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE /RUN DEPTH
☐ - GENERALLY > 10 cm; MAX > 50 [4]
☐ - GENERALLY > 10 cm; MAX < 50 [3]
■ - GENERALLY 5-10 cm [1]
☐ - GENERALLY < 5cm [RIFFLE=0]

RIFFLE/RUN SUBSTRATE
■ -STABLE (e.g., Cobble, Boulder) [2]
■ -MOD. STABLE (e.g., Large Gravel) [1]
☐ -UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE/RUN EMBEDDEDNESS
☐ - NONE [2]
☐ - LOW [1]
■ - MODERATE [0]
☐ - EXTENSIVE [-1]

☐ - NO RIFFLE [Metric=0]

Riffle/Run: 2.5 Max 8

Gradient: 4 Max 10

COMMENTS:_____

6] GRADIENT (ft/mi): 87.9 **DRAINAGE AREA (sq.mi.):** 0.7

%POOL: ___ %GLIDE: ___
%RIFFLE: ___ %RUN: ___

OhioEPA Qualitative Habitat Evaluation Index Field Sheet *QHEI Score:* 69.5

River Code_____ River Mile_____ Stream Rocky River
Date 6/27/97 Location SITE #49 (EAST BRANCH, BARRETT ROAD FORD)
Scorers Initials: JJ Comments:

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR /SLBS[10]	___	___
☐ ☐-BOULDER [9]	___	✓
■ ☐-COBBLE [8]	___	✓
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	___	___
☐ ☐-GRAVEL [7]	___	✓
☐ ☐-SAND [6]	___	✓
■ ☐-BEDROCK[5]	✓	✓
☐ ☐-DETRITUS[3]	___	___
☐ ☐-ARTIFICIAL[0]	___	___

NOTE : (Ignore sludge originating from point-sources; score on natural substrates)
NUMBER OF SUBSTRATE TYPES: ☐-5 or More [2] ☐-4 or Less [0]

SUBSTRATE ORIGIN: Check ONE (OR 2 & AVERAGE)
☐ -LIMESTONE [1]
■ -TILLS [1]
☐ -WETLANDS[0]
☐ -HARDPAN [0]
☐ -SANDSTONE [0]
☐ -RIP/RAP [0]
☐ -LACUSTRINE [0]
■ -SHALE [-1]
☐-COAL FINES [-2]

SILT: EMBEDDED NESS:
SUBSTRATE QUALITY: Check ONE (OR 2 & AVERAGE)
■ -SILT HEAVY [-2]
■ -SILT MODERATE [-1]
☐ -SILT NORMAL [0]
☐ -SILT FREE [1]
☐ -EXTENSIVE [-2]
■ -MODERATE [-1]
■ -NORMAL [0]
☐ -NONE [1]

Substrate: 13 Max 20

COMMENTS:

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
☐-UNDERCUT BANKS[1]
■-OVERHANGING VEGETATION[1]
■-SHALLOWS (IN SLOW WATER) [1]
■-ROOTMATS[1]
☐-DEEP POOLS>70cm[2]
■-ROOTWADS[1]
■-BOULDERS[1]
☐-OXBOWS[1]
■-AQUATIC MACROPHYTES[1]
■-LOGS OR WOODY DEBRIS[1]
COMMENTS:

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐-EXTENSIVE>75%[11]
■-MODERATE 25-75%[7]
■-SPARSE 5-25% [3]
☐-NEARLY ABSENT<5%[1]

Cover: 12 Max 20

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH[4]	☐-EXCELLENT[7]	■-NONE[6]	☐-HIGH[3]	☐-SNAGGING	☐-IMPOUND.
■-MODERATE[3]	■-GOOD[5]	☐-RECOVERED[4]	■-MODERATE[2]	☐-RELOCATION	☐-ISLANDS
☐-LOW[2]	■-FAIR[3]	☐-RECOVERING[3]	■-LOW[1]	☐-CANOPY REMOVAL	☐-LEVEED
☐-NONE[1]	☐-POOR[1]	☐-RECENT OR NO RECOVERY[1]		☐-DREDGING	☐-BANK SHAPING
				☐-ONE SIDE CHANNEL MODIFICATIONS	

Channel: 14.5 Max 20

COMMENTS:

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH L R (Per Bank)	FLOOD PLAIN QUALITY (PAST 100 FOOT RIPARIAN) L R (Most Predominant Per Bank)		BANK EROSION L R (Per Bank)
■ ■ -WIDE>50m[4]	■ ■-FOREST, SWAMP[3]	☐ ☐-CONSERVATION TILLAGE[1]	☐ ☐-NONE/LITTLE[3]
☐ ☐-MODERATE 10-50m[3]	☐ ☐-SHRUB OR OLD FIELD[2]	☐ ☐-URBAN OR INDUSTRIAL[0]	■ ■-MODERATE[2]
☐ ☐ -NARROW 5-10m[2]	☐ ☐-RESIDENTIAL, PARK, NEW FIELD[1]	☐ ☐-OPEN PASTURE, ROWCROP[0]	☐ ☐-HEAVY/SEVERE[1]
☐ ☐ -VERY NARROW<5m[1]	☐ ☐-FENCED PASTURE[1]	☐ ☐-MINING/CONSTRUCTION[0]	
☐ ☐ -NONE[0]			

Riparian: 9 Max 10

COMMENTS:

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
☐ - >1m [6]
☐-0.7-1m[4]
■-0.4-0.7m[2]
☐-0.2-0.4m[1]
☐ - <0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☐ -POOL WIDTH > RIFFLE WIDTH [2]
☐-POOL WIDTH=RIFFLE WIDTH[1]
■ -POOL WIDTH<RIFFLE W.[0]

CURRENT VELOCITY [POOL & RIFFLES!] (Check *All* That Apply)
■ -EDDIES[1]
■ -FAST[1]
■ -MODERATE[1]
■ -SLOW[1]
☐ -TORRENTIAL[-1]
☐ -INTERSTITIAL[-1]
☐ -INTERMITTENT[-2]

Pool/Glide: 6 Max 12

COMMENTS:

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE /RUN DEPTH
■ - GENERALLY >10 cm; MAX > 50 [4]
☐ - GENERALLY >10 cm; MAX < 50[3]
☐ - GENERALLY 5-10 cm[1]
☐-GENERALLY <5cm [RIFFLE=0]

RIFFLE/RUN SUBSTRATE
■-STABLE (e.g., Cobble, Boulder) [2]
☐-MOD. STABLE (e.g., Large Gravel) [1]
☐-UNSTABLE (Fine Gravel, Sand) [0]
☐- NO RIFFLE [Metric=0]

RIFFLE/RUN EMBEDDEDNESS
☐ - NONE [2]
■ - LOW [1]
☐ - MODERATE [0]
☐-EXTENSIVE[-1]

Riffle/Run: 7 Max 8

COMMENTS:

Gradient: 8 Max 10

6] GRADIENT (ft/mi): 13.2 **DRAINAGE AREA (sq.mi.):** 75 %POOL: %GLIDE: %RIFFLE: %RUN:

OhioEPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 62

River Code_____ River Mile_____ Stream Rocky River
Date 6/27/97 Location SITE # 50 (EAST BRANCH, WEST BRIDGE STREET)
Scorers Initials: JS Comments:_____

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE	TYPE	POOL	RIFFLE
☐ ☐-BLDR /SLBS[10]	___	✓	☐ ☐-GRAVEL [7]	___	✓
■ ☐-BOULDER [9]	___	✓	☐ ☐-SAND [6]	___	___
■ ☐-COBBLE [8]	___	✓	☐ ☐-BEDROCK[5]	___	___
☐ ☐-HARDPAN [4]	___	___	☐ ☐-DETRITUS[3]	___	✓
☐ ☐-MUCK [2]	___	___	☐ ☐-ARTIFICIAL[0]	___	✓
☐ ☐-SILT [2]	___	✓			

NOTE : (Ignore sludge originating from point-sources; score on natural substrates)
NUMBER OF SUBSTRATE TYPES: ■-5 or More [2] ☐-4 or Less [0]

SUBSTRATE ORIGIN (Check ONE (OR 2 & AVERAGE)): ☐-LIMESTONE [1] ☐-TILLS [1] ☐-WETLANDS[0] ☐-HARDPAN [0] ☐-SANDSTONE [0] ☐-RIP/RAP [0] ☐-LACUSTRINE [0] ☐-SHALE [-1] ☐-COAL FINES [-2]

SILT: ■-SILT HEAVY [-2] ☐-SILT MODERATE [-1] ☐-SILT NORMAL [0] ☐-SILT FREE [1]

EMBEDDEDNESS: ☐-EXTENSIVE [-2] ■-MODERATE [-1] ☐-NORMAL [0] ☐-NONE [1]

SUBSTRATE QUALITY (Check ONE (OR 2 & AVERAGE))

Substrate: 17 / Max 20

COMMENTS_____

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
☐-UNDERCUT BANKS [1] ■-DEEP POOLS > 70 cm [2] ☐-OXBOWS [1]
■-OVERHANGING VEGETATION [1] ☐-ROOTWADS [1] ☐-AQUATIC MACROPHYTES [1]
☐-SHALLOWS (IN SLOW WATER) [1] ■-BOULDERS [1] ☐-LOGS OR WOODY DEBRIS [1]
☐-ROOTMATS [1] COMMENTS:_____

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐-EXTENSIVE > 75% [11]
☐-MODERATE 25-75% [7]
■-SPARSE 5-25% [3]
■-NEARLY ABSENT < 5% [1]

Cover: 6 / Max 20

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH [4]	☐-EXCELLENT [7]	■-NONE [6]	■-HIGH [3]	☐-SNAGGING	☐-IMPOUND.
☐-MODERATE [3]	☐-GOOD [5]	☐-RECOVERED [4]	■-MODERATE [2]	☐-RELOCATION	☐-ISLANDS
■-LOW [2]	■-FAIR [3]	☐-RECOVERING [3]	☐-LOW [1]	☐-CANOPY REMOVAL	☐-LEVEED
☐-NONE [1]	■-POOR [1]	☐-RECENT OR NO RECOVERY [1]		☐-DREDGING	☐-BANK SHAPING
				☐-ONE SIDE CHANNEL MODIFICATIONS	

Channel: 12.5 / Max 20

COMMENTS:_____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH L R (Per Bank)	FLOOD PLAIN QUALITY (PAST 100 FOOT RIPARIAN) L R (Most Predominant Per Bank)	L R	BANK EROSION L R (Per Bank)
☐ ☐-WIDE > 50m [4]	☐ ☐-FOREST, SWAMP [3]	☐ ☐-CONSERVATION TILLAGE [1]	■ ■-NONE/LITTLE [3]
☐ ☐-MODERATE 10-50m [3]	☐ ☐-SHRUB OR OLD FIELD [2]	■ ■-URBAN OR INDUSTRIAL [0]	☐ ☐-MODERATE [2]
■ ☐-NARROW 5-10m [2]	☐ ☐-RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐-OPEN PASTURE, ROWCROP [0]	☐ ☐-HEAVY/SEVERE [1]
☐ ■-VERY NARROW < 5m [1]	☐ ☐-FENCED PASTURE [1]	☐ ☐-MINING/CONSTRUCTION [0]	
☐ ☐-NONE [0]			

Riparian: 4.5 / Max 10

COMMENTS:_____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
■- > 1m [6]
☐-0.7-1m [4]
☐-0.4-0.7m [2]
☐-0.2-0.4m [1]
☐- < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☐-POOL WIDTH > RIFFLE WIDTH [2]
■-POOL WIDTH = RIFFLE WIDTH [1]
☐-POOL WIDTH < RIFFLE W. [0]

CURRENT VELOCITY (POOL & RIFFLES!) (Check *All* That Apply)
☐-EDDIES [1] ☐-TORRENTIAL [-1]
☐-FAST [1] ☐-INTERSTITIAL [-1]
■-MODERATE [1] ☐-INTERMITTENT [-2]
■-SLOW [1]

Pool/Glide: 9 / Max 12

COMMENTS:_____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE /RUN DEPTH
☐ - GENERALLY > 10 cm; MAX > 50 [4]
■ - GENERALLY > 10 cm; MAX < 50 [3]
☐ - GENERALLY 5-10 cm [1]
☐-GENERALLY < 5 cm [RIFFLE=0]

RIFFLE/RUN SUBSTRATE
■-STABLE (e.g., Cobble, Boulder) [2]
☐-MOD. STABLE (e.g., Large Gravel) [1]
☐-UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE/RUN EMBEDDEDNESS
☐ - NONE [2]
☐ - LOW [1]
■ - MODERATE [0]
☐-EXTENSIVE [-1]

Riffle/Run: 5 / Max 8

COMMENTS:_____ ☐- NO RIFFLE [Metric=0]

Gradient: 8 / Max 10

6] GRADIENT (ft/mi): 15.4 **DRAINAGE AREA (sq.mi.):** 74

%POOL: ____ %GLIDE: ____
%RIFFLE: ____ %RUN: ____

Qualitative Habitat Evaluation Index Field Sheet *QHEI Score:* 61.5

River Code ____ River Mile ____ Stream Rocky River
Date 6/27/97 Location Site #51 (East Branch, Upstream of East Access Road)
Scorers Initials: JJ Comments: ____

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR /SLBS[10]	___	✓
☐ ☐-BOULDER [9]	___	✓
■ ☐-COBBLE [8]	___	✓
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	___	✓

	POOL	RIFFLE
☐ ☐-GRAVEL [7]	___	✓
■ ☐-SAND [6]	___	✓
☐ ☐-BEDROCK[5]	___	✓
☐ ☐-DETRITUS[3]	___	___
☐ ☐-ARTIFICIAL[0]	___	___

NOTE : (Ignore sludge originating from point-sources; score on natural substrates)
NUMBER OF SUBSTRATE TYPES: ■-5 or More [2] ☐-4 or Less [0]

SUBSTRATE ORIGIN — Check ONE (OR 2 & AVERAGE)
☐ -LIMESTONE [1]
■ -TILLS [1]
☐ -WETLANDS[0]
☐ -HARDPAN [0]
☐ -SANDSTONE [0]
☐ -RIP/RAP [0]
☐ -LACUSTRINE [0]
☐ -SHALE [-1]
☐-COAL FINES [-2]

SILT: / EMBEDDEDNESS:
SUBSTRATE QUALITY — Check ONE (OR 2 & AVERAGE)
■ -SILT HEAVY [-2]
☐ -SILT MODERATE [-1]
☐ -SILT NORMAL [0]
☐ -SILT FREE [1]
■ -EXTENSIVE [-2]
■ -MODERATE [-1]
☐ -NORMAL [0]
☐ -NONE [1]

Substrate: 13.5 (Max 20)

COMMENTS ____

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
■-UNDERCUT BANKS [1]
■-OVERHANGING VEGETATION [1]
■-SHALLOWS (IN SLOW WATER) [1]
■-ROOTMATS [1]
☐-DEEP POOLS > 70cm [2]
■-ROOTWADS [1]
☐-BOULDERS [1]
☐-OXBOWS [1]
■-AQUATIC MACROPHYTES [1]
■-LOGS OR WOODY DEBRIS [1]
COMMENTS: ____

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐-EXTENSIVE > 75% [11]
■-MODERATE 25-75% [7]
■-SPARSE 5-25% [3]
☐-NEARLY ABSENT < 5% [1]

Cover: 12 (Max 20)

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH [4]	☐- EXCELLENT [7]	☐-NONE [6]	☐-HIGH [3]	☐-SNAGGING	☐-IMPOUND.
☐-MODERATE [3]	☐-GOOD [5]	☐- RECOVERED [4]	■-MODERATE [2]	☐-RELOCATION	☐-ISLANDS
■-LOW [2]	■- FAIR [3]	■-RECOVERING [3]	■-LOW [1]	☐-CANOPY REMOVAL	☐-LEVEED
☐-NONE [1]	☐-POOR [1]	☐- RECENT OR NO RECOVERY [1]		☐-DREDGING	☐-BANK SHAPING
				☐-ONE SIDE CHANNEL MODIFICATIONS	

Channel: 12.5 (Max 20)

COMMENTS: ____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R Per Bank)	FLOOD PLAIN QUALITY (PAST 100 FOOT RIPARIAN) (L R Most Predominant Per Bank)		BANK EROSION (L R Per Bank)	
☐ ☐ -WIDE > 50m [4]	■ ■-FOREST, SWAMP [3]	☐ ☐-CONSERVATION TILLAGE [1]	■ ■-NONE/LITTLE [3]	
■ ☐-MODERATE 10-50m [3]	☐ ☐-SHRUB OR OLD FIELD [2]	☐ ☐-URBAN OR INDUSTRIAL [0]	☐ ■-MODERATE [2]	
■ ■ -NARROW 5-10m [2]	☐ ■-RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐-OPEN PASTURE, ROWCROP [0]	☐ ☐-HEAVY/SEVERE [1]	
☐ ☐ -VERY NARROW < 5m [1]	☐ ☐-FENCED PASTURE [1]	☐ ☐-MINING/CONSTRUCTION [0]		
☐ ☐ -NONE [0]				

Riparian: 7.5 (Max 10)

COMMENTS: ____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
☐ - > 1m [6]
☐ - 0.7-1m [4]
☐ - 0.4-0.7m [2]
■ - 0.2-0.4m [1]
☐ - < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☐ -POOL WIDTH > RIFFLE WIDTH [2]
☐ -POOL WIDTH = RIFFLE WIDTH [1]
■ -POOL WIDTH < RIFFLE W. [0]

CURRENT VELOCITY [POOL & RIFFLES!] (Check *All* That Apply)
■ -EDDIES [1]
■ -FAST [1]
■ -MODERATE [1]
☐ -SLOW [1]
☐ -TORRENTIAL [-1]
☐ -INTERSTITIAL [-1]
☐ -INTERMITTENT [-2]

Pool/Glide: 4 (Max 12)

COMMENTS: ____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE /RUN DEPTH
■ - GENERALLY > 10 cm; MAX > 50 [4]
☐ - GENERALLY > 10 cm; MAX < 50 [3]
☐ - GENERALLY 5-10 cm [1]
☐ - GENERALLY < 5 cm [RIFFLE=0]

RIFFLE/RUN SUBSTRATE
☐ -STABLE (e.g., Cobble, Boulder) [2]
■ -MOD. STABLE (e.g., Large Gravel) [1]
■ -UNSTABLE (Fine Gravel, Sand) [0]
☐ - NO RIFFLE [Metric=0]

RIFFLE/RUN EMBEDDEDNESS
☐ - NONE [2]
☐ - LOW [1]
■ - MODERATE [0]
■ - EXTENSIVE [-1]

Riffle/Run: 4 (Max 8)

COMMENTS: ____

Gradient: 8 (Max 10)

6] GRADIENT (ft/mi): 6.6 DRAINAGE AREA (sq.mi.): 62

%POOL: ____ %GLIDE: ____
%RIFFLE: ____ %RUN: ____

OhioEPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 67

River Code:_____ RM: _____ Stream Rocky River
Date 10/21/98 Location SITE #52 (WEST BRANCH, NORTH OF BAGLEY ROAD)
Scorers Initials: CZ TZ Comments_____

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR /SLBS[10]	___	___
■ ☐-BOULDER [9]	✓	✓
☐ ☐-COBBLE [8]	✓	✓
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	✓	___
☐ ☐-GRAVEL [7]	✓	✓
■ ☐-SAND [6]	✓	___
☐ ☐-BEDROCK[5]	✓	✓
☐ ☐-DETRITUS[3]	___	___
☐ ☐-ARTIFICIAL[0]	___	___

NOTE : *(Ignore sludge originating from point-sources; score on natural substrates)*
NUMBER OF SUBSTRATE TYPES: ■-*5 or More [2]* ☐-*4 or Less [0]*

SUBSTRATE ORIGIN — Check ONE (OR 2 & AVERAGE)
☐ -LIMESTONE [1]
■ -TILLS [1]
☐ -WETLANDS[0]
☐ -HARDPAN [0]
☐ -SANDSTONE [0]
☐ -RIP/RAP [0]
☐ -LACUSTRINE [0]
☐ -SHALE [-1]
☐-COAL FINES [-2]

SILT: EMBEDDEDNESS:

SUBSTRATE QUALITY — Check ONE (OR 2 & AVERAGE)
■ -SILT HEAVY [-2]
■ -SILT MODERATE [-1]
☐ -SILT NORMAL [0]
☐ -SILT FREE [1]
☐ -EXTENSIVE [-2]
■ -MODERATE [-1]
☐ -NORMAL [0]
☐ -NONE [1]

Substrate: 15.5 Max 20

COMMENTS_____

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
☐ -UNDERCUT BANKS [1]
☐ -OVERHANGING VEGETATION [1]
■ -SHALLOWS (IN SLOW WATER) [1]
☐-ROOTMATS[1]
■ -POOLS> 70 cm [2]
☐ -ROOTWADS [1]
■ -BOULDERS[1]
☐ -OXBOWS, BACKWATERS [1]
☐ -AQUATIC MACROPHYTES [1]
☐-LOGS OR WOODY DEBRIS[1]

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐ - EXTENSIVE > 75% [11]
■ - MODERATE 25-75% [7]
☐-SPARSE 5-25% [3]
☐-NEARLY ABSENT < 5%[1]

COMMENTS:_____

Cover: 11 Max 20

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH[4]	☐- EXCELLENT [7]	■-NONE[6]	■-HIGH [3]	☐-SNAGGING	☐-IMPOUND.
☐-MODERATE[3]	■-GOOD[5]	☐- RECOVERED [4]	☐-MODERATE[2]	☐-RELOCATION	☐-ISLANDS
■-LOW[2]	■- FAIR [3]	☐- RECOVERING[3]	☐-LOW[1]	☐-CANOPY REMOVAL	☐- LEVEED
■-NONE[1]	☐-POOR[1]	☐- RECENT OR NO RECOVERY [1]		☐-DREDGING	☐-BANKSHAPING
				☐-ONE SIDE CHANNEL MODIFICATIONS	

Channel: 14.5 Max 20

COMMENTS:_____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R Per Bank)	FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) (L R Most Predominant Per Bank)		BANK EROSION (L R Per Bank)	
☐ ☐ -WIDE > 50m[4]	☐ ☐-FOREST, SWAMP[3]	☐ ☐-CONSERVATION TILLAGE[1]	■ ■-NONE/LITTLE[3]	
☐ ☐-MODERATE 10-50m[3]	☐ ☐-SHRUB OR OLD FIELD [2]	☐ ☐-URBAN OR INDUSTRIAL [0]	☐ ☐-MODERATE[2]	
■ ■ -NARROW 5-10m[2]	■ ■-RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐-OPEN PASTURE, ROWCROP [0]	☐ ☐-HEAVY/SEVERE[1]	
☐ ☐ -VERY NARROW <5m[1]	☐ ☐-FENCED PASTURE [1]	☐ ☐-MINING/CONSTRUCTION[0]		
☐ ☐ -NONE[0]				

Riparian: 6 Max 10

COMMENTS:_____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
■ - > 1m [6]
☐- 0.7-1m[4]
☐- 0.4-0.7m[2]
☐- 0.2-0.4m[1]
☐ - < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☐ -POOL WIDTH > RIFFLE WIDTH [2]
☐-POOL WIDTH = RIFFLE WIDTH [1]
■ -POOL WIDTH < RIFFLE W. [0]

CURRENT VELOCITY [POOLS & RIFFLES!] (Check *All* That Apply)
☐ -EDDIES[1]
■ -FAST[1]
■ -MODERATE[1]
■ -SLOW[1]
☐ -TORRENTIAL[-1]
☐ -INTERSTITIAL[-1]
☐ -INTERMITTENT[-2]

Pool/Current: 9 Max 12

COMMENTS:_____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH
☐ - Generally >10 cm, MAX > 50 [4]
■ - Generally > 10 cm, MAX < 50 [3]
☐ - Generally 5-10 cm[1]
☐ - Generally < 5 cm [RIFFLE=0]

RIFFLE/RUN SUBSTRATE
■ -STABLE (e.g., Cobble, Boulder) [2]
☐-MOD. STABLE (e.g., Large Gravel) [1]
☐-UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE/RUN EMBEDDEDNESS
☐ - NONE [3]
☐ - LOW [1]
■ - MODERATE [0]
☐ - EXTENSIVE [-1]

☐ - NO RIFFLE [Metric=0]

Riffle/Run: 5 Max 8

Gradient: 6 Max 10

COMMENTS:_____

6] GRADIENT (ft/mi): 15.7 DRAINAGE AREA (sq.mi.): 180

%POOL: ___ %GLIDE: ___
%RIFFLE: ___ %RUN: ___

* Pool areas must be large enough to support a population of mid-sized fish species.

OhioEPA Qualitative Habitat Evaluation Index Field Sheet *QHEI Score:* 73.5

River Code_____ River Mile_____ Stream Rocky River
Date 6/23/97 Location Site # 52.5 (Hilliard Road Bridge)
Scorers Initials: CZ Comments:_____

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR /SLBS[10]	___	___
■ ☐-BOULDER [9]	✓	✓
■ ☐-COBBLE [8]	✓	✓
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	✓	___
☐ ☐-GRAVEL [7]	✓	___
☐ ☐-SAND [6]	___	___
☐ ☐-BEDROCK[5]	✓	___
☐ ☐-DETRITUS[3]	✓	___
☐ ☐-ARTIFICIAL[0]	___	___

NOTE : *(Ignore sludge originating from point-sources; score on natural substrates)*

NUMBER OF SUBSTRATE TYPES: ■-5 or More [2] ☐-4 or Less [0]

SUBSTRATE ORIGIN *Check ONE (OR 2 & AVERAGE)*
☐ -LIMESTONE [1]
■ -TILLS [1]
☐ -WETLANDS[0]
☐ -HARDPAN [0]
☐ -SANDSTONE [0]
☐ -RIP/RAP [0]
☐ -LACUSTRINE [0]
☐ -SHALE [-1]
☐-COAL FINES [-2]

SILT:

SUBSTRATE QUALITY *Check ONE (OR 2 & AVERAGE)*
☐ -SILT HEAVY [-2]
■ -SILT MODERATE [-1]
■ -SILT NORMAL [0]
☐ -SILT FREE [1]

EMBEDDED NESS:
☐ -EXTENSIVE [-2]
☐ -MODERATE [-1]
■ -NORMAL [0]
☐ -NONE [1]

Substrate: 19.5 Max 20

COMMENTS_____

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
☐-UNDERCUT BANKS [1]
■-DEEP POOLS > 70cm [2]
☐-OXBOWS [1]
☐-OVERHANGING VEGETATION [1]
☐-ROOTWADS [1]
■-AQUATIC MACROPHYTES [1]
☐-SHALLOWS (IN SLOW WATER) [1]
■-BOULDERS [1]
■-LOGS OR WOODY DEBRIS [1]
☐-ROOTMATS [1]

COMMENTS:_____

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐-EXTENSIVE > 75% [11]
☐-MODERATE 25-75% [7]
■-SPARSE 5-25% [3]
☐-NEARLY ABSENT < 5% [1]

Cover: 8 Max 20

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH [4]	☐-EXCELLENT [7]	■-NONE [6]	☐-HIGH [3]	☐-SNAGGING	☐-IMPOUND.
☐-MODERATE [3]	■-GOOD [5]	☐-RECOVERED [4]	■-MODERATE [2]	☐-RELOCATION	☐-ISLANDS
■-LOW [2]	☐-FAIR [3]	☐-RECOVERING [3]	☐-LOW [1]	☐-CANOPY REMOVAL	☐-LEVEED
☐-NONE [1]	☐-POOR [1]	☐-RECENT OR NO RECOVERY [1]		☐-DREDGING	☐-BANK SHAPING
				☐-ONE SIDE CHANNEL MODIFICATIONS	

Channel: 15 Max 20

COMMENTS:_____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream☆

RIPARIAN WIDTH (L R Per Bank)	FLOOD PLAIN QUALITY (PAST 100 FOOT RIPARIAN) (L R Most Predominant Per Bank)		BANK EROSION (L R Per Bank)	
■ ■ -WIDE > 50m [4]	■ ■-FOREST, SWAMP [3]	☐ ☐-CONSERVATION TILLAGE [1]	■ ☐-NONE/LITTLE [3]	
☐ ☐-MODERATE 10-50m [3]	☐ ☐-SHRUB OR OLD FIELD [2]	☐ ☐-URBAN OR INDUSTRIAL [0]	☐ ■-MODERATE [2]	
☐ ☐ -NARROW 5-10m [2]	■ ☐-RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐-OPEN PASTURE, ROWCROP [0]	☐ ☐-HEAVY/SEVERE [1]	
☐ ☐ -VERY NARROW < 5m [1]	☐ ☐-FENCED PASTURE [1]	☐ ☐-MINING/CONSTRUCTION [0]		
☐ ☐ -NONE [0]				

Riparian: 9 Max 10

COMMENTS:_____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
☐ - > 1m [6]
■ - 0.7-1m [4]
☐ - 0.4-0.7m [2]
☐ - 0.2-0.4m [1]
☐ - < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☐ -POOL WIDTH > RIFFLE WIDTH [2]
☐ -POOL WIDTH = RIFFLE WIDTH [1]
■ -POOL WIDTH < RIFFLE W. [0]

CURRENT VELOCITY (POOL & RIFFLES!) (Check *All* That Apply)
☐ -EDDIES [1]
■ -FAST [1]
■ -MODERATE [1]
☐ -SLOW [1]
☐ -TORRENTIAL [-1]
☐ -INTERSTITIAL [-1]
☐ -INTERMITTENT [-2]

Pool/Glide: 6 Max 12

COMMENTS:_____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE /RUN DEPTH
☐ - GENERALLY > 10 cm; MAX > 50 [4]
■ - GENERALLY > 10 cm; MAX < 50 [3]
☐ - GENERALLY 5-10 cm [1]
☐ - GENERALLY < 5 cm [RIFFLE=0]

RIFFLE/RUN SUBSTRATE
■ -STABLE (e.g., Cobble, Boulder) [2]
☐ -MOD. STABLE (e.g., Large Gravel) [1]
☐ -UNSTABLE (Fine Gravel, Sand) [0]
☐ - NO RIFFLE [Metric=0]

RIFFLE/RUN EMBEDDEDNESS
☐ - NONE [2]
■ - LOW [1]
☐ - MODERATE [0]
☐ - EXTENSIVE [-1]

Riffle/Run: 6 Max 8

Gradient: 10 Max 10

COMMENTS:_____

6] GRADIENT (ft/mi): 8.9 **DRAINAGE AREA (sq.mi.):** 291 %POOL: ___ %GLIDE: ___ %RIFFLE: ___ %RUN: ___

OhioEPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 67

River Code: _____ RM: 0.16 Stream SAGAMORE CREEK
Date 8/14/98 Location SITE #59 (CANAL ROAD)
Scorers Initials: CZ Comments _____

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR/SLBS[10]	___	___
☐ ☐-BOULDER [9]	✓	___
■ ☐-COBBLE [8]	✓	✓
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	___	___
■ ☐-GRAVEL [7]	✓	✓
☐ ☐-SAND [6]	✓	___
☐ ☐-BEDROCK[5]	___	___
☐ ☐-DETRITUS[3]	___	___
☐ ☐-ARTIFICIAL[0]	___	___

NOTE : *(Ignore sludge originating from point-sources; score on natural substrates)*
NUMBER OF SUBSTRATE TYPES: ☐-*5 or More [2]* ■-*4 or Less [0]*
COMMENTS _____

Check ONE (OR 2 & AVERAGE)
☐ -*LIMESTONE [1]*
■ -*TILLS [1]*
☐ -*WETLANDS[0]*
☐ -*HARDPAN [0]*
☐ -*SANDSTONE [0]*
☐ -*RIP/RAP [0]*
☐ -*LACUSTRINE [0]*
☐ -*SHALE [-1]*
☐-*COAL FINES [-2]*

SUBSTRATE ORIGIN

SILT:
☐ -*SILT HEAVY [-2]*
☐ -*SILT MODERATE [-1]*
■ -*SILT NORMAL [0]*
☐ -*SILT FREE [1]*

EMBEDDEDNESS:
☐ -*EXTENSIVE [-2]*
☐ -*MODERATE [-1]*
■ -*NORMAL [0]*
☐ -*NONE [1]*

SUBSTRATE QUALITY
Check ONE (OR 2 & AVERAGE)

Substrate: 16 (Max 20)

2] INSTREAM COVER

TYPE: **(Check *All* That Apply)**
■ -*UNDERCUT BANKS [1]*
☐ -*OVERHANGING VEGETATION [1]*
■ -*SHALLOWS (IN SLOW WATER) [1]*
■ -*ROOTMATS[1]*
■ -*POOLS> 70 cm [2]*
■ -*ROOTWADS [1]*
☐ -*BOULDERS[1]*
☐ -*OXBOWS, BACKWATERS [1]*
☐ -*AQUATIC MACROPHYTES [1]*
■ -*LOGS OR WOODY DEBRIS[1]*
COMMENTS: _____

AMOUNT: **(Check *ONLY* One or check 2 and *AVERAGE*)**
☐ - *EXTENSIVE > 75% [11]*
■ - *MODERATE 25-75% [7]*
■ -*SPARSE 5-25% [3]*
☐ -*NEARLY ABSENT < 5% [1]*

Cover: 12 (Max 20)

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-*HIGH[4]*	☐ - *EXCELLENT [7]*	■-*NONE[6]*	☐-*HIGH[3]*	☐-*SNAGGING*	☐-*IMPOUND.*
■-*MODERATE[3]*	■-*GOOD[5]*	☐ - *RECOVERED [4]*	■-*MODERATE[2]*	☐-*RELOCATION*	■ - *ISLANDS*
■-*LOW[2]*	■ - *FAIR[3]*	☐ - *RECOVERING[3]*	■-*LOW[1]*	☐-*CANOPY REMOVAL*	☐ - *LEVEED*
☐-*NONE[1]*	☐-*POOR[1]*	☐ - *RECENT OR NO RECOVERY[1]*		☐-*DREDGING*	☐ - *BANKSHAPING*
				☐-*ONE SIDE CHANNEL MODIFICATIONS*	

COMMENTS: _____

Channel: 14 (Max 20)

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R Per Bank)	FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) (L R Most Predominant Per Bank)		BANK EROSION (L R Per Bank)	
☐ ■ -*WIDE > 50m[4]*	■ ■-*FOREST, SWAMP[3]*	☐ ☐-*CONSERVATION TILLAGE[1]*	☐ ■-*NONE/LITTLE[3]*	
■ ☐-*MODERATE 10-50m[3]*	☐ ☐-*SHRUB OR OLD FIELD[2]*	☐ ☐-*URBAN OR INDUSTRIAL[0]*	■ ☐-*MODERATE[2]*	
☐ ☐ -*NARROW 5-10m[2]*	■ ☐-*RESIDENTIAL, PARK, NEW FIELD[1]*	☐ ☐-*OPEN PASTURE, ROWCROP[0]*	☐ ☐-*HEAVY/SEVERE[1]*	
☐ ☐ -*VERY NARROW <5m[1]*	☐ ☐-*FENCED PASTURE[1]*	☐ ☐-*MINING/CONSTRUCTION[0]*		
☐ ☐ -*NONE[0]*				

Riparian: 8.5 (Max 10)

COMMENTS: _____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH **(Check 1 ONLY!)**
☐ - *> 1m [6]*
■ - *0.7-1m[4]*
☐ - *0.4-0.7m[2]*
☐ - *0.2-0.4m[1]*
☐ - *< 0.2m [POOL=0]*

MORPHOLOGY **(Check 1 or 2 & AVERAGE)**
■ -*POOL WIDTH > RIFFLE WIDTH [2]*
☐-*POOL WIDTH = RIFFLE WIDTH[1]*
☐ -*POOL WIDTH < RIFFLE W. [0]*

CURRENT VELOCITY [POOLS & RIFFLES!] **(Check *All* That Apply)**
☐ -*EDDIES[1]*
☐ -*FAST[1]*
■ -*MODERATE[1]*
■ -*SLOW[1]*
☐ -*TORRENTIAL[-1]*
☐ -*INTERSTITIAL[-1]*
☐ -*INTERMITTENT[-2]*

Pool/Current: 8 (Max 12)

COMMENTS: _____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH
☐ - *Generally > 10 cm, MAX > 50 [4]*
■ - *Generally > 10 cm, MAX < 50 [3]*
■ - *Generally 5-10 cm[1]*
☐ - *Generally < 5 cm [RIFFLE=0]*

RIFFLE/RUN SUBSTRATE
■ -*STABLE (e.g., Cobble, Boulder) [2]*
■ -*MOD. STABLE (e.g., Large Gravel) [1]*
☐-*UNSTABLE (Fine Gravel, Sand) [0]*

RIFFLE/RUN EMBEDDEDNESS
☐ - *NONE [2]*
■ - *LOW [1]*
☐ - *MODERATE [0]*
☐ - *EXTENSIVE [-1]*

COMMENTS: _____ ☐ - *NO RIFFLE [Metric=0]*

Riffle/Run: 4.5 (Max 8)

Gradient: 4 (Max 10)

6] GRADIENT (ft/mi): 81.2 **DRAINAGE AREA (sq.mi.):** 6.2

%POOL: ___ %GLIDE: ___
%RIFFLE: ___ %RUN: ___

* Headwater streams must be large enough to support a population of riffle-obligate fish species.

OhioEPA Qualitative Habitat Evaluation Index Field Sheet *QHEI Score:* 77

River Code_____ River Mile 15.1 Stream CHAGRIN RIVER
Date 5/23/97 Location SITE #58 (DOWNSTREAM of BOSTON HILL / BONNIEVIEW CREEKS)
Scorers Initials: JJ Comments:_____

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR /SLBS[10]	___	___
■ ☐-BOULDER [9]	✓	✓
■ ☐-COBBLE [8]	✓	✓
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	✓	✓
☐ ☐-GRAVEL [7]	✓	✓
☐ ☐-SAND [6]	✓	✓
☐ ☐-BEDROCK[5]	___	___
☐ ☐-DETRITUS[3]	✓	✓
☐ ☐-ARTIFICIAL[0]	___	___

NOTE : (Ignore sludge originating from point-sources; score on natural substrates)
NUMBER OF SUBSTRATE TYPES: ■-5 or More [2] ☐-4 or Less [0]

SUBSTRATE ORIGIN — Check ONE (OR 2 & AVERAGE)
☐ -LIMESTONE [1]
■ -TILLS [1]
☐ -WETLANDS[0]
☐ -HARDPAN [0]
☐ -SANDSTONE [0]
☐ -RIP/RAP [0]
☐ -LACUSTRINE [0]
☐ -SHALE [-1]
☐-COAL FINES [-2]

SILT: ☐ -SILT HEAVY [-2] ■ -SILT MODERATE [-1] ■ -SILT NORMAL [0] ☐ -SILT FREE [1]

EMBEDDEDNESS: ☐ -EXTENSIVE [-2] ■ -MODERATE [-1] ■ -NORMAL [0] ☐ -NONE [1]

SUBSTRATE QUALITY — Check ONE (OR 2 & AVERAGE)

Substrate: 19 Max 20

COMMENTS_____

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
☐-UNDERCUT BANKS [1]
■-OVERHANGING VEGETATION [1]
■-SHALLOWS (IN SLOW WATER) [1]
■-ROOTMATS [1]
☐-DEEP POOLS > 70cm [2]
■-ROOTWADS [1]
■-BOULDERS [1]
☐-OXBOWS [1]
■-AQUATIC MACROPHYTES [1]
■-LOGS OR WOODY DEBRIS [1]

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐-EXTENSIVE > 75% [11]
■-MODERATE 25-75% [7]
☐-SPARSE 5-25% [3]
☐-NEARLY ABSENT < 5% [1]

Cover: 14 Max 20

COMMENTS:_____

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH [4]	☐-EXCELLENT [7]	■-NONE [6]	☐-HIGH [3]	■-SNAGGING	☐-IMPOUND.
■-MODERATE [3]	☐-GOOD [5]	☐-RECOVERED [4]	■-MODERATE [2]	☐-RELOCATION	■-ISLANDS
■-LOW [2]	■-FAIR [3]	☐-RECOVERING [3]	☐-LOW [1]	☐-CANOPY REMOVAL	☐-LEVEED
☐-NONE [1]	☐-POOR [1]	☐-RECENT OR NO RECOVERY [1]		☐-DREDGING	☐-BANK SHAPING
				☐-ONE SIDE CHANNEL MODIFICATIONS	

Channel: 13.5 Max 20

COMMENTS:_____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R Per Bank)	FLOOD PLAIN QUALITY (PAST 100 FOOT RIPARIAN) (L R Most Predominant Per Bank)		BANK EROSION (L R Per Bank)
☐ ☐-WIDE > 50m [4]	■ ■-FOREST, SWAMP [3]	☐ ☐-CONSERVATION TILLAGE [1]	■ ■-NONE/LITTLE [3]
☐ ☐-MODERATE 10-50m [3]	☐ ☐-SHRUB OR OLD FIELD [2]	☐ ☐-URBAN OR INDUSTRIAL [0]	☐ ☐-MODERATE [2]
■ ■-NARROW 5-10m [2]	■ ■-RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐-OPEN PASTURE, ROWCROP [0]	☐ ☐-HEAVY/SEVERE [1]
☐ ☐-VERY NARROW < 5m [1]	☐ ☐-FENCED PASTURE [1]	☐ ☐-MINING/CONSTRUCTION [0]	
☐ ☐-NONE [0]			

Riparian: 7 Max 10

COMMENTS:_____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
☐ - > 1m [6]
■-0.7-1m [4]
☐-0.4-0.7m [2]
☐-0.2-0.4m [1]
☐ - < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☐-POOL WIDTH > RIFFLE WIDTH [2]
■-POOL WIDTH = RIFFLE WIDTH [1]
☐-POOL WIDTH < RIFFLE W. [0]

CURRENT VELOCITY [POOL & RIFFLES!] (Check *All* That Apply)
☐-EDDIES [1] ☐-TORRENTIAL [-1]
■-FAST [1] ☐-INTERSTITIAL [-1]
■-MODERATE [1] ☐-INTERMITTENT [-2]
■-SLOW [1]

Pool/Glide: 8 Max 12

COMMENTS:_____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE /RUN DEPTH
■ - GENERALLY > 10 cm; MAX > 50 [4]
■ - GENERALLY > 10 cm; MAX < 50 [3]
☐ - GENERALLY 5-10 cm [1]
☐-GENERALLY < 5 cm [RIFFLE=0]

RIFFLE/RUN SUBSTRATE
■-STABLE (e.g., Cobble, Boulder) [2]
■-MOD. STABLE (e.g., Large Gravel) [1]
☐-UNSTABLE (Fine Gravel, Sand) [0]
☐- NO RIFFLE [Metric=0]

RIFFLE/RUN EMBEDDEDNESS
☐ - NONE [2]
■ - LOW [1]
■ - MODERATE [0]
☐-EXTENSIVE [-1]

Riffle/Run: 5.5 Max 8

COMMENTS:_____

Gradient: 10 Max 10

6] GRADIENT (ft/mi): 6.0 **DRAINAGE AREA** (sq.mi.): 161 %POOL: ___ %GLIDE: ___ %RIFFLE: ___ %RUN: ___

ChioEPA Qualitative Habitat Evaluation Index Field Sheet *QHEI Score:* 84.25

River Code____ River Mile 17.4 Stream CHAGRIN RIVER
Date 5/23/97 Location SITE #59 (MAYFIELD ROAD BRIDGE)
Scorers Initials: JJ Comments:____

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR /SLBS[10]	___	___
■ ☐-BOULDER [9]	✓	✓
■ ☐-COBBLE [8]	✓	✓
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	___	✓
☐ ☐-GRAVEL [7]	✓	✓
☐ ☐-SAND [6]	✓	✓
☐ ☐-BEDROCK[5]	___	___
☐ ☐-DETRITUS[3]	✓	✓
☐ ☐-ARTIFICIAL[0]	___	___

NOTE : (Ignore sludge originating from point-sources; score on natural substrates)
NUMBER OF SUBSTRATE TYPES: ■-5 or More [2] ☐-4 or Less [0]

SUBSTRATE ORIGIN — Check ONE (OR 2 & AVERAGE)
☐ -LIMESTONE [1]
■ -TILLS [1]
☐ -WETLANDS[0]
☐ -HARDPAN [0]
☐ -SANDSTONE [0]
☐ -RIP/RAP [0]
☐ -LACUSTRINE [0]
☐ -SHALE [-1]
☐-COAL FINES [-2]

SILT: / EMBEDDEDNESS:
☐ -SILT HEAVY [-2]
☐ -SILT MODERATE [-1]
■ -SILT NORMAL [0]
☐ -SILT FREE [1]
☐ -EXTENSIVE [-2]
☐ -MODERATE [-1]
■ -NORMAL [0]
☐ -NONE [1]

SUBSTRATE QUALITY — Check ONE (OR 2 & AVERAGE)

Substrate: 20 (Max 20)

COMMENTS:____

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
☐-UNDERCUT BANKS [1]
☐-OVERHANGING VEGETATION [1]
■-SHALLOWS (IN SLOW WATER) [1]
☐-ROOTMATS [1]
■-DEEP POOLS > 70cm [2]
■-ROOTWADS [1]
■-BOULDERS [1]
☐-OXBOWS [1]
☐-AQUATIC MACROPHYTES [1]
■-LOGS OR WOODY DEBRIS [1]

COMMENTS:____

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐-EXTENSIVE > 75% [11]
■-MODERATE 25-75% [7]
☐-SPARSE 5-25% [3]
☐-NEARLY ABSENT < 5% [1]

Cover: 13 (Max 20)

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH [4]	☐-EXCELLENT [7]	■-NONE [6]	☐-HIGH [3]	■-SNAGGING	☐-IMPOUND.
■-MODERATE [3]	■-GOOD [5]	☐-RECOVERED [4]	■-MODERATE [2]	☐-RELOCATION	☐-ISLANDS
☐-LOW [2]	■-FAIR [3]	■-RECOVERING [3]	☐-LOW [1]	☐-CANOPY REMOVAL	☐-LEVEED
☐-NONE [1]	☐-POOR [1]	☐-RECENT OR NO RECOVERY [1]		☐-DREDGING	■-BANKSHAPING
				☐-ONE SIDE CHANNEL MODIFICATIONS	

Channel: 15 (Max 20)

COMMENTS:____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R (Per Bank))	FLOOD PLAIN QUALITY (PAST 100 FOOT RIPARIAN) (L R (Most Predominant Per Bank))		BANK EROSION (L R (Per Bank))
■ ■-WIDE > 50m [4]	■ ■-FOREST, SWAMP [3]	☐ ☐-CONSERVATION TILLAGE [1]	■ ■-NONE/LITTLE [3]
☐ ☐-MODERATE 10-50m [3]	☐ ☐-SHRUB OR OLD FIELD [2]	☐ ☐-URBAN OR INDUSTRIAL [0]	■ ☐-MODERATE [2]
☐ ☐-NARROW 5-10m [2]	☐ ■-RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐-OPEN PASTURE, ROWCROP [0]	☐ ☐-HEAVY/SEVERE [1]
☐ ☐-VERY NARROW < 5m [1]	☐ ☐-FENCED PASTURE [1]	☐ ☐-MINING/CONSTRUCTION [0]	
☐ ☐-NONE [0]			

Riparian: 9.25 (Max 10)

COMMENTS:____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
■ - > 1m [6]
☐-0.7-1m [4]
☐-0.4-0.7m [2]
☐-0.2-0.4m [1]
☐ - < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☐-POOL WIDTH > RIFFLE WIDTH [2]
■-POOL WIDTH = RIFFLE WIDTH [1]
☐-POOL WIDTH < RIFFLE W. [0]

CURRENT VELOCITY [POOL & RIFFLES!] (Check *All* That Apply)
■-EDDIES [1]
■-FAST [1]
■-MODERATE [1]
■-SLOW [1]
☐-TORRENTIAL [-1]
☐-INTERSTITIAL [-1]
☐-INTERMITTENT [-2]

Pool/Glide: 11 (Max 12)

COMMENTS:____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE /RUN DEPTH
■ - GENERALLY > 10 cm; MAX > 50 [4]
■ - GENERALLY > 10 cm; MAX < 50 [3]
☐ - GENERALLY 5-10 cm [1]
☐-GENERALLY < 5cm [RIFFLE=0]

RIFFLE/RUN SUBSTRATE
■-STABLE (e.g., Cobble, Boulder) [2]
■-MOD. STABLE (e.g., Large Gravel) [1]
☐-UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE/RUN EMBEDDEDNESS
☐ - NONE [2]
■ - LOW [1]
☐ - MODERATE [0]
☐-EXTENSIVE [-1]

☐- NO RIFFLE [Metric=0]

Riffle/Run: 6 (Max 8)

COMMENTS:____

Gradient: 10 (Max 10)

6] GRADIENT (ft/mi): 8.8 **DRAINAGE AREA (sq.mi.):** 158

%POOL: ____ %GLIDE: ____
%RIFFLE: ____ %RUN: ____

OhioEPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 79.5

River Code_____ River Mile_____ Stream BLODGETT CREEK
Date 5/17/94 Location UPSTREAM OF STRONGSVILLE "A" WWTP EFFLUENT
Scorers Initials: TZ Comments: ELECTROFISHING SITE

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR /SLBS[10]	___	___
■ ☐-BOULDER [9]	___	✓
☐ ☐-COBBLE [8]	___	___
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	___	___
■ ☐-GRAVEL [7]	✓	✓
☐ ☐-SAND [6]	✓	✓
☐ ☐-BEDROCK[5]	___	___
☐ ☐-DETRITUS[3]	___	___
☐ ☐-ARTIFICIAL[0]	___	___

NOTE : (Ignore sludge originating from point-sources; score on natural substrates)
NUMBER OF SUBSTRATE TYPES: ☐ - ≥ 4 [1] ■ - < 4 [0]

SUBSTRATE ORIGIN — Check ONE (OR 2 & AVERAGE)
☐ -LIMESTONE [1]
SILT:
■ -TILLS [1]
☐ -WETLANDS[0]
☐ -HARDPAN [0]
☐ -SANDSTONE [0]
EMBEDDEDNESS:
☐ -RIP/RAP [0]
☐ -LACUSTRINE [0]
☐ -SHALE [-1]
☐-COAL FINES [-2]

SUBSTRATE QUALITY — Check ONE (OR 2 & AVERAGE)
☐ -SILT HEAVY [-2]
■ -SILT MODERATE [-1]
■ -SILT NORMAL [0]
☐ -SILT FREE [1]
☐ -EXTENSIVE [-2]
☐ -MODERATE [-1]
■ -NORMAL [0]
☐ -NONE [1]

Substrate: 16.5 Max 20

COMMENTS_____

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
■-UNDERCUT BANKS [1]
■-OVERHANGING VEGETATION [1]
■-SHALLOWS (IN SLOW WATER) [1]
■-DEEP POOLS > 70cm [2]
■-ROOTWADS [1]
■-BOULDERS [1]
☐-OXBOWS [1]
■-AQUATIC MACROPHYTES [1]
■-LOGS OR WOODY DEBRIS [1]

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
■-EXTENSIVE > 75% [11]
■-MODERATE 25-75% [7]
☐-SPARSE 5-25% [3]
☐-NEARLY ABSENT < 5% [1]

Cover: 18 Max 20

COMMENTS:_____

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY
☐-HIGH [4]
■-MODERATE [3]
☐-LOW [2]
☐-NONE [1]

DEVELOPMENT
☐-EXCELLENT [7]
■-GOOD [5]
☐-FAIR [3]
☐-POOR [1]

CHANNELIZATION
■-NONE [6]
☐-RECOVERED [4]
☐-RECOVERING [3]
☐-RECENT OR NO RECOVERY [1]

STABILITY
■-HIGH [3]
☐-MODERATE [2]
☐-LOW [1]

MODIFICATIONS/OTHER
☐-SNAGGING
☐-RELOCATION
☐-CANOPY REMOVAL
☐-DREDGING
☐-ONE SIDE CHANNEL MODIFICATIONS
☐-IMPOUND.
☐-ISLANDS
☐-LEVEED
☐-BANK SHAPING

Channel: 17 Max 20

COMMENTS:_____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R (Per Bank))
■ ■-WIDE > 50m [4]
☐ ☐-MODERATE 10-50m [3]
☐ ☐-NARROW 5-10m [2]
☐ ☐-VERY NARROW < 5m [1]
☐ ☐-NONE [0]

FLOOD PLAIN QUALITY (PAST 100 FOOT RIPARIAN) (L R (Most Predominant Per Bank))
■ ■-FOREST, SWAMP [3]
☐ ☐-SHRUB OR OLD FIELD [2]
☐ ☐-RESIDENTIAL, PARK, NEW FIELD [1]
☐ ☐-FENCED PASTURE [1]
☐ ☐-CONSERVATION TILLAGE [1]
☐ ☐-URBAN OR INDUSTRIAL [0]
☐ ☐-OPEN PASTURE, ROWCROP [0]
☐ ☐-MINING/CONSTRUCTION [0]

BANK EROSION (L R (Per Bank))
■ ■-NONE/LITTLE [3]
☐ ☐-MODERATE [2]
☐ ☐-HEAVY/SEVERE [1]

Riparian: 10 Max 10

COMMENTS:_____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
☐ - > 1m [6]
■-0.7-1m [4]
☐-0.4-0.7m [2]
☐-0.2-0.4m [1]
☐ - < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
■-POOL WIDTH > RIFFLE WIDTH [2]
☐-POOL WIDTH = RIFFLE WIDTH [1]
☐-POOL WIDTH < RIFFLE W. [0]

CURRENT VELOCITY [POOL & RIFFLES!] (Check *All* That Apply)
☐-EDDIES [1]
☐-FAST [1]
☐-MODERATE [1]
■-SLOW [1]
☐-TORRENTIAL [-1]
☐-INTERSTITIAL [-1]
☐-INTERMITTENT [-2]

Pool/Glide: 7 Max 12

COMMENTS:_____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE /RUN DEPTH
☐ - GENERALLY > 10 cm; MAX > 50 [4]
☐ - GENERALLY > 10 cm; MAX < 50 [3]
☐ - GENERALLY 5-10 cm [1]
■-GENERALLY < 5cm [RIFFLE=0]

RIFFLE/RUN SUBSTRATE
☐-STABLE (e.g., Cobble, Boulder) [2]
■-MOD. STABLE (e.g., Large Gravel) [1]
☐-UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE/RUN EMBEDDEDNESS
☐ - NONE [2]
☐ - LOW [1]
■ - MODERATE [0]
☐-EXTENSIVE [-1]

☐- NO RIFFLE [Metric=0]

Riffle/Run: 1 Max 8

Gradient: 10 Max 10

COMMENTS:_____

6] GRADIENT (ft/mi): 16.5 DRAINAGE AREA (sq.mi.): 0.8

%POOL: ____ %GLIDE: ____
%RIFFLE: ____ %RUN: ____

Ohio EPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 65.25

River Code_____ River Mile_____ Stream BLODGETT CREEK
Date 10/16/96 Location UPSTREAM of STRONGVILLE "A" WWTP EFFLUENT
Scorers Initials: CZ,JT Comments: ELECTROFISHING SITE

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR /SLBS[10]	___	___
☐ ☐-BOULDER [9]	___	✓
☐ ☐-COBBLE [8]	✓	✓
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	___	___
■ ☐-GRAVEL [7]	✓	✓
■ ☐-SAND [6]	✓	___
☐ ☐-BEDROCK[5]	✓	___
☐ ☐-DETRITUS[3]	___	___
☐ ☐-ARTIFICIAL[0]	___	___

NOTE : (Ignore sludge originating from point-sources; score on natural substrates)
NUMBER OF SUBSTRATE TYPES: ■-5 or More [2] ☐-4 or Less [0]

SUBSTRATE ORIGIN (Check ONE (OR 2 & AVERAGE)): ☐ -LIMESTONE [1] ■ -TILLS [1] ☐ -WETLANDS[0] ☐ -HARDPAN [0] ☐ -SANDSTONE [0] ☐ -RIP/RAP [0] ☐ -LACUSTRINE [0] ☐ -SHALE [-1] ☐-COAL FINES [-2]

SILT: ☐ -SILT HEAVY [-2] ☐ -SILT MODERATE [-1] ■ -SILT NORMAL [0] ☐ -SILT FREE [1]

EMBEDDEDNESS: ☐ -EXTENSIVE [-2] ☐ -MODERATE [-1] ■ -NORMAL [0] ☐ -NONE [1]

SUBSTRATE QUALITY (Check ONE (OR 2 & AVERAGE))

Substrate: 16 Max 20

COMMENTS_____

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
■-UNDERCUT BANKS [1] ☐-DEEP POOLS > 70cm [2] ☐-OXBOWS [1]
■-OVERHANGING VEGETATION [1] ■-ROOTWADS [1] ☐-AQUATIC MACROPHYTES [1]
■-SHALLOWS (IN SLOW WATER) [1] ■-BOULDERS [1] ■-LOGS OR WOODY DEBRIS [1]
■-ROOTMATS [1] COMMENTS:_____

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐-EXTENSIVE > 75% [11] ■-MODERATE 25-75% [7] ■-SPARSE 5-25% [3] ☐-NEARLY ABSENT < 5% [1]

Cover: 12 Max 20

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH [4]	☐-EXCELLENT [7]	■-NONE [6]	☐-HIGH [3]	☐-SNAGGING	☐-IMPOUND.
☐-MODERATE [3]	☐-GOOD [5]	☐-RECOVERED [4]	■-MODERATE [2]	☐-RELOCATION	☐-ISLANDS
■-LOW [2]	☐-FAIR [3]	☐-RECOVERING [3]	☐-LOW [1]	☐-CANOPY REMOVAL	☐-LEVEED
☐-NONE [1]	■-POOR [1]	☐-RECENT OR NO RECOVERY [1]		☐-DREDGING	☐-BANKSHAPING
				☐-ONE SIDE CHANNEL MODIFICATIONS	

Channel: 11 Max 20

COMMENTS:_____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R Per Bank)	FLOOD PLAIN QUALITY (PAST 100 FOOT RIPARIAN) (L R Most Predominant Per Bank)		BANK EROSION (L R Per Bank)	
■ ■ ˙-WIDE > 50m [4]	■ ■-FOREST, SWAMP [3]	☐ ☐-CONSERVATION TILLAGE [1]	■ ■-NONE/LITTLE [3]	
☐ ■-MODERATE 10-50m [3]	☐ ☐-SHRUB OR OLD FIELD [2]	☐ ☐-URBAN OR INDUSTRIAL [0]	■ ■-MODERATE [2]	
☐ ☐ ˙-NARROW 5-10m [2]	☐ ■-RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐-OPEN PASTURE, ROWCROP [0]	☐ ☐-HEAVY/SEVERE [1]	
☐ ☐ ˙-VERY NARROW < 5m [1]	☐ ☐-FENCED PASTURE [1]	☐ ☐-MINING/CONSTRUCTION [0]		
☐ ☐ ˙-NONE [0]				

Riparian: 8.75 Max 10

COMMENTS:_____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
☐ - > 1m [6]
☐-0.7-1m [4]
☐-0.4-0.7m [2]
■-0.2-0.4m [1]
☐ - < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
■ ˙-POOL WIDTH > RIFFLE WIDTH [2]
■-POOL WIDTH = RIFFLE WIDTH [1]
☐ ˙-POOL WIDTH < RIFFLE W. [0]

CURRENT VELOCITY [POOL & RIFFLES!] (Check *All* That Apply)
☐ ˙-EDDIES [1] ☐ ˙-TORRENTIAL [-1]
☐ ˙-FAST [1] ☐ ˙-INTERSTITIAL [-1]
■ ˙-MODERATE [1] ☐ ˙-INTERMITTENT [-2]
■ ˙-SLOW [1]

Pool/Glide: 4.5 Max 12

COMMENTS:_____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE /RUN DEPTH
☐ - GENERALLY > 10 cm; MAX > 50 [4]
☐ - GENERALLY > 10 cm; MAX < 50 [3]
■ - GENERALLY 5-10 cm [1]
☐-GENERALLY < 5cm [RIFFLE=0]

RIFFLE/RUN SUBSTRATE
☐-STABLE (e.g., Cobble, Boulder) [2]
■-MOD. STABLE (e.g., Large Gravel) [1]
☐-UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE/RUN EMBEDDEDNESS
☐ - NONE [2]
■ - LOW [1]
☐ - MODERATE [0]
☐-EXTENSIVE [-1]

☐- NO RIFFLE [Metric=0]

Riffle/Run: 3 Max 8

Gradient: 10 Max 10

COMMENTS:_____

6] GRADIENT (ft/mi): 16.5 DRAINAGE AREA (sq.mi.): 0.8 %POOL: ___ %GLIDE: ___ %RIFFLE: ___ %RUN: ___

Ohio EPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 69.5

River Code_____ River Mile_____ Stream BLODGETT CREEK
Date 5/17/94 Location DOWNSTREAM of STRONGSVILLE "A" WWTP EFFLUENT
Scorers Initials: TZ Comments: ELECTROFISHING SITE

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR /SLBS[10]	___	___
☐ ☐-BOULDER [9]	___	___
☐ ☐-COBBLE [8]	___	___
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	___	___
■ ☐-GRAVEL [7]	✓	✓
■ ☐-SAND [6]	✓	✓
☐ ☐-BEDROCK[5]	___	___
☐ ☐-DETRITUS[3]	___	___
☐ ☐-ARTIFICIAL[0]	___	✓

NOTE : (Ignore sludge originating from point-sources; score on natural substrates)
NUMBER OF SUBSTRATE TYPES: ☐ - ≥ 4 [1] ■ - < 4 [0]

SUBSTRATE ORIGIN (Check ONE (OR 2 & AVERAGE)): ☐ -LIMESTONE [1] ■ -TILLS [1] ☐ -WETLANDS[0] ☐ -HARDPAN [0] ☐ -SANDSTONE [0] ☐ -RIP/RAP [0] ☐ -LACUSTRINE [0] ☐ -SHALE [-1] ☐-COAL FINES [-2]

SILT: ☐ -SILT HEAVY [-2] ■ -SILT MODERATE [-1] ☐ -SILT NORMAL [0] ☐ -SILT FREE [1]

EMBEDDEDNESS: ☐ -EXTENSIVE [-2] ■ -MODERATE [-1] ☐ -NORMAL [0] ☐ -NONE [1]

SUBSTRATE QUALITY (Check ONE (OR 2 & AVERAGE))

Substrate: 12 Max 20

COMMENTS_____

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
■-UNDERCUT BANKS [1] ■-OVERHANGING VEGETATION [1] ☐-SHALLOWS (IN SLOW WATER) [1] ■-DEEP POOLS > 70cm [2] ■-ROOTWADS [1] ☐-BOULDERS [1] ☐-OXBOWS [1] ■-AQUATIC MACROPHYTES [1] ■-LOGS OR WOODY DEBRIS [1]

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
■-EXTENSIVE > 75% [11] ■-MODERATE 25-75% [7] ☐-SPARSE 5-25% [3] ☐-NEARLY ABSENT < 5% [1]

Cover: 16 Max 20

COMMENTS:_____

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH [4]	☐-EXCELLENT [7]	■-NONE [6]	■-HIGH [3]	☐-SNAGGING	☐-IMPOUND.
☐-MODERATE [3]	☐-GOOD [5]	☐-RECOVERED [4]	☐-MODERATE [2]	☐-RELOCATION	☐-ISLANDS
■-LOW [2]	■-FAIR [3]	☐-RECOVERING [3]	☐-LOW [1]	☐-CANOPY REMOVAL	☐-LEVEED
☐-NONE [1]	☐-POOR [1]	☐-RECENT OR NO RECOVERY [1]		☐-DREDGING	☐-BANK SHAPING
				☐-ONE SIDE CHANNEL MODIFICATIONS	

Channel: 14 Max 20

COMMENTS:_____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R (Per Bank))	FLOOD PLAIN QUALITY (PAST 100 FOOT RIPARIAN) (L R (Most Predominant Per Bank))		BANK EROSION (L R (Per Bank))	
☐ ☐-WIDE > 50m [4]	■ ☐-FOREST, SWAMP [3]	☐ ☐-CONSERVATION TILLAGE [1]	■ ■-NONE/LITTLE [3]	
☐ ■-MODERATE 10-50m [3]	☐ ☐-SHRUB OR OLD FIELD [2]	☐ ☐-URBAN OR INDUSTRIAL [0]	☐ ☐-MODERATE [2]	
■ ☐-NARROW 5-10m [2]	☐ ■-RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐-OPEN PASTURE, ROWCROP [0]	☐ ☐-HEAVY/SEVERE [1]	
☐ ☐-VERY NARROW < 5m [1]	☐ ☐-FENCED PASTURE [1]	☐ ☐-MINING/CONSTRUCTION [0]		
☐ ☐-NONE [0]				

Riparian: 7.5 Max 10

COMMENTS:_____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
■ - > 1m [6] ☐ - 0.7-1m [4] ☐ - 0.4-0.7m [2] ☐ - 0.2-0.4m [1] ☐ - < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☐-POOL WIDTH > RIFFLE WIDTH [2] ☐-POOL WIDTH = RIFFLE WIDTH [1] ■-POOL WIDTH < RIFFLE W. [0]

CURRENT VELOCITY (POOL & RIFFLES!) (Check *All* That Apply)
☐-EDDIES [1] ☐-FAST [1] ■-MODERATE [1] ■-SLOW [1] ☐-TORRENTIAL [-1] ☐-INTERSTITIAL [-1] ☐-INTERMITTENT [-2]

Pool/Glide: 8 Max 12

COMMENTS:_____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE /RUN DEPTH
☐ - GENERALLY > 10 cm; MAX > 50 [4] ■ - GENERALLY > 10 cm; MAX < 50 [3] ☐ - GENERALLY 5-10 cm [1] ☐-GENERALLY < 5cm [RIFFLE=0]

RIFFLE/RUN SUBSTRATE
☐-STABLE (e.g., Cobble, Boulder) [2] ☐-MOD. STABLE (e.g., Large Gravel) [1] ■-UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE/RUN EMBEDDEDNESS
☐ - NONE [2] ■ - LOW [1] ☐ - MODERATE [0] ☐-EXTENSIVE [-1]

☐- NO RIFFLE [Metric=0]

Riffle/Run: 4 Max 8

Gradient: 8 Max 10

COMMENTS:_____

6] GRADIENT (ft/mi): 31 DRAINAGE AREA (sq.mi.): 0.9 %POOL: ___ %GLIDE: ___ %RIFFLE: ___ %RUN: ___

OhioEPA Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 63.5

River Code_____ River Mile_____ Stream BLODGETT CREEK
Date 10/16/96 Location DOWNSTREAM of STRONGSVILLE "A" WWTP EFFLUENT
Scorers Initials:_____ Comments: ELECTROFISHING SITE

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR /SLBS[10]	___	___
☐ ☐-BOULDER [9]	✓	___
☐ ☐-COBBLE [8]	___	___
☐ ☐-HARDPAN [4]	___	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	✓	___
■ ☐-GRAVEL [7]	✓	✓
■ ☐-SAND [6]	✓	✓
☐ ☐-BEDROCK[5]	___	___
☐ ☐-DETRITUS[3]	✓	___
☐ ☐-ARTIFICIAL[0]	✓	___

NOTE : (Ignore sludge originating from point-sources; score on natural substrates)
NUMBER OF SUBSTRATE TYPES: ■-5 or More [2] ☐-4 or Less [0]

SUBSTRATE ORIGIN (Check ONE (OR 2 & AVERAGE))
☐ -LIMESTONE [1]
■ -TILLS [1]
☐ -WETLANDS[0]
☐ -HARDPAN [0]
☐ -SANDSTONE [0]
☐ -RIP/RAP [0]
☐ -LACUSTRINE [0]
☐ -SHALE [-1]
☐-COAL FINES [-2]

SILT:
EMBEDDEDNESS:

SUBSTRATE QUALITY (Check ONE (OR 2 & AVERAGE))
☐ -SILT HEAVY [-2]
■ -SILT MODERATE [-1]
■ -SILT NORMAL [0]
☐ -SILT FREE [1]
☐ -EXTENSIVE [-2]
■ -MODERATE [-1]
■ -NORMAL [0]
☐ -NONE [1]

Substrate: 15 Max 20

COMMENTS_____

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
■-UNDERCUT BANKS [1]
■-OVERHANGING VEGETATION [1]
■-SHALLOWS (IN SLOW WATER) [1]
■-ROOTMATS [1]
■-DEEP POOLS > 70 cm [2]
■-ROOTWADS [1]
☐-BOULDERS [1]
☐-OXBOWS [1]
☐-AQUATIC MACROPHYTES [1]
■-LOGS OR WOODY DEBRIS [1]

COMMENTS:_____

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐-EXTENSIVE > 75% [11]
■-MODERATE 25-75% [7]
■-SPARSE 5-25% [3]
☐-NEARLY ABSENT < 5% [1]

Cover: 13 Max 20

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH [4]	☐-EXCELLENT [7]	■-NONE [6]	☐-HIGH [3]	☐-SNAGGING	☐-IMPOUND.
☐-MODERATE [3]	☐-GOOD [5]	☐-RECOVERED [4]	■-MODERATE [2]	☐-RELOCATION	☐-ISLANDS
☐-LOW [2]	■-FAIR [3]	☐-RECOVERING [3]	☐-LOW [1]	☐-CANOPY REMOVAL	☐-LEVEED
■-NONE [1]	■-POOR [1]	☐-RECENT OR NO RECOVERY [1]		☐-DREDGING	☐-BANKSHAPING
				☐-ONE SIDE CHANNEL MODIFICATIONS	

Channel: 11 Max 20

COMMENTS:_____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH (L R Per Bank)	FLOOD PLAIN QUALITY (PAST 100 FOOT RIPARIAN) (L R Most Predominant Per Bank)		BANK EROSION (L R Per Bank)	
☐ ☐-WIDE > 50m [4]	☐ ☐-FOREST, SWAMP [3]	☐ ☐-CONSERVATION TILLAGE [1]	☐ ☐-NONE/LITTLE [3]	
☐ ☐-MODERATE 10-50m [3]	■ ☐-SHRUB OR OLD FIELD [2]	☐ ☐-URBAN OR INDUSTRIAL [0]	■ ■-MODERATE [2]	
■ ☐-NARROW 5-10m [2]	■ ■-RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐-OPEN PASTURE, ROWCROP [0]	☐ ☐-HEAVY/SEVERE [1]	
☐ ■-VERY NARROW < 5m [1]	☐ ☐-FENCED PASTURE [1]	☐ ☐-MINING/CONSTRUCTION [0]		
☐ ■-NONE [0]				

Riparian: 4.5 Max 10

COMMENTS:_____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
■ - > 1m [6]
☐ - 0.7-1m [4]
☐ - 0.4-0.7m [2]
☐ - 0.2-0.4m [1]
☐ - < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
■-POOL WIDTH > RIFFLE WIDTH [2]
☐-POOL WIDTH = RIFFLE WIDTH [1]
☐-POOL WIDTH < RIFFLE W. [0]

CURRENT VELOCITY (POOL & RIFFLES!) (Check *All* That Apply)
☐-EDDIES [1]
☐-FAST [1]
■-MODERATE [1]
■-SLOW [1]
☐-TORRENTIAL [-1]
☐-INTERSTITIAL [-1]
☐-INTERMITTENT [-2]

Pool/Glide: 10 Max 12

COMMENTS:_____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE /RUN DEPTH
☐ - GENERALLY > 10 cm; MAX > 50 [4]
☐ - GENERALLY > 10 cm; MAX < 50 [3]
■ - GENERALLY 5-10 cm [1]
☐ - GENERALLY < 5 cm [RIFFLE=0]

RIFFLE/RUN SUBSTRATE
☐-STABLE (e.g., Cobble, Boulder) [2]
☐-MOD. STABLE (e.g., Large Gravel) [1]
■-UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE/RUN EMBEDDEDNESS
☐ - NONE [2]
■ - LOW [1]
☐ - MODERATE [0]
☐ - EXTENSIVE [-1]

☐ - NO RIFFLE [Metric=0]

Riffle/Run: 2 Max 8
Gradient: 8 Max 10

COMMENTS:_____

6] GRADIENT (ft/mi): 31 DRAINAGE AREA (sq.mi.): 0.9

%POOL: ___ %GLIDE: ___
%RIFFLE: ___ %RUN: ___

Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 75

River Code:_____ RM: _____ Stream BRANDYWINE CREEK
Date 10/26/98 Location UPSTREAM of HUDSON WWTP EFFLUENT
Scorers Initials: CZ Comments ELECTROFISHING SITE

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR /SLBS[10]	___	___
☐ ☐-BOULDER [9]	✓	___
■ ☐-COBBLE [8]	✓	✓
☐ ☐-HARDPAN [4]	✓	✓
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	___	___
■ ☐-GRAVEL [7]	✓	✓
☐ ☐-SAND [6]	✓	___
☐ ☐-BEDROCK[5]	___	___
☐ ☐-DETRITUS[3]	✓	___
☐ ☐-ARTIFICIAL[0]	___	___

NOTE : *(Ignore sludge originating from point-sources; score on natural substrates)*
NUMBER OF SUBSTRATE TYPES: ■-*5 or More [2]* ☐-*4 or Less [0]*

SUBSTRATE ORIGIN (Check ONE (OR 2 & AVERAGE))
☐ -*LIMESTONE [1]*
SILT: ■ -*TILLS [1]*
☐ -*WETLANDS[0]*
☐ -*HARDPAN [0]*
☐ -*SANDSTONE [0]*
EMBEDDEDNESS: ☐ -*RIP/RAP [0]*
☐ -*LACUSTRINE [0]*
☐ -*SHALE [-1]*
☐-*COAL FINES [-2]*

SUBSTRATE QUALITY (Check ONE (OR 2 & AVERAGE))
☐ -*SILT HEAVY [-2]*
■ -*SILT MODERATE [-1]*
■ -*SILT NORMAL [0]*
☐ -*SILT FREE [1]*
☐ -*EXTENSIVE [-2]*
☐ -*MODERATE [-1]*
■ -*NORMAL [0]*
☐ -*NONE [1]*

Substrate: 17.5 Max 20

COMMENTS _____

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
■ -*UNDERCUT BANKS [1]* ■ -*POOLS > 70 cm [2]* ☐ -*OXBOWS, BACKWATERS [1]*
■ -*OVERHANGING VEGETATION [1]* ■ -*ROOTWADS [1]* ☐ -*AQUATIC MACROPHYTES [1]*
■ -*SHALLOWS (IN SLOW WATER) [1]* ■ -*BOULDERS [1]* ■ -*LOGS OR WOODY DEBRIS [1]*
■ -*ROOTMATS [1]* COMMENTS: _____

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐ -*EXTENSIVE > 75% [11]*
■ -*MODERATE 25-75% [7]*
☐ -*SPARSE 5-25% [3]*
☐ -*NEARLY ABSENT < 5% [1]*

Cover: 16 Max 20

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH [4]	☐-EXCELLENT [7]	■-NONE [6]	☐-HIGH [3]	☐-SNAGGING	☐-IMPOUND.
■-MODERATE [3]	■-GOOD [5]	☐-RECOVERED [4]	■-MODERATE [2]	☐-RELOCATION	■-ISLANDS
■-LOW [2]	☐-FAIR [3]	☐-RECOVERING [3]	■-LOW [1]	■-CANOPY REMOVAL	☐-LEVEED
☐-NONE [1]	☐-POOR [1]	■-RECENT OR NO RECOVERY [1]		☐-DREDGING	■-BANK SHAPING
				■-ONE SIDE CHANNEL MODIFICATIONS	

Channel: 12.5 Max 20

COMMENTS: Approx. 25' of STREAM BED RESHAPED JUST US of CULVERT UNDER TURNPIKE

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH L R (Per Bank)	FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) L R (Most Predominant Per Bank)	L R	BANK EROSION L R (Per Bank)
■ ☐-WIDE > 50m[4]	■ ■-FOREST, SWAMP [3]	☐ ☐-CONSERVATION TILLAGE [1]	■ ☐-NONE/LITTLE[3]
☐ ■-MODERATE 10-50m[3]	☐ ☐-SHRUB OR OLD FIELD [2]	☐ ☐-URBAN OR INDUSTRIAL [0]	■ ■-MODERATE[2]
☐ ☐-NARROW 5-10m[2]	☐ ☐-RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐-OPEN PASTURE, ROWCROP [0]	☐ ☐-HEAVY/SEVERE[1]
■ ■-VERY NARROW < 5m[1]	☐ ☐-FENCED PASTURE [1]	☐ ☐-MINING/CONSTRUCTION[0]	
☐ ☐-NONE[0]			

Riparian: 7.5 Max 10

COMMENTS: _____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
■ - *> 1m [6]*
☐ - *0.7-1m[4]*
☐ - *0.4-0.7m[2]*
☐ - *0.2-0.4m[1]*
☐ - *< 0.2m [POOL=0]*

MORPHOLOGY (Check 1 or 2 & AVERAGE)
■-*POOL WIDTH > RIFFLE WIDTH [2]*
☐-*POOL WIDTH = RIFFLE WIDTH[1]*
■-*POOL WIDTH < RIFFLE W. [0]*

CURRENT VELOCITY [POOLS & RIFFLES!] (Check *All* That Apply)
☐-*EDDIES[1]* ☐-*TORRENTIAL[-1]*
■-*FAST[1]* ☐-*INTERSTITIAL[-1]*
■-*MODERATE[1]* ☐-*INTERMITTENT[-2]*
■-*SLOW[1]*

Pool/Current: 10 Max 12

COMMENTS: _____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH
☐ - *Generally > 10 cm, MAX > 50 [4]*
☐ - *Generally > 10 cm, MAX < 50 [3]*
■ - *Generally 5-10 cm[1]*
☐ - *Generally < 5 cm [RIFFLE=0]*

RIFFLE/RUN SUBSTRATE
■-*STABLE (e.g., Cobble, Boulder) [2]*
■-*MOD. STABLE (e.g., Large Gravel) [1]*
☐-*UNSTABLE (Fine Gravel, Sand) [0]*

RIFFLE/RUN EMBEDDEDNESS
☐ - *NONE [2]*
■ - *LOW [1]*
☐ - *MODERATE [0]*
☐ - *EXTENSIVE [-1]*

☐ - *NO RIFFLE [Metric=0]*

Riffle/Run: 3.5 Max 8

Gradient: 8 Max 10

6] GRADIENT (ft/mi): 10.6 **DRAINAGE AREA (sq.mi.):** 9.0

%POOL: ___ %GLIDE: ___
%RIFFLE: ___ %RUN: ___

*Best areas must be large enough to support a population of riffle-obligate fish species.

Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 57.75

River Code:_____ RM: _____ Stream BRANDYWINE CREEK
Date 10/26/98 Location DOWNSTREAM of HUDSON WWTP EFFLUENT
Scorers Initials: CZ Comments ELECTROFISHING SITE

1] SUBSTRATE (Check *ONLY* Two Substrate *TYPE BOXES; Estimate % present*);

TYPE	POOL	RIFFLE
☐ ☐-BLDR/SLBS[10]	___	___
☐ ☐-BOULDER [9]	___	___
☐ ☐-COBBLE [8]	___	✓
☐ ☐-HARDPAN [4]	✓	___
☐ ☐-MUCK [2]	___	___
☐ ☐-SILT [2]	___	___
■ ☐-GRAVEL [7]	✓	✓
■ ☐-SAND [6]	✓	✓
☐ ☐-BEDROCK[5]	___	___
☐ ☐-DETRITUS[3]	✓	___
☐ ☐-ARTIFICIAL[0]	___	___

NOTE : *(Ignore sludge originating from point-sources; score on natural substrates)*
NUMBER OF SUBSTRATE TYPES: ■-*5 or More [2]* ☐-*4 or Less [0]*

SUBSTRATE ORIGIN — Check ONE (OR 2 & AVERAGE)
☐ -LIMESTONE [1]
■ -TILLS [1]
☐ -WETLANDS[0]
☐ -HARDPAN [0]
☐ -SANDSTONE [0]
☐ -RIP/RAP [0]
☐ -LACUSTRINE [0]
☐ -SHALE [-1]
☐ -COAL FINES [-2]

SILT:
EMBEDDEDNESS:

SUBSTRATE QUALITY — Check ONE (OR 2 & AVERAGE)
☐ -SILT HEAVY [-2]
■ -SILT MODERATE [-1]
■ -SILT NORMAL [0]
☐ -SILT FREE [1]
☐ -EXTENSIVE [-2]
■ -MODERATE [-1]
☐ -NORMAL [0]
☐ -NONE [1]

Substrate: 14.5 Max 20

COMMENTS: _____

2] INSTREAM COVER

TYPE: (Check *All* That Apply)
■ -UNDERCUT BANKS [1]
■ -OVERHANGING VEGETATION [1]
■ -SHALLOWS (IN SLOW WATER) [1]
■ -ROOTMATS [1]
☐ -POOLS > 70 cm [2]
☐ -ROOTWADS [1]
☐ -BOULDERS [1]
☐ -OXBOWS, BACKWATERS [1]
■ -AQUATIC MACROPHYTES [1]
■ -LOGS OR WOODY DEBRIS [1]

AMOUNT: (Check *ONLY* One or check 2 and *AVERAGE*)
☐ -EXTENSIVE > 75% [11]
■ -MODERATE 25-75% [7]
■ -SPARSE 5-25% [3]
☐ -NEARLY ABSENT < 5% [1]

Cover: 11 Max 20

COMMENTS: _____

3] CHANNEL MORPHOLOGY: (Check *ONLY* One PER Category OR check 2 and *AVERAGE*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
☐-HIGH [4]	☐-EXCELLENT [7]	■-NONE [6]	☐-HIGH [3]	☐-SNAGGING	☐-IMPOUND.
■-MODERATE [3]	☐-GOOD [5]	☐-RECOVERED [4]	■-MODERATE [2]	☐-RELOCATION	☐-ISLANDS
■-LOW [2]	☐-FAIR [3]	☐-RECOVERING [3]	☐-LOW [1]	☐-CANOPY REMOVAL	☐-LEVEED
☐-NONE [1]	■-POOR [1]	☐-RECENT OR NO RECOVERY [1]		☐-DREDGING	☐-BANKSHAPING
				■-ONE SIDE CHANNEL MODIFICATIONS	

Channel: 11.5 Max 20

COMMENTS: _____

4]. RIPARIAN ZONE AND BANK EROSION-(check ONE box per bank or check 2 and AVERAGE per bank) ★River Right Looking Downstream★

RIPARIAN WIDTH L R (Per Bank)	FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) L R (Most Predominant Per Bank)		BANK EROSION L R (Per Bank)	
☐ ☐-WIDE > 50m [4]	☐ ☐-FOREST, SWAMP [3]	☐ ☐-CONSERVATION TILLAGE [1]	■ ■-NONE/LITTLE [3]	
☐ ☐-MODERATE 10-50m [3]	☐ ■-SHRUB OR OLD FIELD [2]	■ ■-URBAN OR INDUSTRIAL [0]	■ ☐-MODERATE [2]	
■ ■-NARROW 5-10m [2]	☐ ☐-RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐-OPEN PASTURE, ROWCROP [0]	☐ ☐-HEAVY/SEVERE [1]	
☐ ☐-VERY NARROW < 5m [1]	☐ ☐-FENCED PASTURE [1]	☐ ☐-MINING/CONSTRUCTION [0]		
☐ ☐-NONE [0]				

Riparian: 5.25 Max 10

COMMENTS: _____

5.]POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1 ONLY!)
☐ - ≥ 1m [6]
☐ - 0.7-1m [4]
■ - 0.4-0.7m [2]
☐ - 0.2-0.4m [1]
☐ - < 0.2m [POOL=0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
■ -POOL WIDTH > RIFFLE WIDTH [2]
☐ -POOL WIDTH = RIFFLE WIDTH [1]
☐ -POOL WIDTH < RIFFLE W. [0]

CURRENT VELOCITY [POOLS & RIFFLES!] (Check *All* That Apply)
☐ -EDDIES [1]
☐ -FAST [1]
■ -MODERATE [1]
■ -SLOW [1]
☐ -TORRENTIAL [-1]
☐ -INTERSTITIAL [-1]
☐ -INTERMITTENT [-2]

Pool/Current: 6 Max 12

COMMENTS: _____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE/RUN DEPTH	RIFFLE/RUN SUBSTRATE	RIFFLE/RUN EMBEDDEDNESS
☐ - Generally > 10 cm, MAX > 50 [4]	☐-STABLE (e.g., Cobble, Boulder) [2]	☐ - NONE [2]
☐ - Generally > 10 cm, MAX < 50 [3]	■-MOD. STABLE (e.g., Large Gravel) [1]	☐ - LOW [1]
■ - Generally 5-10 cm [1]	■-UNSTABLE (Fine Gravel, Sand) [0]	■ - MODERATE [0]
☐ - Generally < 5 cm [RIFFLE=0]		☐ - EXTENSIVE [-1]

☐ - NO RIFFLE [Metric=0]

Riffle/Run: 1.5 Max 8

Gradient: 8 Max 10

6] GRADIENT (ft/mi): 10.6 **DRAINAGE AREA (sq.mi.):** 9.0

%POOL: ____ %GLIDE: ____
%RIFFLE: ____ %RUN: ____

* Best areas must be large enough to support a population of riffle-obligate fish species.

APPENDIX E
MACROINVERTEBRATE SAMPLING SUMMARY,
1996-1998

Benthos Collection Methods

In 1996, 1997, and 1998, the NEORSD performed qualitative, semi-quantitative and quantitative sampling for benthic macroinvertebrates. Organisms were collected using a D-frame kicknet, hand picking, and Hester-Dendy artificial substrate samplers. Only organisms large enough to be retained by a No. 30 mesh screen were collected. Benthic macroinvertebrate samples were retained in labeled vials and preserved with AGW (a mixture of 85% denatured ethanol, 5% glycerol, and 10% water) for laboratory identification. All organisms were identified to the lowest possible taxonomic level.

Qualitative multiple habitat sampling was performed at all accessible microhabitats at a site until no new taxa were being collected. This period of time usually ranged from one-half hour to one hour at each site. The qualitative multiple habitat sampling provided a list of taxa present within a sample site.

Semi-quantitative samples were collected using a D-frame kick net, which was placed in the stream with the open end facing upstream. The substrate upstream of the net was disturbed by kicking for approximately 30 seconds. All large rocks were scraped to dislodge all invertebrates. The large rocks and debris were then visually inspected for any organisms that may have been clinging to the surface. These were removed using forceps and placed in a vial. All large and/or rare taxa were placed in vials because they may interfere with sample splitting and/or be lost when large samples are split using a Folsom sample splitter. Due to the naturally irregular distribution of benthic macroinvertebrates in streams, 3 to 5 kick samples within a sampling reach were collected and composited. The semi-quantitative samples provide data for Hilsenhoff Biotic Index (HBI) calculations.

The Hilsenhoff Biotic Index (HBI) was developed in Wisconsin by Dr. William Hilsenhoff in 1977 and revised by Dr. Hilsenhoff in 1987. The HBI can be used as an indicator of organic and nutrient pollution, which can result in lower in-stream dissolved oxygen concentrations. The HBI is an average of tolerance values for all individuals collected from a site. Benthic macroinvertebrates, specifically arthropods, are used in this assessment of stream water quality.

The HBI evaluation of water quality is accomplished using a sample of 100 to 200 arthropods collected from rock or gravel riffles. In deeper streams that have no riffles, samples from rock or gravel runs may be substituted, and in sand-bottomed streams, samples from debris that accumulates on sticks or other objects wedged into the sand in swift current may be used (Hilsenhoff, 1987). It is suggested that the stream sites to be sampled have current velocity of 0.3 m/sec (1.0 ft/sec) or greater (Hilsenhoff, 1987).

Sample collection should be performed in the spring before June 1st or between September 1st and October 15th. It has been determined that much higher biotic index values are generally reported for summer months. The use of seasonal correction factors for the summer has been suggested (Hilsenhoff, 1982, 1987).

$$HBI = \sum \frac{n_i a_i}{N}$$

Where:

n_i = Total number of individuals in the ith taxa
a_i = Tolerance value of ith taxa
N = Total number of individuals in a sample

Tolerance values from 0 to 10 have been assigned by Dr. Hilsenhoff for 359 species (Hilsenhoff, 1987). The tolerance values increase with tolerance. For more details about tolerance values and collection methods, refer to Hilsenhoff, 1979, 1982 and 1987.

HBI values are divided into seven narrative water quality ratings: Excellent, Very Good, Good, Fair, Fairly Poor, Poor, Very Poor. The water quality ratings are based on biotic index scores, with higher scores indicating poorer water quality than lower scores (Table E-1), assuming physical habitability of sites to be equal.

Table E-1
Evaluation of Water Quality using the Hilsenhoff Biotic Index

Index Score	Water Quality	Degree of Organic Pollution
0.00-3.50	Excellent	No Apparent Organic Pollution
3.51-4.50	Very Good	Possible Slight Organic Pollution
4.51-5.50	Good	Some Organic Pollution
5.51-6.50	Fair	Fairly Significant Organic Pollution
6.51-7.50	Fairly Poor	Significant Organic Pollution
7.51-8.50	Poor	Very Significant Organic Pollution
8.51-10.00	Very Poor	Severe Organic Pollution

Source: Hilsenhoff, 1987

Using the HBI to evaluate water quality of streams has some advantages. The use of only arthropods helps to simplify collection, sorting and identification. Sample collection

time for HBI evaluations (about 1 hour) is much less than that for artificial substrate samples (six weeks for sampler colonization and many hours of sorting). The relatively small number of arthropods required (100-200) for an evaluation reduces processing time, compared to artificial substrate samples which may contain thousands of organisms, requiring many more hours to process. The requirement to sample only riffles or fast runs for HBI evaluation makes data more comparable between sample locations, because habitat will not be as variable.

The HBI is considered by some to be one of the most reliable indices used for rapid bioassessment today (Szcytko, 1988). HBI values are not strongly affected by stream width, unlike Ephemeropteran, Plecopteran, Trichopteran (EPT) taxa richness values. For this reason, biotic indices are more reliable than taxa richness when ratings are assigned to smaller streams (Lenat, 1993).

The tolerance values provided by Dr. Hilsenhoff were developed in Wisconsin and may require some modification for Northeast Ohio. This modification may not be very significant because both regions are within the Great Lakes region and have ecologically similar streams and rivers. Modified tolerance values have been assigned to many invertebrates and can be found in the U.S. EPA Rapid Bioassessment Protocols, Volume 2 (Barbour, 1999). Site-specific tolerance values, for arthropods collected by the NEORSD, will eventually be determined for future use. Until then, the tolerance values provided by Hilsenhoff will serve as an adequate default.

Approximate tolerance values were assigned to organisms when tolerance values were not available for that species or when the taxonomic level of identification was to the genus only. The approximate tolerance value was determined by averaging the assigned tolerance values for all species within the genus. This approximate tolerance value was then used in the calculation of the HBI score. The range of tolerance values within most genera where approximate values were used was no greater than one. The use of this approximate tolerance value should not have a significant effect on the accuracy of the HBI narrative rating.

Some disadvantages associated with HBI stream evaluations are:

A) Selective sampling techniques. Sampling techniques which examine a specific type of habitat (i.e. riffles, swift runs) and exclude non-arthropods (i.e. snails, worms, leeches, etc.) and other organisms endemic to pools and margins, will not provide sufficient data to characterize the entire benthic community of a stream location.

B) The HBI is only reliable in determining the impact of organic pollution on benthic fauna and was not designated to evaluate non-organic impacts.

The HBI can be modified to include non-arthropods for the bioassessment of streams. This has been accomplished in North Carolina where tolerance values have been determined for non-arthropods. These values for non-arthropods have been included in

the HBI calculation for the development of the North Carolina Biotic Index (NCBI, Lenat, 1993).

Consideration of one index in isolation can lead to misinterpretation of stream conditions. Therefore, multi-metric analysis is used to assess the health of the benthic macroinvertebrate community and water quality at each sample location. NEORSD investigators frequently use the following macroinvertebrate indices to evaluate water quality conditions:

Taxa Richness is the total number of distinct taxa identified in the sample. In most cases the higher the number (diversity) of total taxa, the healthier the community. Increasing diversity correlates with increasing health of the assemblage and suggests that niche space, habitat, and food source are adequate to support survival and propagation of many species. Number of taxa measures overall variety of the macroinvertebrate assemblage. Taxa richness usually consists of species level identifications but can also be evaluated as designated groupings of taxa, often as higher taxonomic groups (i.e., genera, families, orders, etc.) in assessment of invertebrate assemblages. This metric can be affected by the experience and taxonomic skill of the investigator.

EPT Taxa Richness is the total number of different Ephemeropteran, Plecopteran and Trichopteran taxa identified in the sample. The EPT taxa include organisms that are usually sensitive to various stressors like organic pollution, toxic pollution and detrimental land uses within the watershed. As with the taxa richness metric, this metric is also sensitive to the taxonomic skill of the investigator. The greater the number of EPT taxa present in the sample, the healthier the benthic macroinvertebrate community, the better the water quality and/or habitat of the stream.

Percent EPT Composition is the proportion of EPT organisms identified in the sample. Since these groups of organisms are considered sensitive to various types of environmental disruptions, the greater the percent composition, the healthier the benthic macroinvertebrate community and the better the water quality.

Percent Mayfly Composition and **Percent Caddisfly Composition** are individual components of EPT composition. When examined, these metrics may be used to identify the macroinvertebrate community structure and determine the type(s) of impact present. Both mayflies and caddisflies are sensitive to organic pollution, siltation, and habitat diversity and quality. Because of the mobility of certain mayflies, extremely high numbers of Baetidae mayflies may indicate that recovery from a recent disruption may have occurred.

Total Dipteran Taxa measures the total number of different taxa in this large and diverse order of insects. This order contains many genera with widely diverse ecological requirements. Generally, the greater the number of different dipteran taxa, the healthier the benthic macroinvertebrate community.

Percent Tribe Tanytarsini Composition measures the abundance of this pollution sensitive group of Chironomidae.

Percent Other Dipterans and Non-Insects measures the abundance of all dipterans (except tribe Tanytarsini midges) and other invertebrates which are not insects. These organisms tend to predominate the macroinvertebrate community when water quality conditions are adverse.

Dominant 5-10 taxa measures the proportions of the most abundant organisms. A high abundance of a few taxa is indicative of an impacted benthic macroinvertebrate community.

EPT/Chironomidae ratio uses these two indicator groups as a measure of community balance. A healthy, non-impacted site will have greater representation of EPT than the generally pollution tolerant group of Chironomidae. Generally, the higher the EPT/Chironomidae ratio, the healthier the stream.

(*Cricotopus* + *Chironomus*)/Chironomidae measures the abundance of the pollution tolerant genera *Cricotopus* and *Chironomus* to the total abundance of the family Chironomidae. The greater the abundance of these two genera, the greater the impact on the benthic macroinvertebrate community.

Qualitative Community Tolerance Values (QCTV) is an Ohio EPA water quality assessment tool. The assessment of macroinvertebrate data utilizes taxon tolerance values which have been established by Ohio EPA. NEORSD investigators calculate the QCTV using semi-quantitative macroinvertebrate samples collected from natural substrates and utilize the index in the same fashion as the HBI.

The following metrics, when used in conjunction with other measures of macroinvertebrate health, can aid in determining the source of impact on a benthic macroinvertebrate community.

Percent Tolerant Organisms measures the proportion of organisms considered by the Ohio EPA to be tolerant to pollution. The greater the abundance of tolerant organisms, the greater the impact.

Percent Toxic Tolerant Organism composition measures the proportion of organisms tolerant to toxic pollution.

Percent Selected Toxic Tolerant Organism composition measures the proportion of a subset of the toxic tolerant organisms.

Percent Organic Tolerant Organism composition measures the proportion of organisms tolerant to organic pollution.

A summary of the metrics used by NEORSD to evaluate macroinvertebrate communities is presented in Table E-2. NEORSD kick net data are presented in Table E-3. Numbers of organisms used in the calculations are on file at the NEORSD Water Quality & Industrial Surveillance offices.

Quantitative samples were obtained using five replicate Hester-Dendy artificial substrate samplers per sample site. The five Hester-Dendy samplers were secured to an object (i.e. block, brick etc.) and submerged in the stream for approximately six weeks. The quantitative samples were used for the calculation of the Invertebrate Community Index (ICI).

Table E-2 Biological Metrics Used for the Analysis of Benthic Macroinvertebrate Data

	Biological Metrics	Description	Response to Impairment
Richness Measures	Taxa Richness	Total number of individual taxa	Decrease
	EPT Taxa Richness	Number of taxa in the Ephemeropteran (mayfly), Plecopteran (stonefly), and Trichopteran (caddisfly) insect orders	Decrease
	Ephemeropteran Taxa Richness	Total number mayfly taxa (genus or species)	Decrease
	Trichoptera Taxa Richness	Total number caddisfly taxa (genus or species)	Decrease
	Dipteran Taxa Richness	Total number of Diptera (fly) taxa	Decrease
Composition Metrics	Percent EPT Composition	Percent composition mayfly, stonefly and caddisfly larvae	Decrease
	Percent Mayfly Composition	Percent of mayfly larvae in sample	Decrease
	Percent Caddisfly Composition	Percent caddisfly larvae in sample	Decrease
	Percent Tribe Tanytarsini Composition	Percent of Tanytarsini midge larvae in sample	Decrease
	Percent Other Dipterans & Non-Insects	Percent composition of dipterans other than the Tanytarsini midge larvae and non-insects.	Increase
	Shannon Diversity Index	General measure of sample diversity that incorporates richness and evenness	Decrease
	Percent composition Dominant 5-10 Taxa	Percent composition of most abundant taxa	Increase
Tolerance/Intolerance Measures	Percent Tolerant Organisms	Percent of tolerant organisms listed by OEPA for the calculation of the ICI.	Increase
	Percent Toxic Tolerant Organisms	Percent of organisms found to be tolerant of toxic stress, listed by the OEPA.	Increase
	Percent Selected Toxic Tolerant Organisms	Percent of organisms found to be tolerant to specific toxic stressors, listed by the OEPA	Increase
	Percent Organic Tolerant Organisms	Percent of organisms known to be tolerant to organic pollution	Increase
	EPT/Chironomidae ratio	Ratio between the less tolerant mayfly, stonefly and caddisfly taxa and the more tolerant midge taxa.	Decrease

Table E-2 (Continued)

	Biological Metrics	Description	Response to Impairment
Tolerance/Intolerance Measures (Continued)	*Cricotopus+Chironomus/* Chironomidae	Composition of the more tolerant midge genera compared to the entire family of midges.	Increase
	Hilsenhoff Biotic Index (HBI)	Measure of organic pollution using assigned tolerance values from 0-10, with 10 being the most tolerant	Increase
	North Carolina Biotic Index (NCBI)	Measures the level of impact due to organic pollution using tolerance values from 0-10, with 10 being the most tolerant.	Increase
	Qualitative Community Tolerance Value Index (OEPA)	Invertebrate community index based on qualitative samples with assigned tolerance values from 0-60, with 60 being the least tolerant, based on OEPA ICI.	Decrease
	Invertebrate Community Index (OEPA)	Multi-metric index based on 10-community metrics used to analyze data generated from Hester-Dendy artificial substrate samplers.	Decrease

Table E-3
Kick Net Benthic Macroinvertebrate Data
1996-1998

Sample Location	Date	Total Taxa	EPT Taxa	Percent EPT	HBI Score	NCBI Score	QCTV Score	Shannon Diversity Index	Percent Toxic Tolerant	Percent Selected Toxic	Percent Organic Tolerant
Euclid Creek											
0.5	9/18/98	22	2	3.77	6.69	8.05	28.65	2.76	38.68	31.11	12.26
0.51	5/13/97	22	3	8.47	6.18	7.51	24.39	2.46	13.60	10.20	44.10
0.51	8/19/97	34	8	29.70	5.65	7.62	32.78	3.13	15.86	6.89	15.17
1	5/13/97	14	4	10.00	5.95	6.72	21.78	1.79	2.00	2.00	56.00
1	8/19/97	36	7	42.60	5.71	7.17	36.13	2.87	12.27	2.80	5.20
1	9/18/98	36	9	44.40	5.54	7.10	36.04	3.04	24.30	23.40	4.70
1.5	9/22/97	33	9	50.20	5.19	6.88	38.50	2.81	8.80	8.50	10.00
2	5/13/97	10	0	0.00	7.41	7.43	18.12	1.81	7.30	2.40	36.60
2	8/19/97	31	8	26.80	5.82	6.94	35.11	2.67	8.80	6.10	15.80
2	8/19/98	37	8	61.70	5.35	7.19	37.35	2.76	8.20	5.10	8.20
2.5	10/2/97	30	5	74.40	5.05	7.39	38.14	2.10	2.90	2.30	10.80
3	5/13/97	26	5	10.70	5.86	7.14	28.06	2.48	3.90	2.80	23.60
3	8/20/97	39	9	55.50	5.26	6.81	39.23	2.64	4.60	2.30	2.10
3	8/19/98	42	11	64.10	5.20	6.67	39.21	2.60	3.60	2.80	5.20
3.5	9/25/97	33	8	33.30	5.49	7.44	35.83	2.74	19.30	18.10	4.70
4	5/14/97	15	1	1.80	7.49	6.62	15.13	1.23	6.50	2.40	64.00
4	8/20/97	36	5	58.00	5.33	7.40	37.52	2.53	4.50	3.80	16.20
4	9/28/98	30	6	34.20	5.63	7.10	35.87	2.90	4.30	3.70	13.04
Green Creek											
7	5/19/97	8	2	7.34	5.57	6.66	23.00	1.57	0.92	0.00	36.70
7	10/20/97	24	4	34.87	5.45	7.18	36.00	2.45	2.63	1.97	14.47
Nine Mile Creek											
8a	5/27/97	2	0	0.00	7.00	7.00	16.00	0.23	6.25	6.25	93.75
9	6/13/97	2	0	0.00	8.00	5.70	15.00	0.44	0.00	0.00	84.00
9up	10/2/97	16	1	22.73	5.74	7.47	35.00	1.95	2.60	0.65	12.99
9down	10/2/97	4	0	0.00	9.14	9.88	29.00	1.20	0.00	0.00	12.50
10	5/22/97	7	0	0.00	7.14	7.82	21.00	1.55	27.27	27.27	50.00
10	10/6/97	18	1	34.38	5.64	7.79	33.00	2.04	5.21	2.08	41.15
Dugway Brook											
12	6/12/97	6	0	0.00	8.00	9.48	15.00	0.51	4.62	4.26	91.49
14	5/27/97	14	2	4.10	7.33	8.64	29.00	1.65	62.30	59.84	24.59
14	10/6/97	27	1	7.14	6.97	7.96	29.00	2.34	31.87	30.77	39.01
15	6/9/97	9	0	0.00	8.08	6.87	16.00	0.88	5.85	5.85	79.51
15	10/6/97	20	1	8.37	6.68	7.82	30.00	2.06	11.03	6.08	44.11
Doan Brook											
1 (16)	9/17/98	25	4	8.97	6.23	7.96	30.00	2.30	29.49	21.37	36.75
2 (17)	5/18/97	13	1	0.27	7.11	8.43	19.00	1.06	10.54	10.54	85.14
2 (17)	6/9/97	14	3	31.87	6.01	7.87	29.00	2.12	31.87	31.87	29.67
2 (17)	8/29/97	30	3	27.41	5.93	7.69	35.00	2.29	5.92	3.43	36.76
2 (17)	9/17/98	28	3	10.68	6.35	8.15	27.00	2.43	36.41	34.47	26.70
3 (17.1)	5/18/97	27	2	3.19	6.72	8.37	30.00	2.02	26.17	20.97	58.05
3 (17.1)	6/12/97	20	2	35.97	5.99	7.91	33.00	2.24	33.81	33.81	17.27
3 (17.1)	8/29/97	28	6	58.71	5.35	7.25	39.00	2.23	0.00	0.00	18.44
3 (17.1)	6/20/98	29	4	21.89	6.27	7.91	34.00	2.22	1.01	1.01	53.20
3 (17.1)	7/15/98	28	3	31.38	6.00	7.50	35.00	2.48	0.75	0.00	33.88
3 (17.1)	8/17/98	23	4	48.44	5.88	7.68	36.00	2.18	0.00	0.00	29.17
4	9/17/98	33	3	21.58	6.24	7.55	35.00	2.84	7.37	2.63	24.21
5	8/17/98	23	2	27.41	6.06	7.07	35.00	2.53	3.70	0.00	20.74

Table E-3
Kick Net Benthic Macroinvertebrate Data
1996-1998

Sample Location	Date	Total Taxa	EPT Taxa	Percent EPT	HBI Score	NCBI Score	QCTV Score	Shannon Diversity Index	Percent Toxic Tolerant	Percent Selected Toxic	Percent Organic Tolerant
Doan Brook (Cont'd)											
6	8/17/98	13	1	2.27	6.00	7.50	27.00	2.23	29.55	29.55	45.45
18.5	6/20/98	11	0	0.00	7.36	7.45	24.00	1.91	14.52	8.06	62.90
18.5	7/15/98	9	0	0.00	6.86	8.25	18.00	1.26	4.35	4.35	82.61
7 (19)	8/27/97	28	2	5.47	6.25	7.33	30.00	2.86	7.81	0.78	22.66
7 (19)	8/17/98	18	1	8.93	5.72	6.94	32.00	2.07	0.89	0.00	46.43
8 (19.5)	5/18/97	33	0	0.00	7.01	8.06	25.00	1.93	36.66	35.55	55.74
8 (19.5)	6/20/98	22	2	12.89	6.48	8.31	30.00	2.17	19.59	17.53	56.70
8 (19.5)	7/15/98	24	2	17.96	6.03	8.07	32.00	2.13	7.76	6.12	63.67
8 (19.5)	8/17/98	13	2	45.83	5.20	7.11	36.00	2.11	4.17	0.00	30.56
Cuyahoga River											
22.51	8/27/96	35	9	62.55	5.40	6.63	39.00	2.70	10.21	4.68	5.53
22.7	8/28/98	29	7	32.17	5.79	6.97	36.00	2.88	22.38	18.88	1.40
22.8	8/28/96	29	11	68.20	5.36	6.40	41.00	2.61	6.45	6.45	4.61
22.9	8/30/96	34	13	50.00	5.44	6.56	40.00	2.98	4.49	4.49	16.67
23	9/4/96	42	14	50.48	4.91	6.12	41.00	2.85	3.51	3.19	6.55
24	9/19/96	34	12	64.52	4.14	6.10	40.00	2.52	1.61	1.21	2.82
24.5	10/1/96	38	13	56.86	5.23	6.61	36.00	2.85	3.27	2.61	15.69
Big Creek											
25	8/13/96	25	5	50.58	5.46	7.47	36.00	2.39	22.97	16.28	11.34
25	8/6/97	17	2	10.56	6.61	8.64	21.00	2.29	33.80	33.80	33.10
25.1	8/13/96	27	4	35.82	5.94	7.59	35.00	2.71	24.64	21.12	20.19
25.2	8/13/96	31	6	49.64	5.97	7.26	37.00	2.59	16.42	15.33	18.25
25.2	8/6/97	30	5	20.82	6.26	8.10	29.00	2.72	44.90	33.06	15.10
25.3	8/13/96	24	4	56.57	5.77	7.11	36.00	2.51	15.94	11.16	11.55
25.3	8/6/97	36	5	27.49	5.96	7.78	30.00	3.00	31.75	17.54	20.85
26	8/15/96	34	6	60.73	5.28	7.41	37.00	2.55	12.83	9.16	6.54
26.5	9/11/97	14	4	54.55	5.44	7.62	34.00	2.10	6.06	6.06	3.03
27	8/15/96	16	2	17.97	5.95	8.43	30.00	2.12	55.47	26.56	21.09
28	8/27/96	16	0	0.00	6.56	8.82	25.00	1.77	73.85	43.58	10.09
28	10/16/96	14	0	0.00	6.00	8.87	23.00	2.29	13.16	0.00	15.79
29	8/27/96	25	5	68.11	5.30	7.26	39.00	2.27	9.45	1.97	7.48
29	9/27/96	14	4	47.17	5.24	7.87	31.00	2.18	1.89	0.00	7.55
30	8/15/96	25	3	40.19	5.40	7.60	35.00	2.33	16.77	8.86	24.05
30	9/27/96	12	1	8.06	5.85	8.04	22.00	2.03	9.68	4.84	33.87
Mill Creek											
31	9/23/98	22	3	40.35	5.41	7.58	33.00	2.23	20.18	12.28	26.32
32	9/23/98	18	3	34.00	5.32	7.94	34.00	2.35	19.00	4.00	18.00
33	9/23/98	19	3	33.73	5.68	7.70	32.00	2.41	18.07	8.43	16.87
33.5	9/28/98	19	3	38.05	5.28	7.80	32.00	2.33	8.85	0.00	31.86
34	9/28/98	22	1	13.39	6.54	8.40	30.00	2.56	44.09	40.16	27.56
35	9/28/98	26	3	64.00	5.12	7.52	37.00	2.34	9.60	7.20	8.80
West Creek											
36	10/2/98	27	3	17.70	6.36	7.36	34.00	2.64	52.21	47.35	10.18
37	10/2/98	37	7	38.74	5.74	6.85	36.00	2.91	26.09	25.69	14.23
38	10/2/98	23	4	45.51	5.36	6.75	39.00	2.41	10.67	0.00	13.48

Table E-3
Kick Net Benthic Macroinvertebrate Data
1996-1998

Sample Location	Date	Total Taxa	EPT Taxa	Percent EPT	HBI Score	NCBI Score	QCTV Score	Shannon Diversity Index	Percent Toxic Tolerant	Percent Selected Toxic	Percent Organic Tolerant
Tinkers Creek											
39	9/14/98	35	10	50.53	5.58	6.35	40.00	2.82	9.47	5.79	8.95
40	9/15/98	30	9	60.32	5.33	6.02	40.00	2.78	2.38	2.38	6.35
41	9/14/98	25	6	50.00	5.79	6.79	37.00	2.82	2.54	0.00	4.24
42	9/16/98	31	8	58.73	5.69	5.90	40.00	2.96	3.17	2.12	4.23
Chippewa Creek											
43	10/2/98	36	11	56.68	5.17	5.19	42.00	2.94	9.22	1.84	2.30
43.5	10/5/98	40	6	22.22	5.83	6.35	34.00	3.29	24.31	22.22	5.56
44	10/5/98	33	8	57.83	4.96	5.38	40.00	2.76	4.22	3.01	4.82
Burke Brook											
48.1	7/29/96	7	0	0.00	6.92	10.00	16.00	1.39	37.50	37.50	46.88
Rocky River											
49	8/6/96	27	8	65.80	4.78	5.84	40.00	2.35	1.00	0.00	2.40
50	8/7/96	39	10	45.00	5.64	6.11	38.00	3.02	10.30	8.40	4.80
51	8/7/96	34	10	61.00	4.84	4.73	42.00	2.75	16.60	15.30	0.90
52	8/7/96	32	9	56.30	5.18	6.30	41.00	2.46	1.70	1.40	11.10
52.5	8/6/96	24	9	81.20	5.25	4.94	42.00	2.29	1.30	0.00	5.60
Sagamore Creek											
57	10/2/98	46	15	45.54	4.68	5.30	37.00	3.42	9.82	7.14	6.70
Chagrin River											
58	5/23/97	40	13	20.21	5.40	7.20	36.87	2.91	9.33	9.33	17.62
58	9/19/97	51	13	48.78	4.86	5.50	40.39	3.07	11.36	10.49	8.57
59	5/23/97	39	15	28.24	5.41	6.37	37.67	2.95	11.76	11.18	10.00
59	9/19/97	55	12	44.33	5.29	5.67	40.13	3.21	12.81	10.51	10.67

Table E-4
Hester-Dendy Benthic Macroinvertebrate Data
1996-1998

Sample Location	Date	Total Taxa	EPT Taxa	Percent EPT Composition	ICI Score	ICI Narrative Rating	Shannon Diversity Index	Percent Toxic Tolerant	Percent Selected Toxic	Percent Organic Tolerant
Euclid Creek										
1.5	9/22/97	51	7	64.11	42	Very Good	2.5	6.82	3.7	8.33
2.5	10/2/97	39	5	34.33	40	Good	2.95	13.93	8.96	7.71
3.5	9/25/97	58	6	8.22	28	Fair	2.99	51.34	47.07	8.46
Big Creek										
25	9/26/96	38	3	3.52	20	Fair	2.4	44.54	38.03	23.42
25	8/6/97	18	1	0.78	8	Poor	2.13	66.15	66.15	0.78
25.2	10/11/96	25	2	2.69	12	Poor	1.34	16.38	16.14	72.86
25.2	8/6/97	56	6	20.08	24	Fair	2.98	36.94	20.38	21.59
25.3	8/6/97	55	5	12.66	24	Fair	2.83	46.02	28.06	17.92
26.5	9/11/97	32	4	9.75	26	Fair	2.71	43.68	17.33	6.50
27	9/30/96	9	0	0	0	Very Poor	1.78	38.00	14.00	24.00
28	10/16/96	14	0	0	4	Poor	1.55	56.21	0.65	18.95
29	9/27/96	15	4	22.02	28	Fair	1.71	59.63	5.50	9.17
30	9/27/96	8	0	0	4	Poor	1.42	91.58	46.32	0.00

APPENDIX F
CUYAHOGA RIVER MACROINVERTEBRATE SAMPLING
1996

Introduction

In 1996, Northeast Ohio Regional Sewer District investigators collected one semi-quantitative benthic macroinvertebrate sample from riffle/run areas at each routine Cuyahoga River sample location upstream of the Navigation Channel (#24.5, 24, 23, 22.9, 22.8, 22.7 and 22.51) using a D-frame kick net. Three to five replicate kick samples were collected at each location, depending on habitat conditions and stream size. Samples were then composited and sorted. After macroinvertebrates were identified to the lowest possible taxon, the number of individuals representing each taxon and the number of taxa in each sample were recorded. Multimetric analysis, which included the calculation of the Hilsenhoff Biotic Index (HBI) and the North Carolina Biotic Index (NCBI), was used to assess the health of the benthic macroinvertebrate community and water quality at each sample location. HBI and NCBI scores from 1996, as well as those obtained at the same sites in 1994 and 1991 are presented in Table F-1 with several other indices or metrics used to evaluate macroinvertebrate community health. The HBI and NCBI indicate benthic macroinvertebrate community health based on individual tolerance values related to organic pollution (sewage). Both indices are applied to samples collected from riffles and fast runs. The HBI uses (assigns tolerance values to) arthropods, while the NCBI uses several groups of organisms not included in the HBI. These groups are mollusks, turbellarians, some oligochaetes, leeches, hydracarinids and several species of beetles. Both indices generate scores from 0-10 with 10 indicating the highest degree of impact from organic pollution.

Results and Discussion

The 1996 HBI scores ranged from the *Very Good* range, indicating possible slight organic pollution, downstream of the State Route 82 bridge (Site #24), to the *Fair* range, indicating fairly significant organic pollution, under the Southwest Interceptor (Site #22.7). In general, HBI narrative ratings remained relatively constant from 1991 to 1996, with slight variations at Sites 24.5 and 24.

1996 HBI scores gradually increased in a downstream direction from Site #24 to Site #22.7, indicating slight declines in the condition of the benthic macroinvertebrate community and water quality. The gradual increases in HBI scores observed at the Old Riverview Road bridge (Site #23) and the railroad bridge southeast of East 71st Street and Canal Road (Site #22.9) may reflect the influence of tributary streams on the Cuyahoga River. Each of these sites is approximately 0.1 to 0.2 miles downstream from the confluence of a tributary stream. The greatest spatial increase in HBI scores observed in 1996 occurred between Site #24 and Site #23. Site #23 is located approximately 0.2 miles downstream of Tinkers Creek, one of the largest tributaries to the Cuyahoga River. Several community metrics, including Ephemeropteran,

Plecopteran, and Tricopteran (EPT)/Chironomidae, (Cricotopus+Chironomus)/ Chironomidae, Percent Other Dipterans and Non-Insects, and Percent Organic Tolerant Organisms indicate that organic pollution may be a source of impact at Site #23.

HBI scores improved slightly from 1994 to 1996 at all four sites where scores were obtained in both years, indicating an improvement in water quality during this time period. The 1996 HBI scores, however, remained slightly higher (worse) than the 1991 scores at Sites 22.9, 22.8, and 22.51. (Two samples were collected at Sites 22.9 and 22.51 in 1991 and scores were averaged for the purposes of this discussion.) The slight increase may be attributable to organic pollution, as indicated by the HBI, percent organic tolerant organisms metric and/or high flow conditions prior to the sample date.

The 1996 NCBI scores exhibited a trend similar to that shown by the 1996 HBI scores. NCBI scores obtained during 1996 ranged from 6.1 (*Good-Fair*) at Site #24, to 6.97 (*Fair*) at Site #22.7. Scores obtained at Site #22.7 indicate a continuous improvement in water quality since 1991. Conversely, scores obtained at Sites #22.9 and #22.8 exhibit a gradual increase in scores (decrease in water quality) since 1991.

HBI and NCBI scores were higher at Site #24.5 than at the next two sites downstream, #24 and #23, from 1991 through 1996. Site #24.5 consistently exhibited high (relative to the other sites) proportions of organisms tolerant to organic pollution. These results may be related, in part, to habitat limitations at the site or local land use practices. Because this site lacked defined stable riffles, sampling was limited to snags, boulders and margin areas where flow velocity was evident. The higher HBI and NCBI scores may be attributable in part to the agricultural land use with cultivation to the river's edge.

Downstream of Mill Creek, at Site #22.9, the proportions of Toxic Tolerant, Selected Toxic Tolerant, and Organic Tolerant Organisms, indicate that organic pollution may be a source of impact.

HBI and NCBI scores have consistently been higher (worse) at Site #22.7, where the flow is deeper and slower, than at most of the other Cuyahoga River sites monitored by NEORSD. This site had the greatest abundance of chironomidae larvae and the caddisfly larva *Hydroptila* sp. These organisms are generally found in greater abundance at sites with greater depth and reduced flow velocity (Growns and Davis, 1994). In 1996, Site #22.7 exhibited lower proportions of EPT (Ephemeroptera, Plecoptera, and Trichoptera) organisms and organic tolerant taxa, and higher proportions of tolerant, toxic tolerant, and selected toxic tolerant taxa than the other Cuyahoga River sites monitored by NEORSD. The absence of defined, stable riffles at this site limited sampling to snags, boulders, and margin areas, where flow velocity was evident. The higher HBI and NCBI scores obtained at this location may be attributable, at least in part, to the limited sampling effort and the landfills present on both banks of the river in this area.

Conclusions

Some of the 1996 samples were collected following an extended period of high flow conditions. At Sites 24.5 and 22.7, habitat conditions limited the areas that could be sampled. These factors may have had some impact on the sampling results. Recovery of the riparian zone on both banks of the river, between the Southerly Wastewater Treatment Plant and Site #22.7, should aid in the recovery of the macroinvertebrate community in this segment of the river. Continued monitoring may be warranted to identify the source(s) and type(s) of stress impacting Cuyahoga River macroinvertebrate communities. Future sampling strategies should include sample stations that bracket the tributaries of the Cuyahoga River.

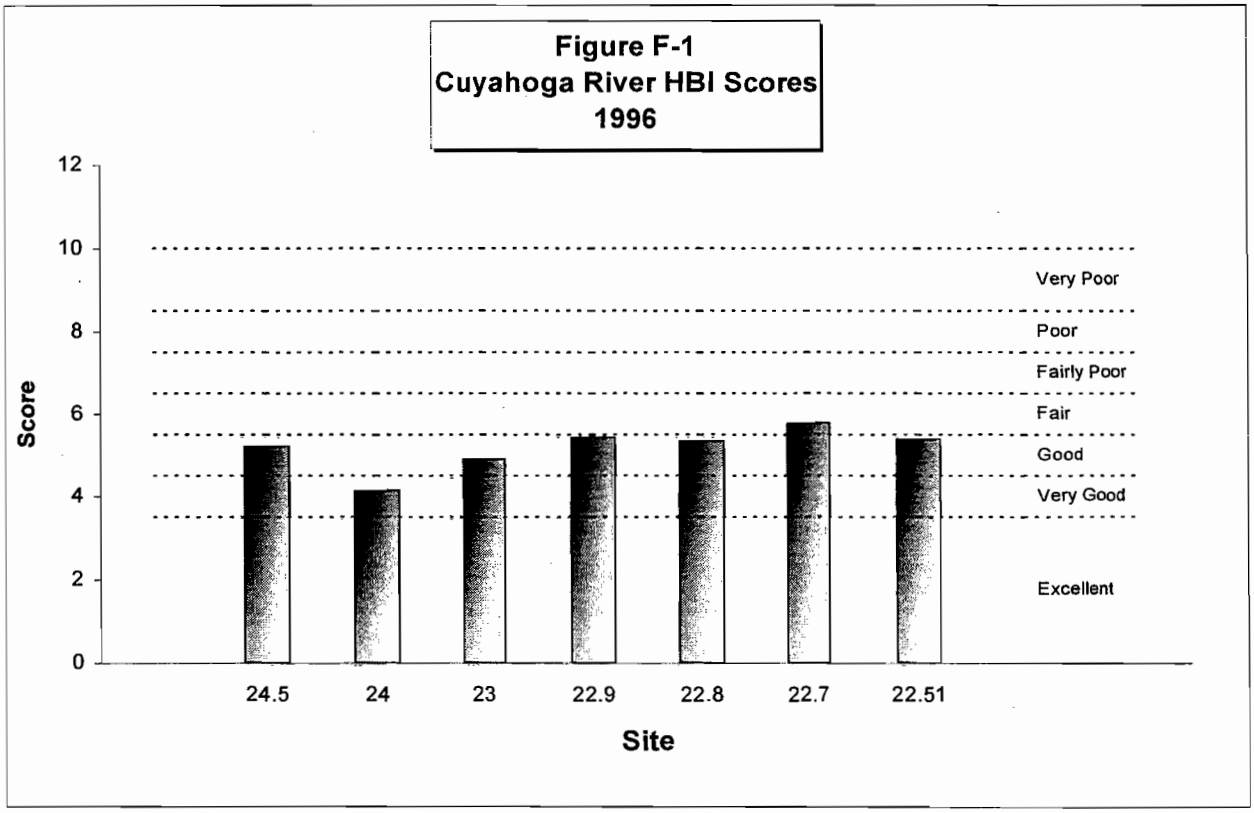
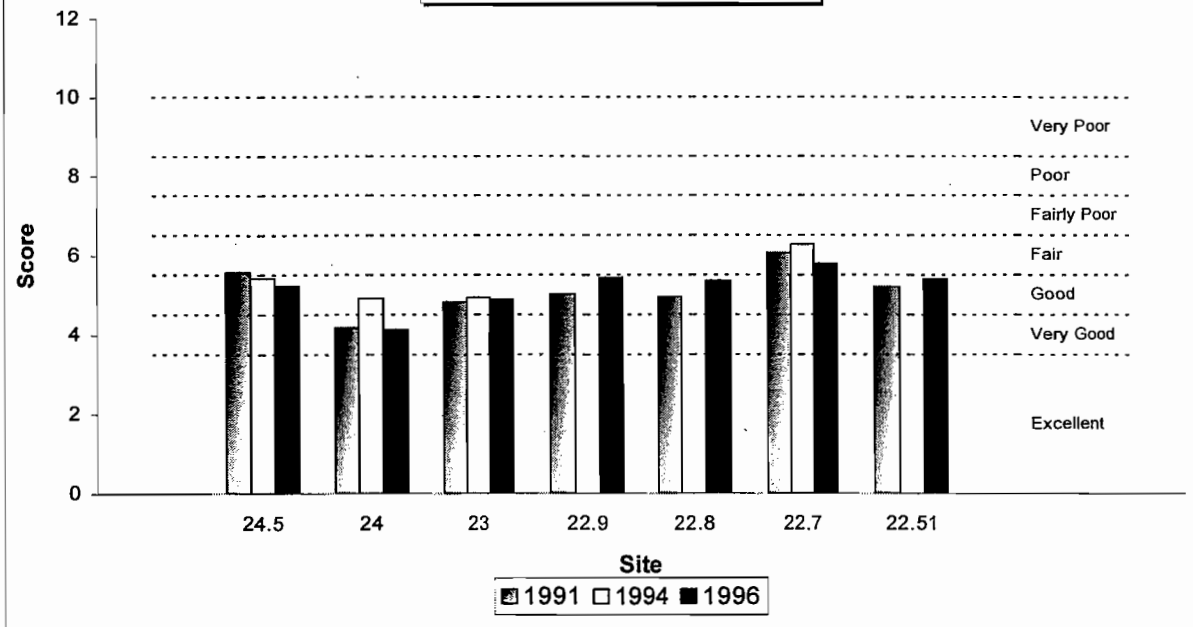


Figure F-2
Cuyahoga River *HBI Scores
1991-1996



*1991 scores for Sites 23, 22.9, and 22.51 are averages of multiple samples

Figure F-3
Cuyahoga River NCBI Scores
1996

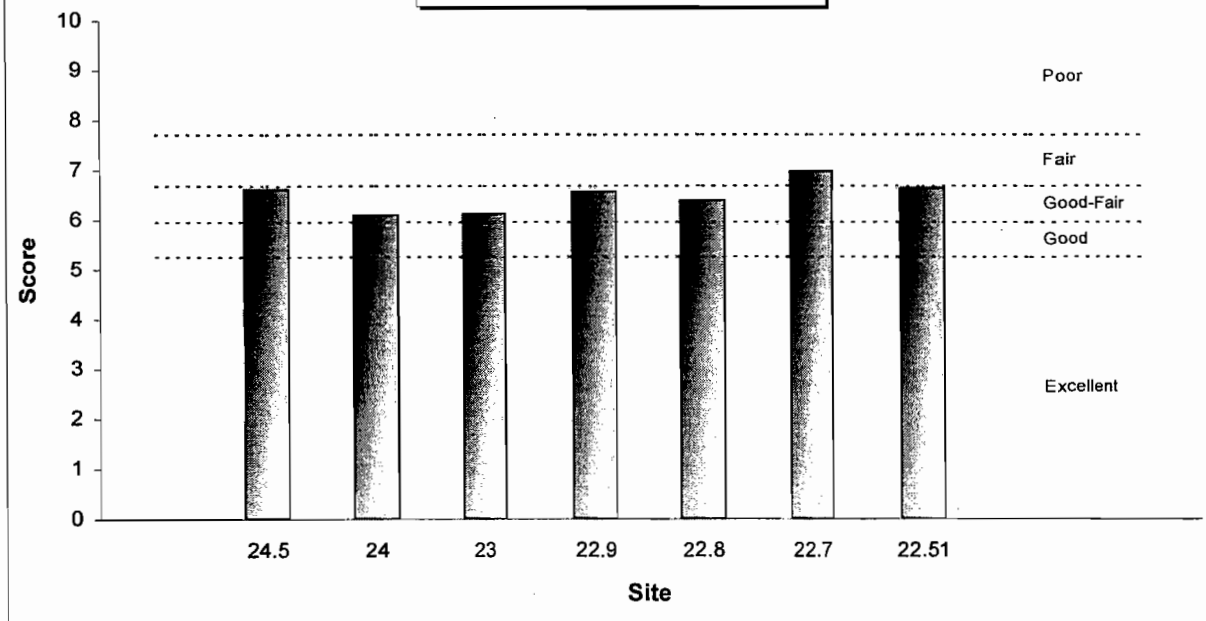
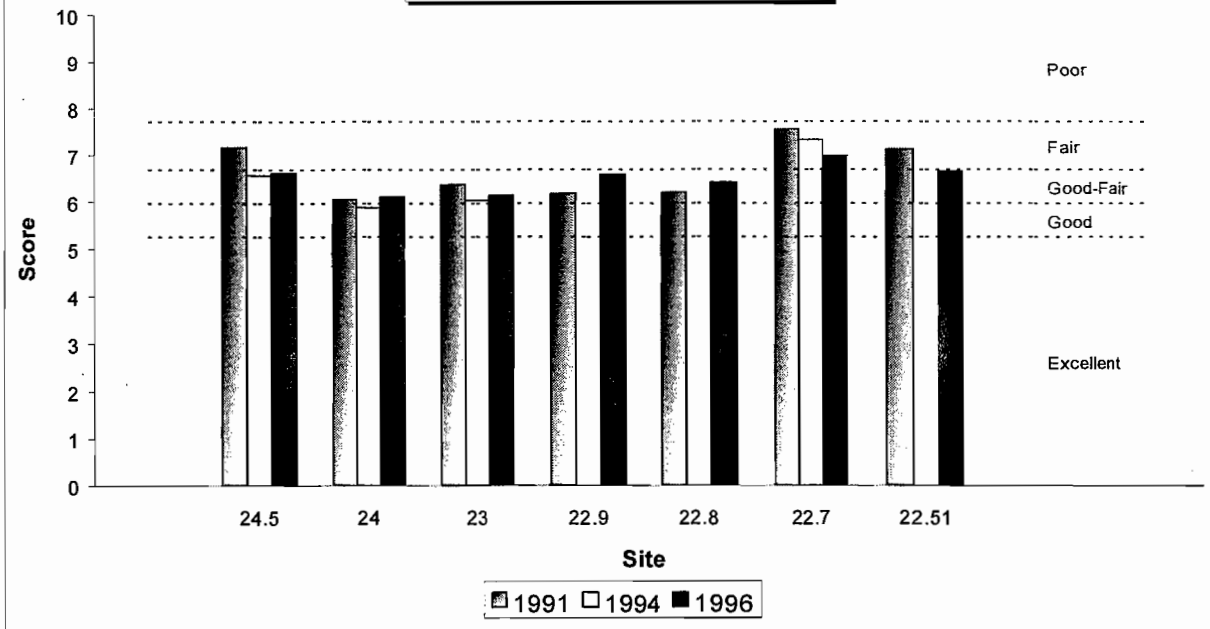


Figure F-4
Cuyahoga River *NCBI Scores
1991-1996



*1991 scores for Sites 23, 22.9, and 22.51 are averages of multiple samples

Figure F-5
Cuyahoga River Macroinvertebrate Tolerance Scores
1996

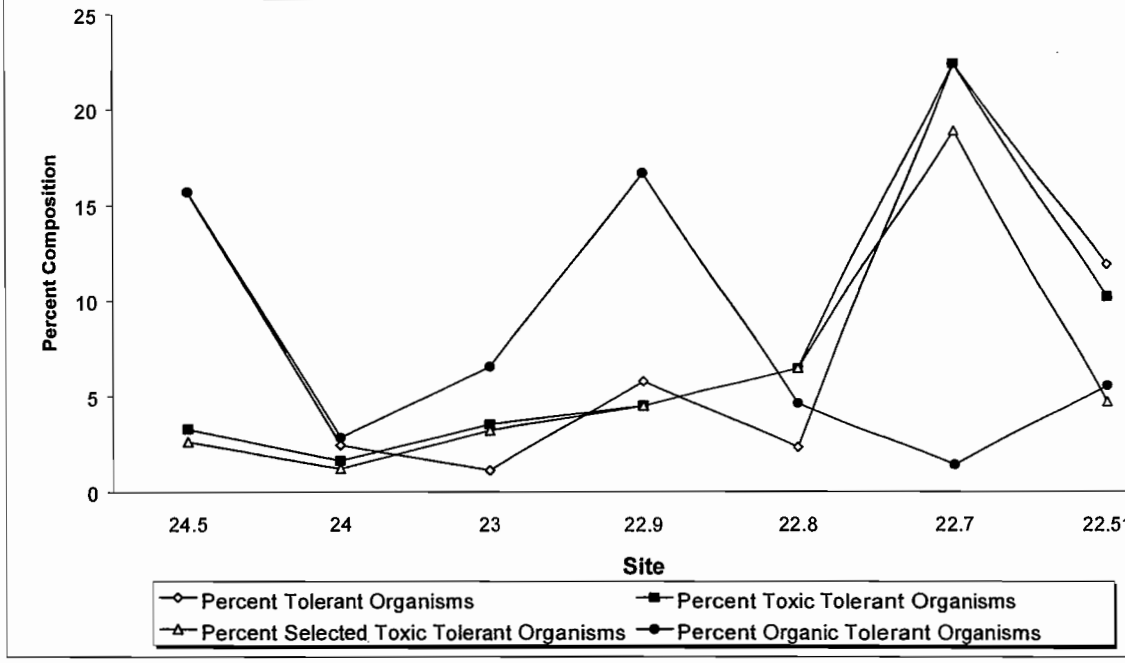


Table F-1
Cuyahoga River Benthic Macroinvertebrate Kick Net Data
1991-1996

Site #	Collection Date	Sample Type	Total Organisms	HBI Score	HBI Narrative Rating	NCBI Score	NCBI Narrative Rating	QVTV Score (weighted avg.)	QVTV Score (avg)	Taxa Richness	Shannon Diversity Index	EPT Taxa Richness	Percent EPT Composition	EPT / Chironomidae
24.5	10/01/96	KS	153	5.23	Good	6.61	Good-Fair	36	36	38	2.9	13	56.9	5.4
24.5	10/04/94	KS	482	5.42	Good	6.56	Good-Fair	38	36	49	2.9	11	49.8	1.5
24.5	07/01/91	KS	549	5.57	Fair	7.16	Fair	39	36	34	2.3	12	63.9	5.7
24	09/19/96	KS	248	4.14	Very Good	6.10	Good-Fair	40	36	34	2.5	12	64.5	5.7
24	08/30/94	KS	442	4.92	Good	5.87	Good	40	38	37	2.8	10	49.8	1.6
24	07/01/91	KS	879	4.18	Very Good	6.04	Good-Fair	41	38	45	2.2	16	75.8	4.6
24	07/01/91	Qual. KS	365					41	38	28	2.0	9	75.9	3.9
24	05/13/91	Qual. KS	50					37	39	13	2.2	3	12.0	0.2
23	09/04/96	KS	626	4.91	Good	6.12	Good-Fair	41	37	42	2.9	14	50.5	1.6
23	08/30/94	KS	301	4.94	Good	6.02	Good-Fair	40	37	37	2.7	10	52.5	2.0
23	08/14/91	KS	349	5.06	Good	6.21	Good-Fair	42	38	37	2.5	14	74.8	4.3
23	07/01/91	KS (A)	681	4.98	Good	6.49	Good-Fair	41	37	37	2.3	14	76.8	3.8
23	07/01/91	KS (B)	1672	4.45	Very Good	6.38	Good-Fair	42	36	42	2.0	12	85.4	10.1
22.9	08/30/96	KS	156	5.44	Good	6.56	Good-Fair	40	37	34	3.0	13	50.0	2.3
22.9	08/15/91	KS	349	5.02	Good	6.21	Good-Fair	42	38	37	2.5	14	74.8	4.3
22.9	07/03/91	KS	866	5.04	Good	6.13	Good-Fair	44	37	32	2.0	12	87.1	12.2
22.8	08/28/96	KS	217	5.36	Good	6.40	Good-Fair	41	39	29	2.6	11	68.2	5.3
22.8	08/14/91	KS	217	4.96	Good	6.19	Good-Fair	41	37	24	2.4	10	76.0	4.5
22.7	08/26/96	KS	143	5.79	Fair	6.97	Fair	36	37	29	2.9	7	32.2	0.8
22.7	10/03/94	KS	83	6.27	Fair	7.32	Fair	35	33	26	2.8	6	45.8	1.2
22.7	08/13/91	KS	87	6.06	Fair	7.55	Fair	33	33	27	2.9	5	20.7	0.6
22.51	08/27/96	KS	235	5.40	Good	6.63	Good-Fair	39	34	35	2.7	9	62.6	4.5
22.51	08/14/91	KS	118	5.40	Good	7.46	Fair	36	33	25	2.5	8	44.1	1.0
22.51	07/03/91	KS	335	5.01	Good	6.77	Fair	41	35	40	2.3	11	78.8	5.9

Table F-1
Cuyahoga River Benthic Macroinvertebrate Kick Net Data
1991-1996
(Continued)

Site #	Collection Date	(Cricotopus+ Chironomus)/ Chironomidae	Total Mayfly Taxa	Total Caddisfly Taxa	Total Dipteran Taxa	Percent Mayfly Composition	Percent Caddisfly Composition	Percent Tribe Tanytarsini Composition	Percent Other Dipterans and Non-Insects	Percent Tolerant Organisms	Percent Toxic Tolerant Organisms	Percent Selected Toxic Tolerant Organisms	Percent Organic Tolerant Organisms
24.5	10/01/96	0.25	8	5	13	12.4	44.4	2.0	34.6	15.7	3.3	2.6	15.7
24.5	10/04/94	0.28	5	6	28	11.6	38.2	8.5	38.6	11.0	11.4	10.2	11.8
24.5	07/01/91	0.15	8	4	16	12.6	51.4	0.2	35.2	2.7	1.8	1.8	20.6
24	09/19/96	0.04	5	7	13	10.5	54.0	1.6	18.6	2.4	1.6	1.2	2.8
24	08/30/94	0.16	4	6	16	14.0	35.8	5.0	36.7	2.3	5.2	5.2	5.2
24	07/01/91	0.01	10	5	19	33.0	42.7	2.4	18.5	0.3	0.3	0.3	1.8
24	07/01/91	0.00	4	5	16	10.1	65.8	3.3	20.0	0.8	0.8	0.8	1.4
24	05/13/91	0.56	1	2	10	2.0	10.0	0.0	88.0	10.0	30.0	30.0	28.0
23	09/04/96	0.10	6	8	19	11.3	39.1	9.9	33.2	1.1	3.5	3.2	6.6
23	08/30/94	0.17	6	4	14	14.0	38.5	3.3	34.2	2.3	4.7	4.7	10.0
23	08/14/91	0.12	8	6	12	27.2	47.6	7.2	14.0	2.6	3.7	2.3	4.3
23	07/01/91	0.05	8	5	17	25.0	51.7	2.2	20.1	0.4	1.2	1.2	3.1
23	07/01/91	0.05	6	6	24	22.1	63.3	0.7	11.0	0.3	1.3	0.5	2.0
22.9	08/30/96	0.15	6	7	11	20.5	29.5	8.3	36.5	5.8	4.5	4.5	16.7
22.9	08/15/91	0.12	8	6	12	27.2	47.6	7.2	14.0	2.6	3.7	2.3	4.3
22.9	07/03/91	0.10	8	4	12	62.4	24.7	3.2	8.7	0.4	0.7	0.7	4.3
22.8	08/28/96	0.50	6	5	11	31.8	36.4	2.8	20.3	2.3	6.5	6.5	4.6
22.8	08/14/91	0.03	7	3	10	40.1	35.9	1.8	21.2	0.0	0.5	0.5	1.4
22.7	08/26/96	0.16	4	3	12	15.4	16.8	12.6	37.1	22.4	22.4	18.9	1.4
22.7	10/03/94	0.56	4	2	15	31.3	14.5	4.8	45.8	24.1	25.3	24.1	8.4
22.7	08/13/91	0.00	4	1	9	18.4	2.3	1.2	54.0	4.6	1.2	0.0	18.4
22.51	08/27/96	0.24	6	3	12	47.7	14.9	5.5	28.9	11.9	10.2	4.7	5.5
22.51	08/14/91	0.10	6	2	11	35.6	8.5	0.0	50.0	6.8	5.9	5.9	7.6
22.51	07/03/91	0.38	7	4	20	69.0	9.9	0.9	18.8	4.5	7.2	6.6	3.6

APPENDIX G
ROCKY RIVER MACROINVERTEBRATE SAMPLING
1996

During 1996, Northeast Ohio Regional Sewer District (NEORSD) investigators collected macroinvertebrate kick net samples at five sites on the Rocky River. Please refer to the Rocky River section in the NEORSD's Greater Cleveland Area Environmental Water Quality Assessment report for descriptions of the sampling sites.

HBI scores calculated for Rocky River sites for 1996 ranged from 4.84 (*Good*) at Site 51 to 5.64 (*Fair*) at Site 50. The 1996 HBI scores indicate that organic pollution existed at fairly significant levels at Site #50 and that some organic pollution existed at the remaining sites. In general, HBI scores improved at all locations for the period between 1992 and 1996. The greatest improvement occurred downstream of the now decommissioned Berea WWTP, at Site #49, where HBI scores improved from 6.63 (*Fairly Poor*) to 4.78 (*Good*). Improvement also occurred at Sites 52 and 52.5. The improvements in the HBI scores may be attributable to the construction of the Southwest Interceptor (SWI), the decommissioning of several wastewater treatment plants, and the permanent diversion of their flows to the Southerly WWTP via the SWI. Prior to decommissioning, these small WWTPs discharged to the Rocky River.

The 1996 NCBI Scores ranged from 4.73 (*Excellent*) at Site #51 to 6.31 (*Good – Fair*) at Site #52. The NCBI scores at all Rocky River sites exhibited an improvement from 1992 to 1996. The 1996 the Qualitative Community Tolerance Value (QCTV) scores ranged from 38 at Site #50 to 42 at Sites 51 and 52.5. The QCTV, an assessment tool which is under further development by the Ohio EPA, does not require the use of artificial substrate samplers.

Site #51
Between 1992 and 1996 the benthic macroinvertebrate community changed from one dominated by other dipterans and non-insects to a more balanced community with an increase in Ephemeropteran, Plecopteran, and Tricopteran (EPT) composition, and a greater abundance of mayflies and caddisflies. HBI scores improved from 5.6 (*Fair*) in 1992 to 4.84 (*Good*) in 1996, indicating a possible improvement in water quality. The score, however, indicates that some organic pollution was present at Site 51 in 1996. NCBI scores also indicated a positive change in water quality, with scores improving from 5.99 (*Good-Fair*) in 1992 to 4.73 (*Excellent*) in 1996.

The abundance of organic tolerant organisms at Site #51 decreased considerably from 9.02% in 1992 to 0.92% in 1996. The proportions of toxic tolerant and selected toxic tolerant organisms remained at similar levels from 1992 to 1996. Although the levels were not extremely high (16-18%), these data indicate that the benthic macroinvertebrate community at Site 51 may be influenced by sources other than organic pollution. Possible sources include municipal WWTP discharges (including CSO, SSO and treated effluent) and non-point sources upstream of Site #51. Mayfly

composition remained relatively unchanged from 21.7% in 1992 and 23.6% in 1996. Caddisfly composition, however, increased from 13.1% in 1992 to 37.4% in 1996. While the proportions of caddisflies increased from 1992 to 1996, the total number of caddisfly taxa remained the same, suggesting only a slight change in water and/or habitat quality. The proportions of Tanytarsini midges fluctuated from 1.64% in 1992 to 6.14% in 1993 to 0.31% in 1996. Further sampling may be required to determine the cause of this fluctuation.

Site #50

The benthic macroinvertebrate community structure at Site #50 changed somewhat between 1992 and 1996. In 1992, six of the 10 dominant taxa were pollution tolerant midge larvae, while in 1996, only two of the 10 dominant taxa were midges. Three caddisfly taxa replaced midge taxa in 1996, increasing the number of caddisfly taxa in the 10 dominant taxa from one in 1992 to four in 1996. However, other data indicate that Site #50 remained impacted by fairly significant organic pollution in 1996. The source of this impact may be dry weather discharges of sewage to the Rocky River upstream of Site #50 (see Problems and Remediation section).

In 1996, Site #50 had the highest HBI score of all routine sites sampled on Rocky River (5.64 [*Fair*]), indicating the presence of fairly significant organic pollution. HBI scores fluctuated from 6.00 (*Fair*) in 1992 to 5.25 (*Good*) in 1993 to 5.64 (*Fair*) in 1996. NCBI scores improved slightly, from 6.85 (*Fair*) in 1992 to 6.11 (*Good-Fair*) in 1996. The 1996 NCBI score indicates that fairly significant organic pollution existed at Site #50.

The proportion of toxic tolerant organisms in the benthic macroinvertebrate community at Site #50 decreased from 37.7% in 1992 to 10.3% in 1996. The proportion of selected toxic tolerant organisms also decreased from 32.2% in 1992 to 8.4% in 1996, indicating a decrease in the amount of toxic stressors present. The proportion of organic tolerant organisms increased slightly, from 2.7% in 1992 to 4.8% in 1996. During the same time period, the proportion EPT taxa increased from 28.8% to 45.0%. The largest increase in EPT organisms was in caddisfly composition, which increased from 18.0% in 1992 to 31.2% in 1996. Mayfly composition showed only a slight increase from 10.2% in 1992 to 13.8% in 1996. Although the percent EPT composition increased, the number of EPT taxa remained relatively unchanged from 1992 to 1996.

Site #49

A substantial change occurred in the benthic macroinvertebrate community structure at Site #49 between 1992 and 1996. During this time period, the community changed from one composed mostly of pollution tolerant taxa, including chironomidae larvae and oligochaetes, to one in which seven of the 10 dominant organisms were pollution sensitive mayfly and caddisfly taxa. This change can be attributed to the completion of NEORSD's Southwest Interceptor in 1993 and the decommissioning of the Berea WWTP. The benthic macroinvertebrate data indicate that the major stressor at this location prior to decommissioning was toxic stress associated with municipal discharges, CSOs and SSOs.

Between 1992 and 1996, a notable improvement in HBI scores occurred at Site #49, with scores improving from 6.63 (*Fairly Poor*) to 4.78 (*Good*). NCBI scores also reflected an improvement in water quality and benthic macroinvertebrate community health during this time period, with scores improving from 8.15 (*Poor*) to 5.84 (*Good*). QCTV scores also improved from 28 in 1992 to 40 in 1996.

The trend of improvement in the benthic macroinvertebrate community is also demonstrated with the EPT Taxa Richness metric. The total number of pollution sensitive EPT taxa increased from three in 1992 to nine in 1995 and eight in 1996. The percent EPT Composition increased from 4.6% in 1992 to 65.8% in 1996. The greatest increase in this group was for the order Trichoptera, which increased from 3.8% to 49.2%. The Ephemeropterans also increased from 0.8% to 16.6%. An increase in the ratio of pollution sensitive EPT organisms to pollution tolerant chironomidae, from 0.1 in 1992 to 3.1 in 1996, also indicates improved water quality. During this same time period, a dramatic change in the abundance of pollution tolerant chironomidae larvae was measured at Site #49. In 1992, 66% of the chironomidae larvae were pollution tolerant while in 1996, none of the chironomidae larvae collected were pollution tolerant. Following the decommissioning of the Berea WWTP, the proportion of toxic tolerant organisms, which are associated with municipal discharges and sewer overflows, declined considerably from 76.9% in 1992 to 1.0% in 1996.

Site #52

The benthic macroinvertebrate data for the period of 1992 to 1996 indicate a trend of continued improvement in the water quality for the West Branch of the Rocky River. In 1992, dipterans and non-insects dominated this location. In 1996, however, the community became more balanced, with a decline in dipterans and non-insects and an increase in EPT composition. This improvement may also be attributable to the completion of the Southwest interceptor and decommissioning of several small WWTPs, which prior to decommissioning, discharged directly to the West Branch.

The HBI scores for Site #52 improved from 6.08 (*Fair*) in 1992 to 5.18 (*Good*) in 1996. The 1996 HBI score indicates that some organic pollution was present at the time samples were collected. NCBI scores also improved from 7.69 (*Fair*) in 1992 to 6.30 (*Good -Fair*) in 1996. QCTV scores also indicate an improvement in the health of the benthic macroinvertebrate community in the west branch of the Rocky River. The score increased from 33 in 1992 to 41 in 1996, indicating good water quality.

The proportion of pollution sensitive EPT organisms increased from 14.3% in 1992 to 56.3% in 1996. The greatest increase in abundance was for the order Trichoptera, from 5.7% to 44.3%. However, the total number of EPT taxa remained relatively unchanged. The proportions of the various types of tolerant organisms decreased noticeably from 1992 to 1996. During this time period, toxic tolerant organisms decreased from 28.6% to 1.8%, selected toxic tolerant organisms decreased from 28.1% to 1.4%, and organic tolerant organisms decreased from 22.4% to 11.1%. In 1996, investigators collected more organic tolerant organisms than toxic tolerant organisms, indicating that organic pollution was present. Further sampling and investigation may be necessary to determine the source of this environmental stressor.

Site #52.5

The benthic macroinvertebrate community at Site #52.5 also improved from 1992 to 1996. In 1992, the predominant groups of organisms were dipterans and non-insects (62.3%), which include pollution tolerant taxa. In 1996, the predominant group was the pollution sensitive group EPT (81.2%). The improvement in the various metrics and indices suggests an improvement in the water quality of Rocky River, which may be attributable to the completion of the Southwest Interceptor.

HBI scores improved from 6.21 (*Fair*) in 1992 to 5.25 (*Good*) in 1996. The 1996 score indicates that some organic pollution existed at this location. The NCBI scores showed considerable improvement from 7.49 (*Fair*) in 1992 to 4.94 (*Excellent*) in 1996.

The proportion EPT organisms increased from 34.7% in 1992 to 81.2% in 1996. Much of the increase is attributable to an increase in the percent composition of Trichopterans, from 21.7% in 1992 to 67.0% in 1996. In addition to the increase in Trichopteran composition, there was an increase in the number of Ephemeropteran (2 to 4) and Trichopteran (4 to 5) taxa during the same time period. The abundance of all types of tolerant organisms greatly decreased from 1992 to 1996. The greatest decrease was found in the abundance of selected toxic tolerant organisms (31.3% to 0.0%) and toxic tolerant organisms (33.0% to 1.3%). The abundance of organic tolerant organisms in 1996 was about half of what was present in 1992 and, when compared to the other tolerant groups, remained the most abundant.

Table G-1
Rocky River Benthic Macroinvertebrate Kick Net Data
1992-1996

Sample Site	Collection Date	Total Organisms	QCTV Score (weighted avg)	QCTV Score (avg)	HBI Score	HBI Narrative Rating	NCBI Score	NCBI Narrative Rating	Taxa Richness	Shannon Diversity Index	EPT Taxa Richness	Percent EPT Composition	EPT/ Chironomidae	(Cricotopus+ Chironomus)/ Chironomidae	Total Mayfly Taxa
49	08/06/96	295	40	39	4.78	Good	5.84	Good	27	2.35	8	65.8	3.1	0.0	3
49	08/04/95	568	41	38	4.87	Good	6.08	Good-Fair	33	2.54	9	75.9	7.0	0.2	4
49	09/24/93	155	27	33	6.41	Fair	8.36	Poor	24	1.95	4	6.5	0.1	0.7	2
49	07/29/93	338	27	33	6.61	Fairly Poor	8.27	Poor	25	1.77	6	10.4	0.1	0.8	4
49	06/10/92	131	28	32	6.63	Fairly Poor	8.15	Poor	22	2.37	3	4.6	0.1	0.7	1
50	08/07/96	311	38	37	5.64	Fair	6.11	Good-Fair	39	3.02	10	45.0	1.5	0.2	4
50	08/24/93	423	42	38	5.25	Good	5.90	Good	42	2.50	12	78.3	7.2	0.1	7
50	06/05/92	901	36	35	6.00	Fair	6.85	Fair	50	2.91	10	28.8	0.5	0.5	4
51	08/07/96	326	42	38	4.84	Good	4.73	Excellent	34	2.75	10	61.0	2.2	0.6	5
51	08/20/93	407	41	39	5.62	Fair	5.14	Excellent	38	2.84	10	50.1	1.3	0.4	5
51	06/03/92	244	38	35	5.60	Fair	5.99	Good-Fair	44	3.16	14	40.2	0.9	0.5	8
52	08/07/96	641	41	38	5.18	Good	6.30	Good-Fair	32	2.46	9	56.3	2.0	0.0	4
52	08/25/93	512	39	37	5.90	Fair	6.72	Fair	37	2.75	9	34.0	0.8	0.0	4
52	06/16/92	210	33	33	6.08	Fair	7.69	Fair	40	3.05	8	14.3	0.3	0.5	5
52.5	08/06/96	303	42	37	5.25	Good	4.94	Excellent	24	2.29	9	81.2	7.7	0.0	4
52.5	09/19/94	241	42	37	5.07	Good	4.82	Excellent	23	2.22	10	83.8	14.4	0.1	5
52.5	08/24/93	714	44	38	5.70	Fair	4.70	Excellent	29	2.09	12	82.9	10.4	0.0	7
52.5	06/04/92	355	34	33	6.21	Fair	7.49	Fair	37	2.81	6	34.7	0.8	0.7	2

Table G-1
Rocky River Benthic Macroinvertebrate Kick Net Data
1992-1996
(Continued)

Sample Site	Collection Date	Total Caddisfly Taxa	Total Dipteran Taxa	Percent Mayfly Composition	Percent Caddisfly Composition	Percent Tribe Tanytarsini Composition	Percent Other Dipterans and Non-Insects	Percent Tolerant Organisms	Percent Toxic Tolerant Organisms	Percent Selected Toxic Tolerant Organisms	Percent Organic Tolerant Organisms
49	08/06/96	5	12	16.6	49.2	1.0	25.8	0.7	1.0	0.0	2.4
49	08/04/95	5	16	26.4	49.5	0.5	19.4	2.1	3.9	1.9	0.9
49	09/24/93	2	12	1.3	5.2	0.0	91.0	62.6	74.2	59.4	5.8
49	07/29/93	2	11	5.6	4.7	0.0	88.5	67.2	76.9	69.2	2.4
49	06/10/92	2	13	0.8	3.8	0.0	90.8	55.0	60.3	58.8	9.9
50	08/07/96	6	18	13.8	31.2	4.8	35.1	6.4	10.3	8.4	4.8
50	08/24/93	5	19	24.1	54.1	4.3	14.7	2.1	3.1	1.2	1.4
50	06/05/92	5	30	10.2	18.0	6.0	57.9	17.5	37.7	32.2	2.7
51	08/07/96	5	16	23.6	37.4	0.3	33.4	1.5	16.6	15.3	0.9
51	08/20/93	5	21	17.7	32.4	6.1	40.8	7.1	15.2	14.3	6.1
51	06/03/92	5	21	21.7	13.1	1.6	52.1	8.6	18.9	18.9	9.0
52	08/07/96	5	16	12.0	44.3	3.0	39.3	0.5	1.7	1.4	11.1
52	08/25/93	5	21	5.3	28.7	13.1	52.2	4.5	4.7	2.0	16.0
52	06/16/92	3	19	8.6	5.7	1.0	76.7	21.4	28.6	28.1	22.4
52.5	08/06/96	5	9	14.2	67.0	0.3	18.5	0.7	1.3	0.0	5.6
52.5	09/19/94	5	7	17.0	66.8	0.8	14.1	0.4	0.8	0.4	4.6
52.5	08/24/93	5	10	28.9	54.1	4.2	11.8	1.1	1.1	0.6	6.0
52.5	06/04/92	4	19	13.0	21.7	0.0	62.3	25.9	33.0	31.3	11.6

Figure G-1
Rocky River Hilsenhoff Biotic Index Scores
1992-1996

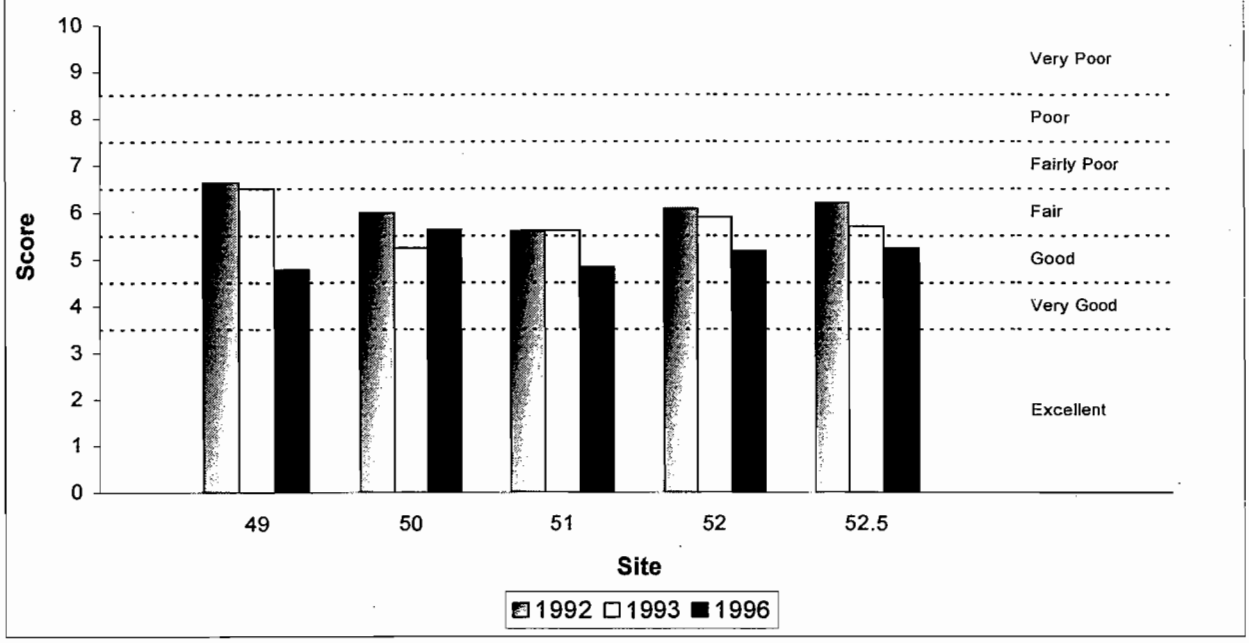
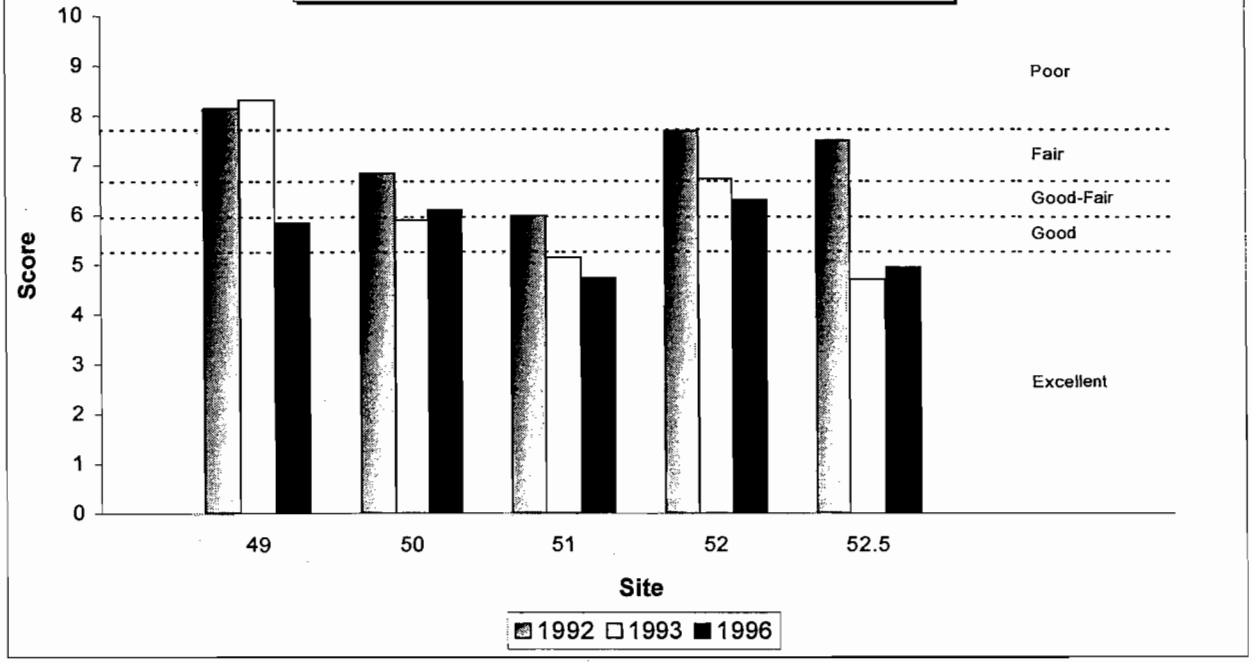


Figure G-2
Rocky River North Carolina Biotic Index Scores
1992-1996



APPENDIX H
BIG CREEK MACROINVERTEBRATE SAMPLING
1995 - 1997

Introduction

In January 1995, the Northeast Ohio Regional Sewer District notified Ohio EPA that it would be necessary to bypass flow from the Ridge Road Trunk Sewer to Big Creek on February 7, 1995. The bypass was needed to conduct an inspection of the Big Creek Interceptor (BCI) in conjunction with the District's BCI Rehabilitation project. Following the notification, Ohio EPA requested that NEORSD conduct macroinvertebrate sampling on Big Creek in 1995, 1996, and 1997 to measure any impacts bypass events may have had on the health of the stream. Flow was diverted to Big Creek via the outfall from Combined Sewer Overflow (CSO) #054, which is located immediately east of Ridge Road on the south bank of the creek. Flow was also diverted to the creek on February 23, 1995.

NEORSD selected four locations to monitor the response of Big Creek's macroinvertebrate community to the diversions. A brief description of each site follows.

Site #25.3 is located approximately 500 feet upstream of the CSO #054 outfall. This section of the creek is channelized, with steep concrete banks and a substrate that is predominantly a concrete bed, broken concrete slabs, and rubble.

Site #25.2 is located approximately 500 feet downstream of the CSO #054 outfall. Like Site #25.3, this site is channelized, with steep concrete banks and a substrate that is predominantly a concrete bed, with broken concrete slabs, and rubble.

Site #25.1 is located approximately 4,500 feet downstream of the CSO #054 outfall, near Rose Field in the Cleveland Metroparks Brookside Reservation. This site was chosen because substrate features were more natural than at other locations downstream of the diversion. The substrate at this location consists of cobble, gravel, concrete rubble, and sand. Concrete, sandstone, and gabion walls for erosion control are located on both banks. Benthic macroinvertebrate samples were previously collected at this location in 1989 and 1991.

Site #25, which is a routine NEORSD sample site, is located downstream of Jennings Road, approximately 900 feet upstream from Big Creek's confluence with the Cuyahoga River.

During 1995, 1996, and 1997, Hester-Dendy artificial substrate samplers were installed according to OEPA specifications and methods at Sites 25.3, 25.2 and 25. The data produced with the Hester-Dendy samplers were used to calculate the Invertebrate Community Index (ICI). The sites sampled during this study have been assigned the Warmwater Habitat aquatic life use designation, which requires an ICI score of at least 34 (Good) to meet Ohio EPA's biological criterion for macroinvertebrates. In 1996, Hester-Dendy artificial substrate samplers were also installed upstream of Site #25.3, at Sites #26, 26.5, 27, 28, 29 and 30. Site #26.5 is located on the East Branch of Big

Creek, approximately 50 feet upstream of the Biddulph Road Bridge, east of Tiedeman Road. Descriptions of the remaining sites can be found in the Big Creek section of the 1996-1998 Greater Cleveland Area Environmental Water Quality Assessment. Several Hester-Dendy samplers were lost because of high flows and/or vandalism in 1995 and 1996. When possible, samplers were reinstalled to replace those which were lost. A list of sampler installation and retrieval dates is presented in Table H-1.

Kick net samples, which were also collected at all sample locations, were used to generate Hilsenhoff Biotic Index (HBI) and North Carolina Biotic Index (NCBI) scores. HBI and NCBI scores were used to supplement the Hester-Dendy data and for comparison with historical data. ICI, HBI, and NCBI scores are shown graphically in Figures H-1, H-2, and H-3. ICI scores are shown in Table H-2. Table H-3 displays additional metrics calculated using data generated by the Hester-Dendy samples. HBI scores, NCBI scores and additional metric scores generated using kick-net data can be found in Table H-4.

Results

1995

In 1995, Sites #25.3 and #25.2 both met the Ohio EPA biological criterion for macroinvertebrates with scores in the *Good* range (38 and 34). Although the ICI scores do not indicate that an impact occurred, an examination of four individual metrics (percent composition of tolerant organisms, mayflies, caddisflies, and other dipterans & non-insects) reveals differences in the community structure, which may be attributable to discharges to the creek via CSO #054. The proportion of pollution tolerant organisms at Site #25.2 was approximately twice as high as at Site #25.3. The proportions of mayflies and caddisflies, which are sensitive to organic pollution, were lower at Site #25.2 than at Site #25.3. The proportion of other dipterans and non-insects, which includes genera that tend to be tolerant to organic pollution, was higher at Site #25.2 than at Site #25.3. Even in the absence of bypass events, however, results similar to these might be expected upstream and downstream of CSOs.

HBI scores in the *Good* range (5.2 and 5.2), indicating the presence of some organic pollution, and NCBI scores in the *Fair* range (6.83 and 7.09) were obtained at Sites #25.3 and #25.2 in 1995. Both sites also had a relatively high proportion of two species of mayflies, *Baetis flavistriga* and *Baetis intercalaris*. When found in high proportions, these organisms tend to indicate recovery from a period of disturbance. (C.T. Robinson et al, 1990; G. Englund, 1991; C.R. Townsend et al, 1997). Site #25.1 received HBI and NCBI scores in the *Fair* range (5.75 and 7.45) in 1995. The HBI score was an improvement from the 1991 score of 6.61 *Fairly Poor*.

Individual metrics highlight some of the differences in the macroinvertebrate communities at these sites. At Site #25.1, proportions of tolerant organisms and other dipterans & non-insects were higher than at Sites #25.2 and #25.3. Additionally, the proportion of mayflies observed at Site #25.1 in 1995 was about half of those at Sites #25.2 and 25.3. These metrics indicate the possible presence of other impacts between CSO 054 and Site #25.1. However, the benthic macroinvertebrate community structure

indicates that Site #25.1 improved from 1991 to 1995, with Taxa Richness increasing from 14 to 32, Ephemoropteran Plecopteran Trichopteran (EPT) Taxa Richness increasing from 4 to 8 and percent mayfly composition increasing from 9.09 to 32.67.

Site #25 obtained an ICI score in the *Fair* range (22) in 1995. The original Hester-Dendy samplers installed at Site #25 in 1995 were vandalized. Additional samplers were installed on August 21, 1995 and retrieved on September 27, 1995, approximately five weeks later than those at Sites #25.2 and 25.3. The low ICI score obtained at Site #25 may be attributable, at least in part, to the late retrieval of the Hester-Dendy samplers and/or impacts downstream of the CSO #054 outfall. Individual metrics, including percent pollution tolerant organism composition and percent other dipterans & non-insects (Table H-4) indicate that Site #25 was impacted.

HBI and NCBI scores obtained for Site #25 on August 30, 1995 were comparable to those obtained upstream at Sites #25.1, 25.2 and 25.3 on August 21, 1995. Between August 30 and September 27, 1995, however, HBI scores at this site increased from *Good* to *Fairly Poor* (5.33 to 6.85), while NCBI scores increased from *Fair* to *Poor* (7.4 to 8.32). The increase in scores indicates that an environmental disruption may have occurred between Site #25.1 and Site #25 during the time period between August 30 and September 27, 1995. Several of the individual metrics for the kick samples collected on these two dates increased substantially, including the percent composition other dipterans & non-insects, the percent composition of tolerant organisms, the percent composition of toxic tolerant organisms and the percent organic pollution tolerant organisms. During the same time period, decreases were measured in the percent EPT composition, percent mayfly composition, and percent caddisfly composition.

1996

During 1996, three major rain events occurred during the six-week Hester-Dendy colonization period. The steep, straight concrete streambed in the area of sites #25.3 and #25.2 may have enhanced the scouring effect of spate conditions. No ICI score could be calculated for Site #25.3 in 1996 because the Hester-Dendy samplers were lost following a spate on September 16, 1996. The samplers were not reset because the six-week colonization period would have extended beyond the end of the sampling season defined by Ohio EPA protocols. Site #25.2 obtained an ICI score in the *Poor* range (12). Examination of the individual metrics for the Hester-Dendy sample collected at Site #25.2 indicates an increase in the proportion of tolerant organisms from 1995 to 1996. Decreases in the proportions of mayflies and caddisflies also occurred during that period. A notable increase in the proportion of other dipterans and non-insects (including burrowing and tube building chironomids and oligochaetes, which tend to be more tolerant to spates) from 1995 to 1996 in the Hester-Dendy samples may also be attributable to these events (Growns and Davis, 1994). The increased abundance of organisms that can tolerate spates (i.e., tube building midges, worms, and other dipterans) has a negative effect on the ICI score.

1996 HBI scores for Sites #25.3 and #25.2 were in the *Fair* range (5.77 and 5.97), indicating the existence of fairly significant organic pollution. NCBI scores were also in the *Fair* range (7.13 and 7.28). These scores were higher than those calculated for

previous years at this location, indicating a decline in water quality.

HBI and NCBI scores at Site #25.1 were slightly higher in 1996 (5.94 *Fair* and 7.59 *Fair*) than in 1995 (5.75 *Fair* and 7.45 *Fair*). The HBI scores indicate that fairly significant organic pollution existed at this site in both years. Examination of the individual metrics indicates a decrease in the proportions of mayflies, caddisflies, and tanytarsini midges from 1995 to 1996. During the same time period, there was an increase in the proportion of other dipterans and non-insects.

In 1996, as in 1995, Site #25 received an ICI score in the *Fair* range (20). Because of high flow conditions which occurred early in the month of September, the 1996 sample was also collected late in the season. Examination of individual metrics indicates some improvement in the benthic macroinvertebrate community from 1995 to 1996, which is not reflected in the ICI score. For example, the proportion of tolerant organisms and non-insects decreased, while the combined proportion of mayflies and caddisflies increased.

Differences between the 1996 ICI scores for Sites #25 and #25.2, may be attributable, at least in part, to the response to wet weather events caused by differences in habitat conditions at these sites. Because of its very steep concrete banks, the creek has no real access to a functional floodplain at Site #25.2 to dissipate the energy of spate conditions. This in turn enhances the scouring effect, resulting in reduced numbers of organisms and a lower ICI score. At Site #25, however, the creek lacks the steep concrete channel and has access to a functional floodplain. Additionally, the influence of the Cuyahoga River on this site causes the water velocity to slow down and back up during heavy rain events, resulting in deeper, slower water than at Site #25.2. The result is less scouring and the elimination of fewer organisms.

Site #25 obtained an HBI score in the *Good* range (5.46), indicating the presence of some organic pollution, and an NCBI score in the *Fair* range (7.47) in 1996. The 1996 HBI and NCBI scores for Site #25 were similar to those collected in previous years at the same site and in 1996 at the upstream sites. Examination of the individual metrics for the kick net data collected from Site #25 on August 13, 1996, indicates little change in the benthic macroinvertebrate community when compared to the August 30, 1995 sample. Individual metrics which support this assertion include the percent EPT composition, the ratio of EPT to chironomidae, the percent mayfly composition and the percent other dipterans and non-insects. The dominant taxa for both dates were also similar, which is reflected in the previously mentioned metrics. Kick net samples collected on August 13, showed an improvement over those collected in September 1995. Metrics which showed an improvement from September 1995 to August 1996 include the toxic tolerant organism composition, percent other dipterans and non-insects, and the percent EPT composition.

During 1996, macroinvertebrate sampling was conducted at several sites located upstream of Big Creek Site #25.3, including Sites 26, 26.5, 27, 28, 29, and 30. Hester-Dendy samplers installed at Site #26 were washed away late in the season and were not able to be reset. The Hester-Dendy samplers installed at Site #28 remained in the stream for an extended period of time and were removed late in the season because of

an extended period of high water levels at this site. Various community metrics used to calculate the ICI score indicate that negative environmental factors are influencing the macroinvertebrate communities at Sites 27, 28, and 30. The absence of Ephemeropteran, Plecopteran, and Trichopteran (EPT) taxa at these sites, for example, resulted in a score of 0 for each of the metrics which use EPT taxa. In general, HBI results indicate that water quality conditions were better on the East Branch than on the West Branch. HBI scores in the *Fair* and *Fairly Poor* ranges at Sites #27 and #28 indicate the presence of fairly significant and significant organic pollution, respectively. Sites #26, 29, and 30 on the East Branch obtained HBI scores in the *Good* range, indicating the presence of some organic pollution. Historical data indicated that water quality improved at Site #29 between 1991 and 1996, when HBI scores decreased from 6.38 (*Fair*) to 5.30 (*Good*). The improvement in HBI scores at this location may be attributable to the elimination of dry weather discharges of sanitary sewage upstream of this sample location. Further sampling may be warranted to better characterize the benthic macroinvertebrate communities at Sites 28 and 30, and to ensure the continued improvement in water quality upstream of Site 29.

1997

In 1997, Sites #25.3 and 25.2 both obtained ICI scores of in the *Fair* range (24 and 24). Although the ICI score at Site #25.2 improved from 1996 to 1997, the 1997 scores for both sites were lower than those obtained in 1995. HBI and NCBI scores at both sites increased during the three-year period from 1995 through 1997, indicating a possible decline in water quality. Both sites obtained HBI scores in the *Fair* range (5.96 and 6.26) and NCBI scores in the *Poor* range (7.78 and 8.10). The HBI scores indicate that fairly significant organic pollution existed at these sites in 1997.

In 1997, the dominant groups of organisms collected at Site #25.3 were other dipterans and non-insects (which include oligochaetes and chironomids). The proportions of these organisms increased from 1995 to 1997 in the kick net samples and the Hester-Dendy samples. The combined proportion of oligochaetes and midges increased at Site #25.3 from 22.7% in 1995 to 50.2% in 1997 for kick net samples and from 36% to 68.3% for Hester-Dendy samples. When these organisms comprise the majority of the macroinvertebrates collected, an industrial impact is indicated. (Diggins and Stewart, 1998) The increase in oligochaetes and midges may have been attributable, in part, to a pickle liquor spill to the West Branch of Big Creek, which occurred approximately 1.5 miles upstream from Site #25.3. The spill, which was discovered and investigated by NEORSD investigators on July 18, 1997, does not explain, however, any increase in oligochaetes and midges which occurred between 1995 and 1996. A decrease in the percent EPT composition from 1995 to 1997 was also observed in the kick net and Hester-Dendy samples. This decrease may have also been a result, in part, of the spill, because Ephemeropterans, Plecopterans and Trichopterans are sensitive to organic and industrial pollution.

Kick net data collected at Site #25.2 also exhibited results similar to those observed at Site #25.3. The proportions of other dipterans and non-insects, toxic tolerant organisms, and organic pollution tolerant organisms increased from 1995 to 1997, while the percent EPT composition decreased.

Site #25 received an ICI score of 8 (*Poor*) in 1997, which was the lowest score recorded at this site during the three-year sampling period. This low score indicates that, at the time, Site #25 may have been impacted by some type of environmental disruption. The 10 dominant taxa in the Hester-Dendy sample were chironomidae larvae. The proportions of other dipterans & noninsects and EPT organisms in the sample indicate a stressed macroinvertebrate community, and the proportion of toxic tolerant organisms in Hester-Dendy samples collected at this site increased from 1995 to 1997. During the time period when macroinvertebrate sampling was conducted, the Jennings Road Freeway (Route 176) was under construction, approximately 500 feet upstream of Site #25. The highway construction may have had a negative impact on Site #25, with increased sediment loads and associated stormwater run-off. The decrease in mayfly and caddisfly composition may be attributable to increased siltation (I.D. Hogg, R.H. Norris, 1991; T.F. Waters, 1995), toxic, and/or organic pollution. Without any direct measurement of the sediment loads and turbidity, however, no direct correlation can be made between the freeway construction and the macroinvertebrate community at Site #25.

Site #25 received an HBI score in the *Fairly Poor* range (6.61), which indicates the presence of significant organic pollution, and an NCBI score in the *Poor* range (8.64). An examination of the individual metrics indicates that the proportion of tolerant organisms was similar for the Hester-Dendy and kick net samples. The percent EPT composition and the percent caddisfly composition were lower in the kick net samples in 1997 than in 1996 or August 1995. The proportions of tolerant organisms, toxic tolerant organisms, and organic tolerant organisms were higher in the 1997 kick net samples than in the samples collected in 1996 or in August 1995. These metrics indicate that this site had been impacted by some environmental disruption.

Conclusions

The Invertebrate Community Index, the Hilsenhoff Biotic Index, the North Carolina Biotic Index, and several individual metrics were used to evaluate macroinvertebrate community health on Big Creek during the period from 1995 to 1997, following the diversions of sewage from the Big Creek Interceptor via the CSO #054 outfall.

Figures H-1 through H-3 demonstrate two general trends regarding the Big Creek macroinvertebrate community. One trend depicted by the figures is a general decline in the condition of the macroinvertebrate community, as measured by the ICI, HBI, and NCBI, from upstream to downstream. Another trend is a general decline in the condition of the macroinvertebrate community over time. Investigators are uncertain whether these trends are the result of bypass events during the Big Creek Interceptor Rehabilitation project.

Although a limited amount of Big Creek macroinvertebrate sampling data was collected by NEORSD prior to 1995, samples bracketing CSO 054 were never collected during that time period. Differences in the macroinvertebrate communities upstream and downstream of CSO 054 may be related to combined sewer overflows, bypass events associated with the rehabilitation of the Big Creek Interceptor, or other factors. Habitat alterations, industrial discharges, local sewage collection system conditions, and other

factors affect urban streams. All of these influence the condition of a stream's macroinvertebrate community.

Table H-1
Big Creek Benthic Macroinvertebrate Sampling, 1995-1997
Hester Dendy Artificial Substrate Sampler Installation and Retrieval Dates

Year	Site	Installation Date	Reset Date(s)	Retrieval Date	Comments
1995	25.3	3-Jul	20-Jul	21-Aug	Water level dropped samplers exposed
	25.2	2-Jul	20-Jul	21-Aug	Samplers vandalized
	25	5-Jul	21-Jul	27-Sep	Samplers vandalized
1996	30	26-Jul	18-Sep	27-Sep	Samplers had shifted, were repositioned
	29	26-Jul		27-Sep	
	28	26-Jul		16-Oct	
	27	25-Jul		30-Sep	
	26	25-Jul	Lost on 30 - Sep	Lost	Too late to reset
	25.3	25-Jul	Lost on 18 - Sep	Lost	Lost during spate - too late to reset
	25.2	25-Jul	6-Aug 27-Aug 4-Oct	11-Oct	Series of spates disturbed HDs
	25	25-Jul		26-Sep	Retrieved 3 weeks late due to high water levels
1997	25.3	16-Jun		6-Aug	
	25.2	16-Jun		6-Aug	
	25	16-Jun		6-Aug	

Table H-2
Big Creek Benthic Macroinvertebrate Sampling, 1995-1997
Invertebrate Community Index Scores

ICI Metric	1995 Site 25.3 Value	1995 Site 25.3 Score	1995 Site 25.2 Value	1995 Site 25.2 Score	1995 Site 25 Value	1995 Site 25 Score	**1996 Site 30 Value	**1996 Site 30 Score	**1996 Site 29 Value	**1996 Site 29 Score	**1996 Site 28 Value	**1996 Site 28 Score	**1996 Site 27 Value	**1996 Site 27 Score	**1996 Site *26 Value	**1996 Site *26 Score	**1996 Site *25.3 Value	**1996 Site *25.3 Score	**1996 Site 25.2 Value	**1996 Site 25.2 Score	**1996 Site 25 Value	**1996 Site 25 Score	1997 Site 25.3 Value	1997 Site 25.3 Score	1997 Site 25.2 Value	1997 Site 25.2 Score	1997 Site 25 Value	1997 Site 25 Score
1. Total Number of Taxa	49	6	46	6	36	4	9	0	21	2	14	2	9	0	-	-	-	-	23	2	33	4	55	6	55	6	18	2
2. Number of Mayfly Taxa	2	0	2	0	1	0	0	0	2	0	0	0	0	0	-	-	-	-	1	0	1	0	2	0	2	0	1	0
3. Number of Caddisfly Taxa	4	6	5	6	3	6	0	0	2	4	0	0	0	0	-	-	-	-	1	2	2	4	3	6	4	6	0	0
4. Number of Dipteran Taxa	31	6	25	6	28	6	9	2	14	4	5	0	5	0	-	-	-	-	17	4	22	6	33	6	31	6	12	2
5. % Mayflies	39.0	6	29.0	6	0.2	2	0	0	4.1	2	0.0	0	0.0	0	-	-	-	-	2.0	2	2.7	2	6.4	2	15.3	2	0.8	2
6. % Caddisflies	18.6	6	8.5	6	0.4	2	0	0	15.7	6	0.0	0	0.0	0	-	-	-	-	0.7	2	0.9	2	6.4	2	4.8	2	0.0	0
7. % Tanytarsini Midges	2.0	2	1.7	2	0.2	2	0	0	5.8	2	0.0	0	0.0	0	-	-	-	-	0.0	0	0.2	2	0.9	2	0.6	2	1.9	2
8. % Other Diptera and Non-Insects	39.8	4	60.7	2	98.8	0	100	0	73.6	0	99.3	0	92.0	0	-	-	-	-	96.6	0	93.5	0	85.0	0	76.0	0	97.1	0
9. % Tolerant Organisms	20.0	2	44.5	0	81.0	0	21.4	2	5.8	6	19.6	2	38.0	0	-	-	-	-	82.0	0	53.2	0	33.6	0	35.0	0	69.0	0
10. Qualitative EPT Taxa	4	0	3	0	1	0	1	0	4	2	0	0	1	0	-	-	-	-	3	0	3	0	5	2	2	0	2	0
Total ICI Score		38		34		22		4		28		4		0		-		-		12		20		24		24		8

* Samplers Lost Late in Season
** Series of Spates During Sample Period

Table H-3
Big Creek Benthic Macroinvertebrate Sampling, 1995-1997
Hester-Dendy Samples
Individual Metric Scores

	1995			1996								1997			
	Site			Site								Site			
Metric/Index	25.3	25.2	25	30	29	28	27	26	25.3	25.2	25	26.5	25.3	25.2	25
Collection Date	21-Aug	21-Aug	27-Sep	9/27/96	27-Sep	16-Oct	30-Sep	-	-	11-Oct	26-Sep	11-Sep	6-Aug	6-Aug	6-Aug
Total Organisms	3332	2408	1565	95	109	153	50	-	-	409	568	277	2701	2385	514
ICI Score	38	34	22	4	28	4	0	-	-	12	20	26	24	24	8
Taxa Richness	51	47	37	8	15	14	9	-	-	25	38	32	55	56	18
EPT Taxa Richness	6	7	3	0	4	0	0	-	-	2	3	4	5	6	1
% EPT Composition	57.6	37.2	0.6	0	22.0	0.0	0.0	-	-	2.7	3.5	9.8	12.7	20.1	0.8
% Chironomidae Composition	31.9	40.3	33.1	100	73.4	69.3	40.0	-	-	20.2	49.0	75.1	64.3	43.4	97.3
% Non-insect Compositon	6.6	17.5	59.4	0	1.8	5.2	52.0	-	-	73.4	27.4	7.9	19.9	28.6	1.3
% Oligochaete Composition	4.1	14.9	57.2	0	0.0	2.0	0.0	-	-	72.4	22.2	5.4	4.0	8.5	0.0
EPT / Chironomidae	1.8	0.9	0.0	0	0.3	0.0	0.0	-	-	0.1	0.1	0.1	0.2	0.5	0.0
Cricotopus + Chironomus / Chironomidae	0.3	0.1	0.7	0.48	0.0	0.0	0.3	-	-	0.7	0.8	0.1	0.2	0.2	0.4
% Toxic Tolerant Organisms	24.6	35.1	30.4	91.58	59.6	56.2	38.0	-	-	16.4	44.5	43.7	46.0	39.9	66.2
% Selected Toxic Tolerant Organisms	18.8	29.1	28.5	46.32	5.5	0.7	14.0	-	-	16.1	38.0	17.3	28.1	20.4	66.2
% Organic Tolerant Organisms	6.1	17.0	62.9	0	9.2	19.0	24.0	-	-	72.9	23.4	6.5	17.9	21.6	0.8

Table H-4
Big Creek Benthic Macroinvertebrate Sampling, 1995-1997
Kick Net Samples
Individual Metric Scores

Metric/Index	1995				1996								1997			
	Site				Site								Site			
	25.3	25.2	25.1	25	30	29	28	27	26	25.3	25.2	25.1	25	26.5	25.3	25.2	25
Collection Date	21-Aug	21-Aug	21-Aug	30-Aug	15-Aug	27-Aug	27-Aug	15-Aug	15-Aug	13-Aug	13-Aug	13-Aug	13-Aug	11-Sep	6-Aug	6-Aug	6-Aug
Total Organisms	577	452	303	517	316	254	218	128	382	251	274	483	344	66	211	245	142
HBI Score	5.22	5.15	5.77	5.33	5.4	5.30	6.56	5.95	5.28	5.77	5.97	5.94	5.46	5.44	5.96	6.26	6.61
HBI Narrative Rating	Good	Good	Fair	Good	Good	Good	Fairly Poor	Fair	Good	Fair	Fair	Fair	Good	Good	Fair	Fair	Fairly Poor
NCBI Score	6.83	7.06	7.40	7.40	7.6	7.26	8.82	8.43	7.41	7.11	7.26	7.59	7.47	7.62	7.78	8.10	8.64
NCBI Narrative Rating	Fair	Fair	Fair	Fair	Poor	Fair	Poor	Poor	Fair	Fair	Fair	Fair	Fair	Fair	Poor	Poor	Poor
Taxa Richness	26	25	32	30	25	25	16	16	34	24	31	27	25	14	36	30	17
EPT Taxa Richness	6	6	8	5	3	5	0	2	6	4	6	4	5	4	5	5	2
% EPT Composition	70.9	71.5	45.9	47.9	40.19	68.1	0.0	18.0	60.7	56.6	49.6	35.8	50.6	54.6	27.5	20.8	10.6
% Chironomidae Composition	17.3	14.6	31.4	25.2	28	11.8	74.8	55.5	17.0	18.3	18.6	29.0	28.5	12.1	40.2	31.1	48.6
% Non-insect Composition	7.5	6.6	9.2	13.2	15.8	8.3	16.1	21.1	15.4	14.3	6.9	13.9	11.6	24.2	20.6	19.2	38.0
% Oligochaete Composition	5.4	4.9	6.3	15.1	7.2	0.0	5.5	1.6	1.0	7.2	1.5	4.4	6.4	0.0	10.0	2.9	28.9
EPT / Chironomidae	4.1	4.9	1.5	1.8	1.43	5.8	0.0	0.3	3.6	3.1	2.7	1.2	1.8	4.5	0.7	0.4	0.2
Cricotopus + Chironomus / Chironomidae	0.3	0.4	0.4	0.6	0.213	0.1	0.6	0.4	0.5	0.5	0.7	0.6	0.5	0.5	0.3	0.6	0.6
Total Mayfly Taxa	2	2	3	2	1	1	0	1	2	2	2	2	2	1	2	2	2
Total Caddisfly Taxa	4	4	5	4	2	4	0	1	4	2	4	2	3	3	3	3	0
Total Diptera Taxa	11	12	17	15	17	14	9	9	14	12	14	14	13	6	21	13	7
% Mayfly Composition	50.4	59.3	32.7	39.0	33.86	19.3	0.0	15.6	41.1	28.7	34.7	24.2	37.2	28.8	16.6	12.2	10.6
% Caddisfly Composition	20.5	12.2	13.2	8.9	6.33	48.8	0.0	2.3	19.6	27.9	15.0	11.6	13.4	25.8	10.9	8.6	0.0
% Tribe Tanytarsini Composition	0.0	0.4	1.3	0.5	0	0.8	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.0	0.5	0.0	0.0
% Other Dipteran and Non-Insects	28.4	28.1	52.8	50.8	59.81	28.7	91.7	82.0	38.2	43.4	50.0	63.6	48.8	37.9	72.0	78.8	87.3
% Tolerant Organisms	10.6	10.6	20.8	25.6	12.34	3.5	53.2	35.2	5.2	14.3	8.8	16.8	20.6	4.6	29.9	38.8	70.4
% Toxic Tolerant Organisms	9.5	10.8	27.4	24.3	16.77	9.5	73.9	55.5	12.8	15.9	16.4	24.6	23.0	6.1	31.8	44.9	33.8
% Selected Toxic Tolerant Organisms	6.8	7.1	17.5	17.2	8.86	2.0	43.6	26.6	9.2	11.2	15.3	21.1	16.3	6.1	17.5	33.1	33.8
% Organic Tolerant Organisms	6.8	8.6	12.9	18.4	24.05	7.5	10.1	21.1	6.5	11.6	18.3	20.9	11.3	3.0	20.9	15.1	33.1

Figure H-1
Big Creek Benthic Macroinvertebrate Sampling, 1995-1997
Invertebrate Community Index Scores

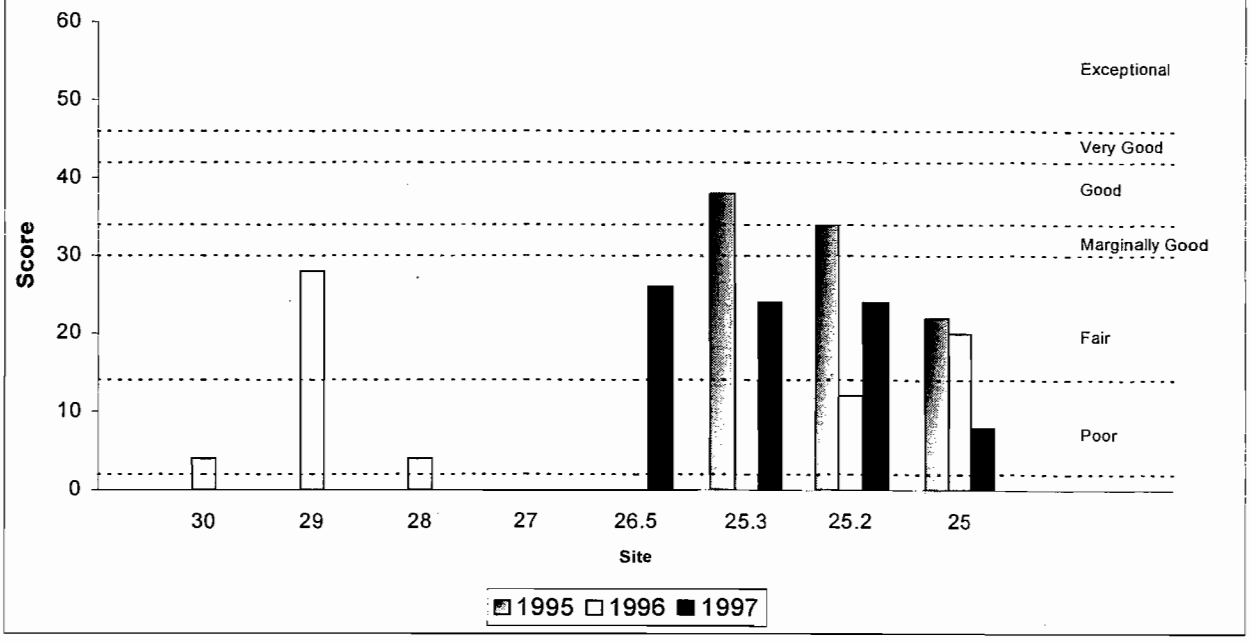


Figure H-2
Big Creek Benthic Macroinvertebrate Sampling, 1995-1997
Hilsenhoff Biotic Index Scores

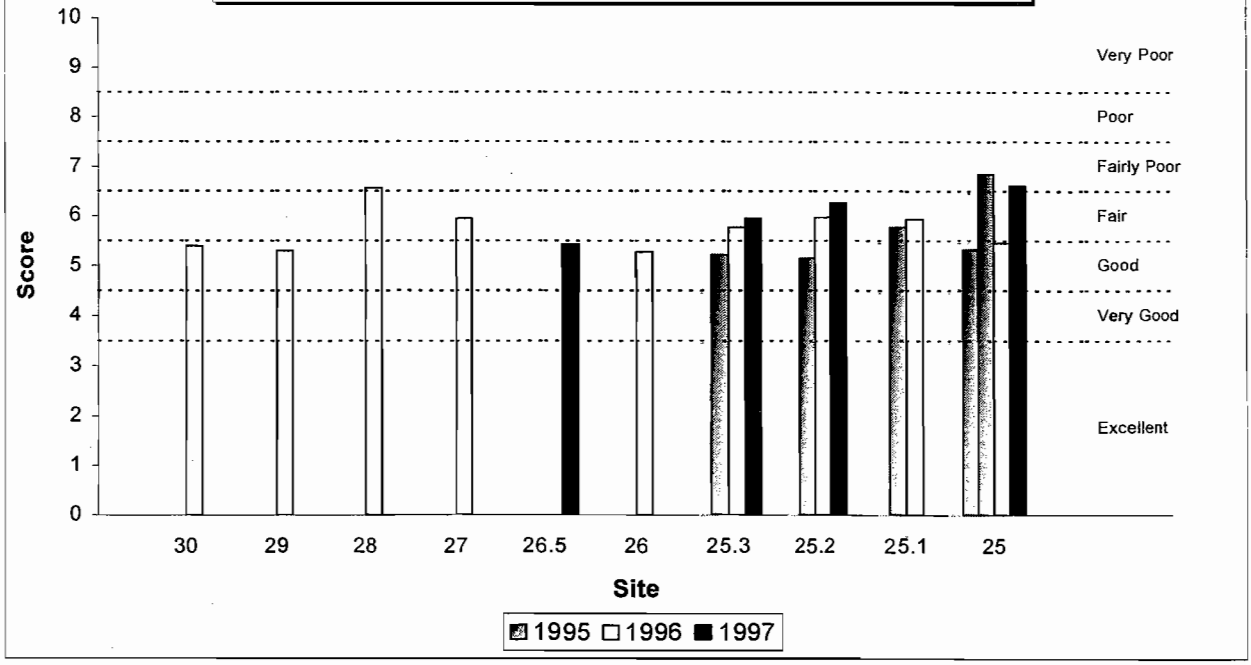
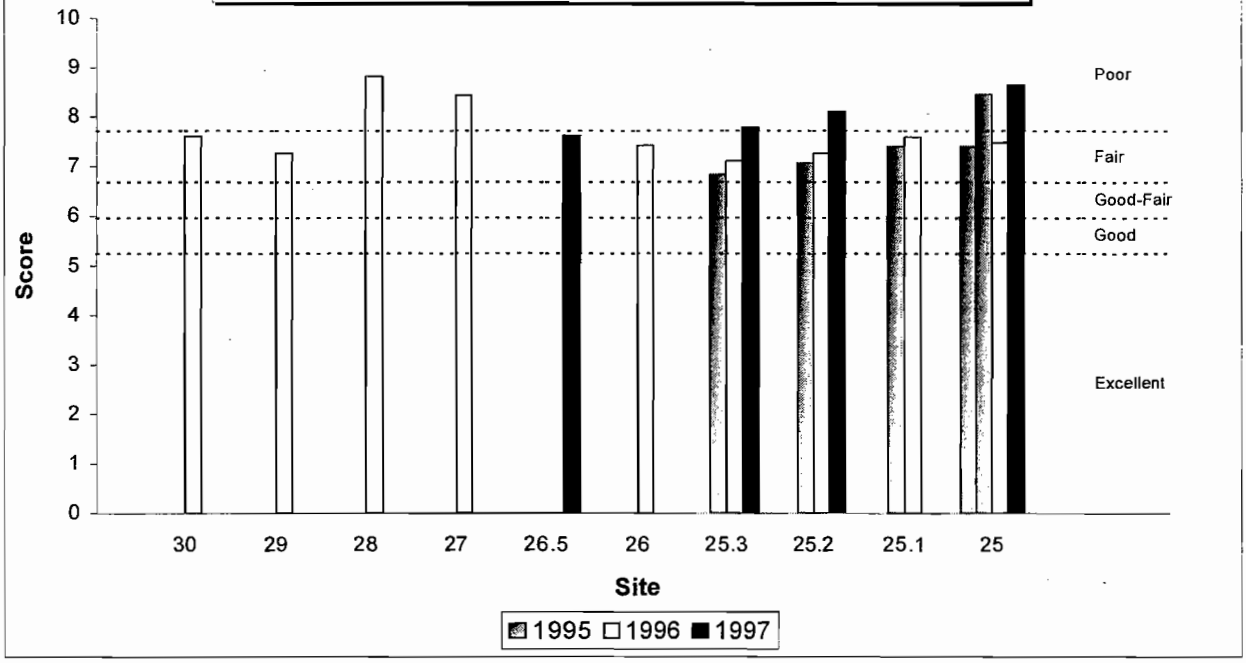


Figure H-3
Big Creek Benthic Macroinvertebrate Sampling, 1995-1997
North Carolina Biotic Index Scores



APPENDIX I
SUMMARY OF ELECTROFISHING RESULTS, 1996 - 1998

NEORSD performed quantitative sampling for fish during 1996-1998 utilizing its 17' Coffelt aluminum electrofishing boat and generator-powered longline electroshocking equipment. Specimens were identified to species level, weighed, counted and examined for the presence of DELT anomalies and returned to the stream from which they were collected. DELT anomalies include deformities, eroded fins, lesions and tumors. Fish which were not identified in the field were placed in formalin and sent to the Ohio State University's Museum of Biological Diversity, where they were identified by the Curator of Fishes. Electrofishing was performed at the following areas:

1. Cuyahoga River (upstream and downstream of the Southerly WWTP)
2. Brandywine Creek (upstream and downstream of the Hudson WWTP)
3. Blodgett Creek (upstream and downstream of the former Strongsville "A" WWTP)
4. Rocky River (upstream and downstream of Blodgett Creek)
5. Euclid Creek (at NEORSD's five routine sampling locations)

Longline generator electrofishing consists of wading in a sample zone in an upstream direction for a distance of 150-200 meters and electroshocking all habitat types including undercut banks, brush piles, log jams, boulders and other submerged structures. Fish are then netted and placed in a nylon floating live well where they are later processed. Ohio EPA protocols require two or three individual sampling passes to assess fish community health.

Boat electrofishing consists of shocking all habitat types within a sampling zone, which is 0.5 kilometers in length, while moving from upstream to downstream. In zones with extensive woody debris and abundant cover, a slower boat speed is necessary to maneuver the boat. The stunned fish are collected and placed in an on-board live well for later processing. According to Ohio EPA protocols, each boat sampling zone should be electrofished two or three times during the sampling season.

The electroshocking data collected by NEORSD were compiled and used to evaluate fish community health through the use of two Ohio EPA indices, the Index of Biotic Integrity (IBI) and the Modified Index of Well Being (Mlwb). The IBI incorporates 12 community metrics representing structural and functional attributes. The structural attributes are based upon fish community aspects such as fish numbers and diversity. Functional attributes are based upon fish community aspects such as feeding strategies, environmental tolerances and disease symptoms. These metrics are individually scored by comparing the data collected at a survey site with values expected at reference sites located in a similar geographic region. The maximum IBI score is 60 and the minimum is 12. The summation of the 12 individual metric scores

provides a single value IBI score, which determines the narrative rating (*Exceptional*, *Good*, *Fair*, or *Poor*) of a fish community.

The modified Index of Well Being (MIwb) incorporates four fish community measures: numbers of individuals, biomass, and the Shannon Diversity Index $(\overline{H})$ based on numbers and weight of fish. Unlike the IBI score, the MIwb score is the result of a mathematical calculation based upon the formula:

Modified Index of Well-Being

$$MIwb = 0.5\,lnN + 0.5\,lnB + \overline{H}(No.) + \overline{H}(Wt.)$$

where:

N = Relative numbers of all species excluding species designated "highly tolerant"

B = Relative weights of all species excluding species designated "highly tolerant"

$\overline{H}(No.)$ = Shannon Diversity Index based on numbers

$\overline{H}(Wt.)$ = Shannon Diversity Index based on weight

Shannon Diversity Index

$$\overline{H} = -\sum\left[\left(\frac{n_i}{N}\right)log_e\left(\frac{n_i}{N}\right)\right]$$

where:

n_i = Relative numbers or weight of species

N = Total number or weight of the sample

A detailed description of the sampling and analysis methods utilized in fish surveys including calculations of IBIs and MIwbs can be found in OEPA's *Biological Criteria for the Protection of Aquatic Life Volumes II* (1987, Updated January 1, 1988) *and III* (1989). The following is a summary of electrofishing results obtained by NEORSD during 1996-1998.

Table I-1
NEORSD Electrofishing Summary
1996-1998

Sample Location	Date	IBI Score	IBI Narrative Rating	MIwb Score	MIwb Narrative Rating
Blodgett Creek					
Upstream of Strongsville "A" WWTP	8/19/96	20	Poor	NA	-
	10/7/96	28	Fair	NA	-
Downstream of Strongsville "A" WWTP	8/19/96	24	Poor	NA	-
	10/7/96	22	Poor	NA	-
Brandywine Creek					
Upstream of Hudson WWTP	7/2/98	34	Fair	NA	-
	9/11/98	36	Marginally Good	NA	-
Downstream of Hudson WWTP	7/2/98	30	Fair	NA	-
	9/11/98	34	Fair	NA	-
Cuyahoga River					
Upstream of Southerly WWTP	9/15/97	28	Fair	7.0	Fair
	10/16/97	24	Poor	7.9	Fair
	8/4/98	24	Poor	7.6	Fair
	9/30/98	26	Fair	7.5	Fair
Downstream of Southerly WWTP	9/15/97	14	Very Poor	4.7	Very Poor
	10/16/97	22	Poor	7.4	Fair
	8/4/98	24	Poor	7.5	Fair
	9/30/98	28	Fair	7.6	Fair
At Lower Harvard Avenue	9/16/97	18	Poor	6.4	Fair
	10/17/97	20	Poor	5.7	Poor
	8/5/98	22	Poor	4.9	Very Poor
	10/2/98	22	Poor	6.1	Poor
Euclid Creek					
Site # 0.5 Lakeshore Boulevard	6/23/98	20	Poor	2.6	Very Poor
	8/21/98	26	Fair	5.1	Poor
	10/6/98	30	Fair	6.0	Poor
Site # 1 St. Clair Avenue	6/24/98	30	Fair	5.7	Poor
	8/20/98	26	Poor	6.1	Fair
	10/12/98	26	Poor	6.5	Fair
Site # 2 South Branch	6/24/98	26	Poor	NA	-
	8/19/98	26	Poor	NA	-
	10/7/98	32	Fair	NA	-
Site # 3 North Branch	6/24/98	26	Poor	NA	-
	8/19/98	26	Poor	NA	-
	10/7/98	30	Fair	NA	-
Site # 4 Mayfield Road	6/29/98	28	Fair	NA	-
	8/20/98	30	Fair	NA	-
	10/12/98	32	Fair	NA	-
Rocky River					
Upstream of Blodgett Creek	8/22/96	42	Good	7.9	Good
	10/8/96	42	Good	6.6	Fair
Downstream of Blodgett Creek	8/22/96	46	Very Good	7.8	Marginally Good
	10/8/96	40	Good	7.6	Marginally Good

APPENDIX J
CUYAHOGA RIVER ELECTROFISHING SURVEYS,
1997-1998

Introduction

Since 1990, the Northeast Ohio Regional Sewer District's (NEORSD) Water Quality and Industrial Surveillance Department (WQIS) has conducted electrofishing surveys on the Cuyahoga River. Sampling was conducted in 1990, 1991, 1992, 1997 and 1998. During August, September and October of 1997 and 1998, NEORSD conducted electrofishing upstream of the Southerly Wastewater Treatment Plant (WWTP) at River Mile (RM) 11.3, downstream of the Southerly WWTP at RM 10.5, and downstream of the Lower Harvard Avenue Bridge at RM 7.1. The purpose of the surveys was to evaluate and characterize the overall health of the fish communities at these locations.

The electrofishing data collected by NEORSD was compiled and utilized to evaluate fish community health through the application of two Ohio EPA indices, the Index of Biotic Integrity (IBI) and the Modified Index of Well Being (MIwb). The IBI incorporates 12 metrics representing structural and functional attributes of the fish community. The structural attributes are based upon fish community aspects such as fish numbers and diversity. Functional attributes are based upon fish community aspects such as feeding strategies, environmental tolerances and disease symptoms. These metrics are individually scored by comparing the data collected at a survey site with values expected at reference sites located in a similar geographic region. The maximum IBI score is 60 and the minimum is 12. The summation of the 12 individual metric scores provides a single IBI score, which corresponds to a narrative rating of *Exceptional*, *Good*, *Fair*, or *Poor*.

The Modified Index of Well Being (MIwb) incorporates four fish community measures: numbers of individuals, biomass, and the Shannon Diversity Index $(\overline{H})$ based on numbers and weight of fish. Unlike the IBI score, the MIwb score is the result of a mathematical calculation based upon the formula:

Modified Index of Well-Being

$$MIwb = 0.5\, lnN + 0.5\, lnB + \overline{H}(No.) + \overline{H}(Wt.)$$

where:

N = Relative numbers of all species excluding species designated "highly tolerant"

B = Relative weights of all species excluding species designated "highly tolerant"

$\overline{H}(No.)$ = Shannon Diversity Index based on numbers

$\overline{H}(Wt.)$ = Shannon Diversity Index based on weight

Shannon Diversity Index

$$\overline{H} = -\sum\left[\left(\frac{n_i}{N}\right) log_e\left(\frac{n_i}{N}\right)\right]$$

where:

n_i = Relative numbers or weight of species

N = Total number or weight of the sample

Fish Collection Methods

NEORSD performed quantitative sampling for fish during 1997-1998 utilizing its 17' Coffelt aluminum electrofishing boat. Boat electrofishing consists of shocking all habitat types within a sampling zone, which is 0.5 kilometers in length, while moving from upstream to downstream. In zones which have extensive woody debris and abundant cover, a slower boat speed is necessary to maneuver the boat. The stunned fish are collected and put in an on-board live well for later processing. According to Ohio EPA protocols, each boat sampling zone should be electrofished two or three times during the sampling season.

Specimens were identified to species level, weighed, counted, and examined for the presence of DELT anomalies, which include deformities, eroded fins, lesions and tumors. Fish were returned to the site from which they were collected (except for voucher specimens and those which could not be identified in the field, which were identified in our laboratory).

A detailed description of the sampling and analysis methods utilized in fish community surveys, including calculations of the IBI and MIwb, can be found in Ohio EPA's *Biological Criteria for the Protection of Aquatic Life Volumes II* (1987, Updated January 1, 1988) *and III* (1989).

Ohio EPA's Qualitative Habitat Evaluation Index (QHEI) was used to assess aquatic habitat conditions at each sample location.

Results and Discussion

Cuyahoga River IBI and MIwb scores for 1990, 1991, 1992, 1997, and 1998 are displayed graphically in Figures J-1 and J-3 and are listed in Tables J-1 and J-2. Data tables located at the end of this report list the species, numbers, weights, pollution

tolerances and the incidence of DELT anomalies of fishes collected on the Cuyahoga River from September 1997 through October 1998. The data tables also show the IBI and MIwb scores for each site.

During 1997 and 1998, IBI and MIwb scores obtained by NEORSD upstream and downstream of the Southerly WWTP were generally in the *Poor* to *Fair* range. Index scores at the same locations were generally in the *Very Poor* to *Poor* range during the period 1990-1992. This trend of improving fish community index scores, which can be seen in Figures J-1 and J-3, is even more apparent in Figures J-2 and J-4, which compare combined electrofishing results from the period 1990-1992 with those from 1997-1998. Index scores at the Lower Harvard Avenue Bridge have remained in the *Poor* range since 1991.

Another indication of the improvement in Cuyahoga River fish community health is the increase in the proportion of pollution intolerant fish collected in recent years. According to Ohio EPA's *Biological Criteria for the Protection of Aquatic Life: Volume II*, fish species which are tolerant of pollution tend toward community predominance with decreasing water and/or habitat quality (p. 4-29). This trend is shown in Figures J-5 and J-6.

QHEI scores for each site are shown below and are displayed graphically in the Figure J-7. Scores were generally in the *Good-Fair* range at all three sites, except at the site upstream of the Southerly Wastewater Treatment Center in 1997, when this site received a score of 71, which is just above the *Good-Fair* range. Except for the construction/demolition material disposal sites located downstream of the Southerly Wastewater Treatment Plant along both banks of the river, no major habitat modifications were evident in the area where electrofishing was conducted. According to Ohio EPA's *The Qualitative Habitat Evaluation Index (QHEI): Rationale, Methods, and Application*, "Stream reaches with QHEI scores averaging > 60 will likely have the potential to attain the WWH use" (p. 40).

Cuyahoga River QHEI Scores
1997-1998

Sample Location	1997		1998	
	Score	Narrative Rating	Score	Narrative Rating
Upstream of Southerly WWTP	71	Good-Excellent	66.5	Good-Fair
Downstream of Southerly WWTP	63.75	Good-Fair	66	Good-Fair
Lower Harvard Avenue	61.5	Good-Fair	64	Good-Fair

QHEI field sheets for Cuyahoga River sites, which were electrofished by NEORSD during 1997 and 1998, are located in Appendix D of the 1996-1998 Greater Cleveland Area Environmental Water Quality Assessment report.

Summary and Conclusions

Qualitative Habitat Evaluation Index scores indicate that fish communities in the Cuyahoga River upstream and downstream of the Southerly WWTP and near the Lower Harvard Avenue Bridge have the potential to meet the numerical criteria for the Warmwater Habitat aquatic life use designation (WWH). Although the fish communities at these sites are not currently attaining the WWH criteria (IBI score of 40, MIwb score of 8.7), results of sampling conducted by NEORSD from 1991-1998 indicate a trend of improvement upstream and downstream of the Southerly WWTP. These improvements in the Cuyahoga River fish communities have occurred during a period when the flow of sanitary sewage to the Southerly WWTP has increased as a result of the decommissioning of several smaller wastewater treatment plants.

Table J-1
Northeast Ohio Regional Sewer District
Cuyahoga River Index of Biotic Integrity Scores, 1990-1998

Upstream Southerly WWTP			Downstream Southerly WWTP			At Lower Harvard		
Date	Score	Narrative Rating	Date	Score	Narrative Rating	Date	Score	Narrative Rating
8/30/90	16	Poor	8/30/90	18	Poor			
9/28/90	14	Very Poor	9/28/90	14	Very Poor			
Average, 1990	15	Very Poor	Average, 1990	16	Poor			
						6/26/91	18	Poor
6/25/91	12	Very Poor	6/25/91	12	Very Poor	8/25/91	18	Poor
8/22/91	16	Poor	8/22/91	18	Poor	10/1/91	22	Poor
9/30/91	22	Poor	9/30/91	18	Poor	Average, 1991	19.3	Poor
Average, 1991	16.7	Poor	Average, 1991	16	Poor			
						7/6/92	22	Poor
7/1/92	18	Poor	7/1/92	22	Poor			
9/9/92	22	Poor	9/9/92	18	Poor			
10/9/92	20	Poor	10/9/92	18	Poor	10/13/92	18	Poor
Average, 1992	20	Poor	Average, 1992	19.3	Poor	Average, 1992	20	Poor
Average, 1990-1992	17.5	Poor	Average, 1990-1992	17.3	Poor	Average, 1990-1992	19.6	Poor
						9/16/97	16	Poor
9/15/97	28	Fair	9/15/97	14	Very Poor	10/17/97	20	Poor
10/16/97	24	Poor	10/16/97	22	Poor	Average, 1997	18	Poor
Average, 1997	26	Fair	Average, 1997	18	Poor			
						8/5/98	22	Poor
8/4/98	24	Poor	8/4/98	24	Poor	10/2/98	22	Poor
9/30/98	26	Fair	9/30/98	28	Fair	Average, 1998	22	Poor
Average, 1998	25	Poor	Average, 1998	26	Fair			
Average, 1997-1998	25.5	Poor	Average, 1997-1998	22	Poor	Average, 1997-1998	20	Poor

Table J-2
Northeast Ohio Regional Sewer District
Cuyahoga River Modified Index of Well-Being Scores, 1990-1998

Upstream Southerly WWTP			Downstream Southerly WWTP			At Lower Harvard		
Date	Score	Narrative Rating	Date	Score	Narrative Rating	Date	Score	Narrative Rating
8/30/90	4.1	Very Poor	8/30/90	4.7	Very Poor			
9/28/90	4.6	Very Poor	9/28/90	4.8	Very Poor			
Average, 1990	4.4	Very Poor	Average, 1990	4.8	Very Poor			
6/25/91	4.0	Very Poor	6/25/91	4.8	Very Poor	6/26/91	5.7	Poor
8/22/91	5.7	Poor	8/22/91	6.2	Poor	8/25/91	6.1	Poor
9/30/91	6.9	Fair	9/30/91	5.8	Poor	10/1/91	6.4	Fair
Average, 1991	5.5	Poor	Average, 1991	5.6	Poor	Average, 1991	6.1	Poor
7/1/92	5.7	Poor	7/1/92	6.9	Fair	7/6/92	5.9	Poor
9/9/92	5.8	Poor	9/9/92	6.0	Poor			
10/9/92	5.1	Poor	10/9/92	6.9	Fair	10/13/92	5.8	Poor
Average, 1992	5.5	Poor	Average, 1992	6.6	Fair	Average, 1992	5.9	Poor
Average, 1990-1992	5.2	Poor	Average, 1990-1992	5.8	Poor	Average, 1990-1992	6.0	Poor
9/15/97	7.0	Fair	9/15/97	4.7	Very Poor	9/16/97	6.4	Fair
10/16/97	7.9	Fair	10/16/97	7.4	Fair	10/17/97	5.7	Poor
Average, 1997	7.5	Fair	Average, 1997	6.1	Poor	Average, 1997	6.1	Poor
8/4/98	7.5	Fair	8/4/98	7.5	Fair	8/5/98	4.8	Very Poor
9/30/98	7.5	Fair	9/30/98	7.6	Fair	10/2/98	6.1	Poor
Average, 1998	7.5	Fair	Average, 1998	7.6	Fair	Average, 1998	5.5	Poor
Average, 1997-1998	7.5	Fair	Average, 1997-1998	6.8	Fair	Average, 1997-1998	5.8	Poor

Figure J-1
Average Cuyahoga River Index of Biotic Integrity Scores
1990-1998

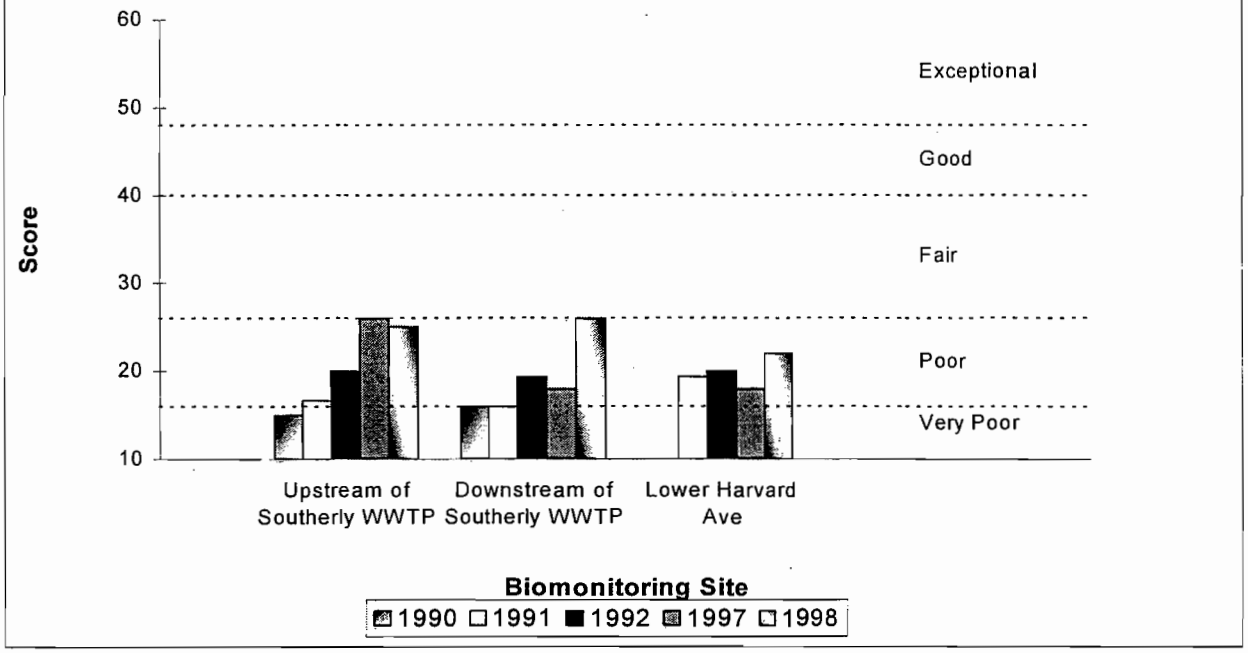


Figure J-2
Average Cuyahoga River Index of Biotic Integrity Scores,
1990-1992 vs. 1997-1998

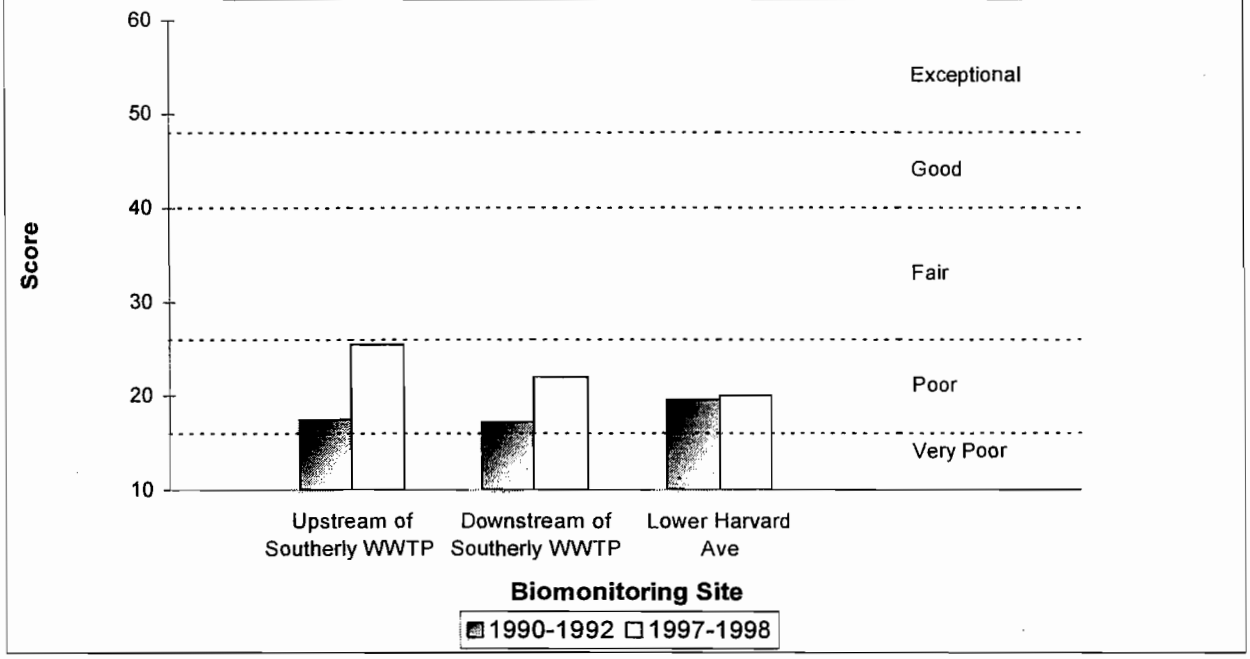


Figure J-3
Average Cuyahoga River Modified Index of Well-Being Scores
1990-1998

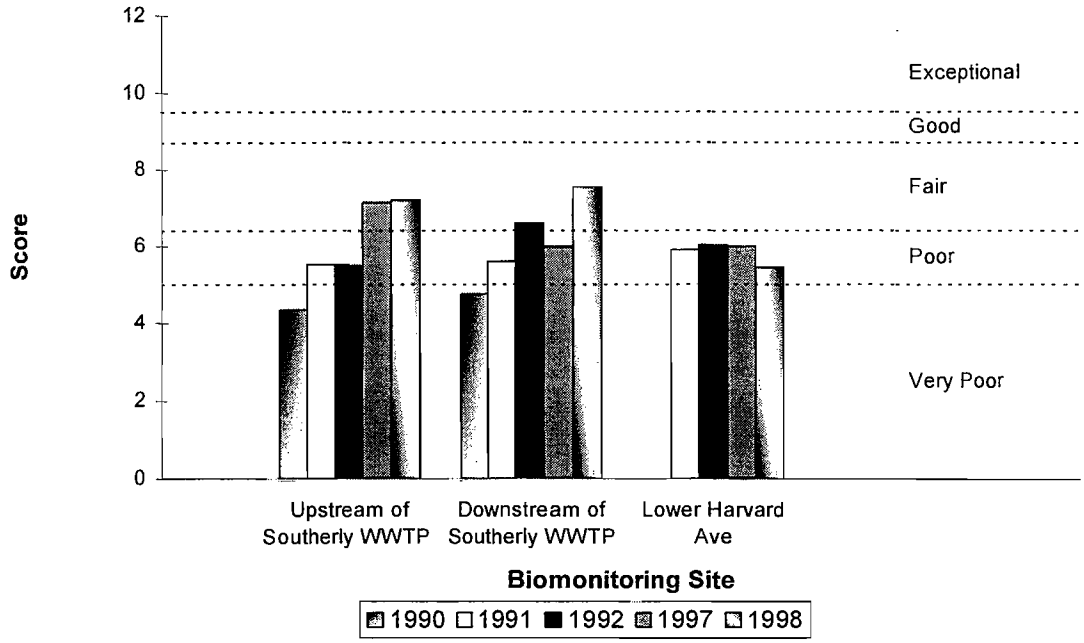


Figure J-4
Average Cuyahoga River Modified Index of Well-Being Scores,
1990-1992 vs 1997-1998

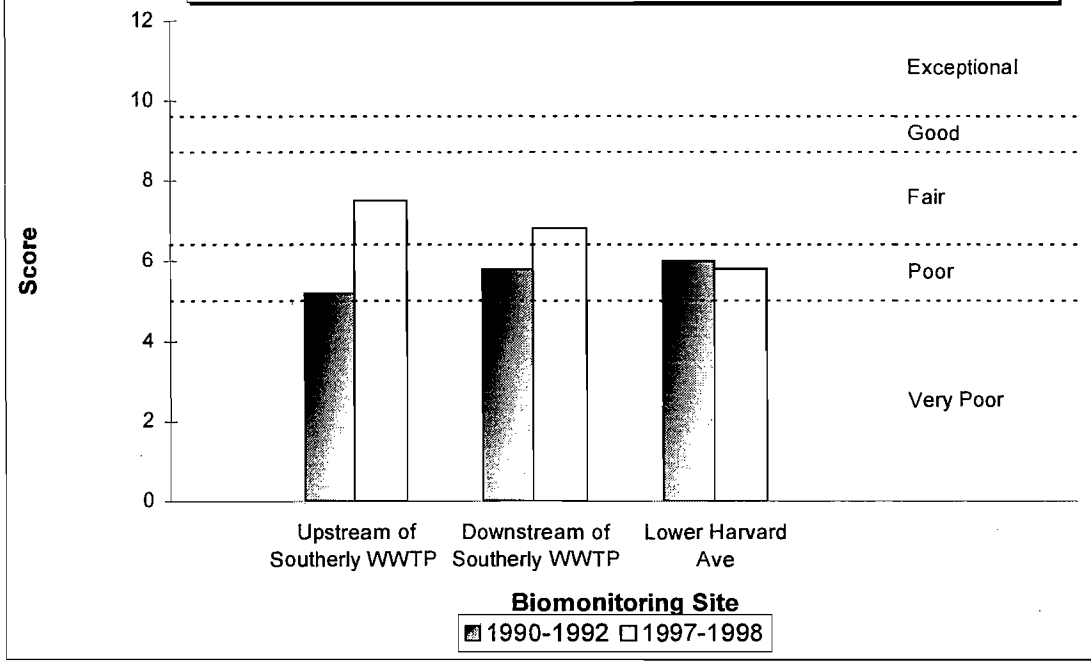
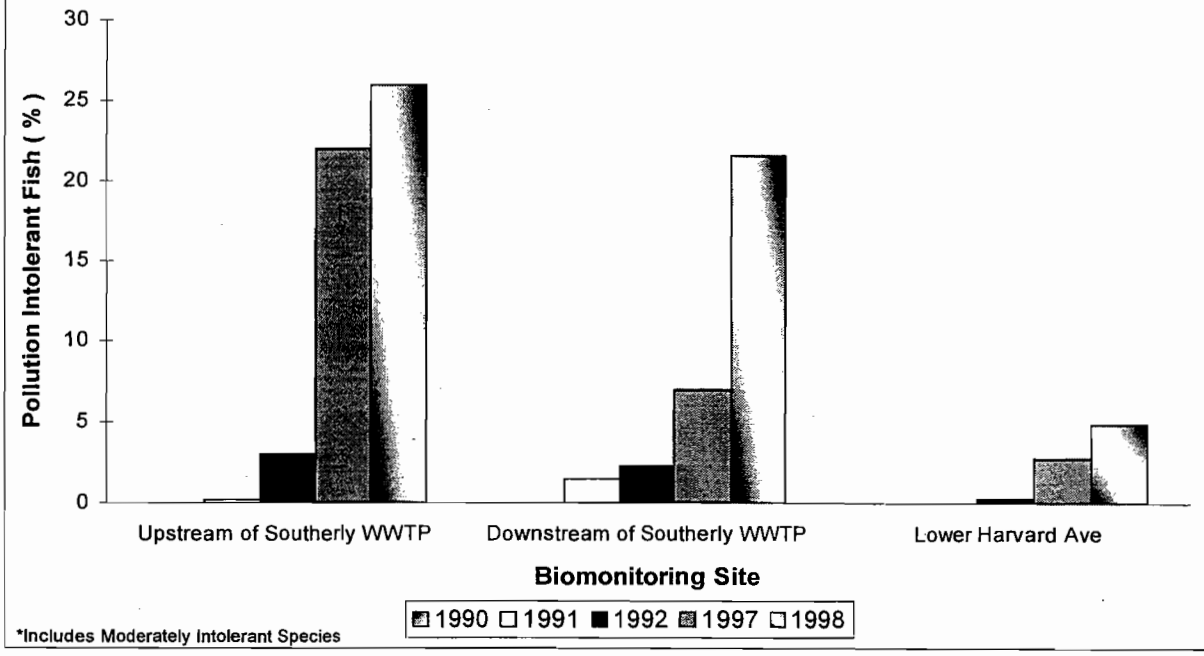
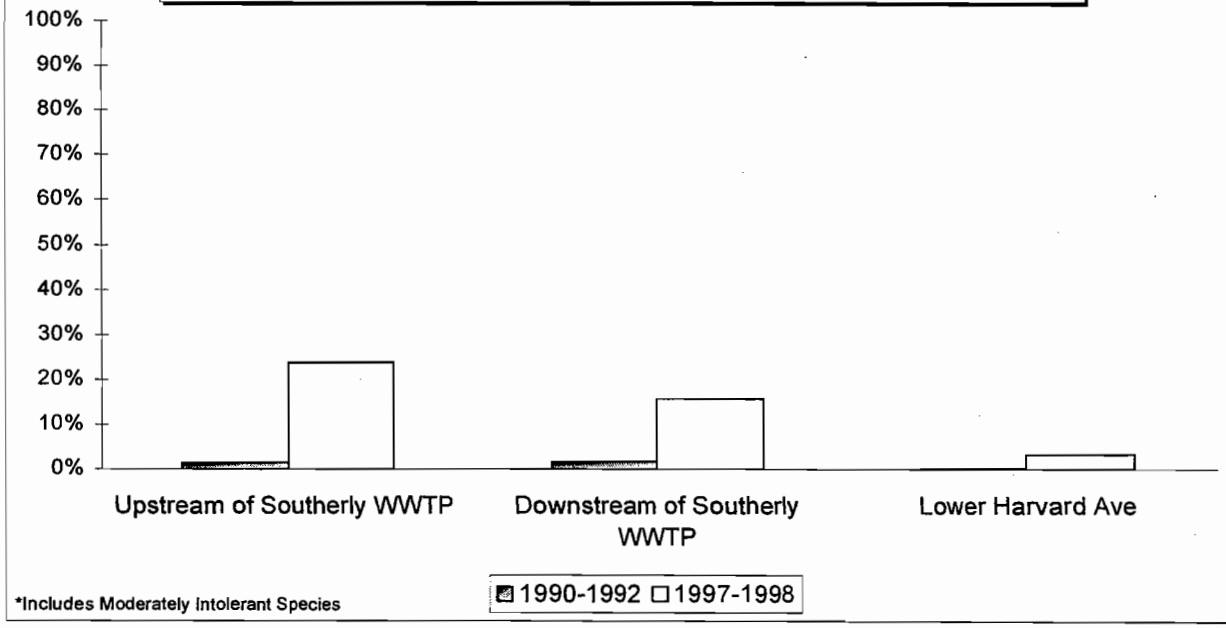


Figure J-5
Proportion of Pollution *Intolerant Fish Collected
Cuyahoga River, 1990-1998



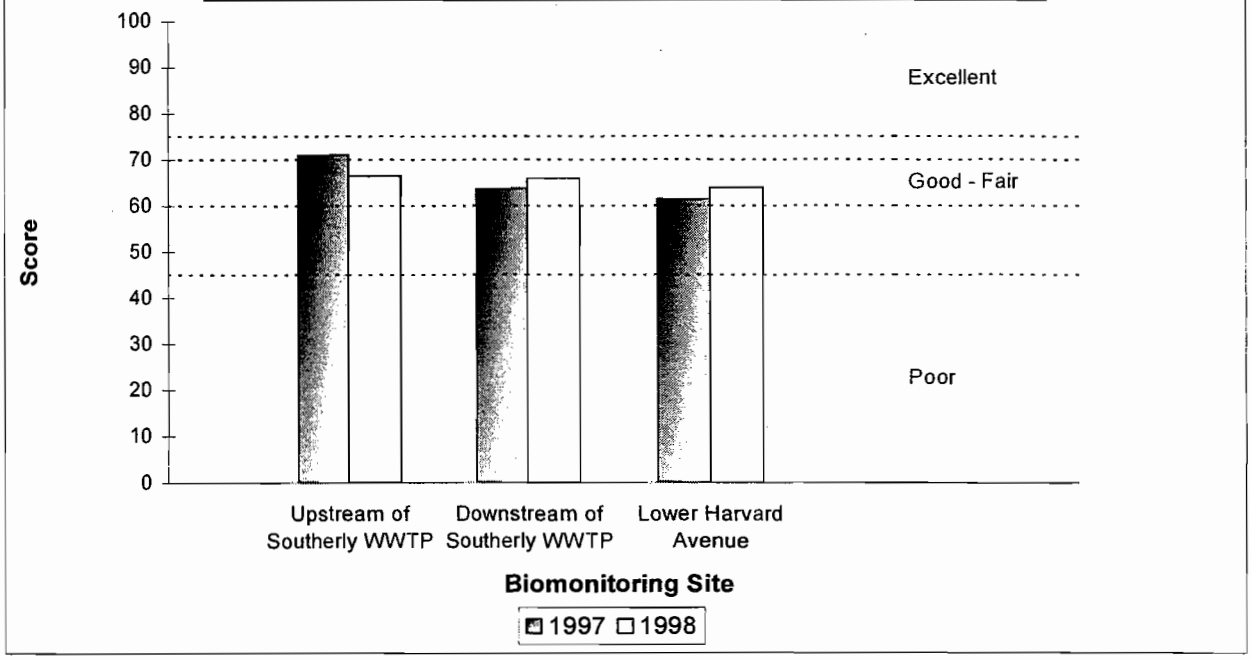
*Includes Moderately Intolerant Species

Figure J-6
Proportion of Pollution *Intolerant Fish Collected on the Cuyahoga River
1990-1992 vs. 1997-1998



*Includes Moderately Intolerant Species

Figure J-7
Cuyahoga River Qualitative Habitat Evaluation Index Scores
1997-1998



Cuyahoga River Upstream of Southerly Wastewater Treatment Plant
September 15, 1997
Collection Distance: 0.5 km
Collection Method: Boat Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies
Dorosoma cepedianum Eastern gizzard shad	8	0.648	--	--
Hypentelium nigricans Northern hog sucker	23	4.539	Moderately Intolerant	Fin lesion (1)
Catostomus commersoni Common white sucker	2	0.242	Highly Tolerant	--
Cyprinus carpio Common carp	4	5.998	Highly Tolerant	--
Semotilus atromaculatus Creek chub	1	0.002	Highly Tolerant	--
Notropis atherinoides Common Emerald shiner	12	0.076	--	--
Notropis comutus Common shiner	1	0.040	--	--
Notropis spilopterus Spotfin shiner	4	0.020	--	--
Notropis stramineus Sand shiner	1	0.002	Moderately Intolerant	--
Pimephales notatus Bluntnose minnow	3	0.014	Highly Tolerant	--
Ictalurus natalis Yellow bullhead	11	1.648	Highly Tolerant	Mouth lesions (3) Deformed fin (1)
Ambloplites rupestris Northern rockbass	1	0.006	--	--
Micropterus dolomieui Smallmouth bass	2	0.080	Moderately Intolerant	--

Cuyahoga River Upstream of Southerly Wastewater Treatment Plant
September 15, 1997

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies
Lepomis cyanellus Green sunfish	1	0.010	Highly Tolerant	--
Percina caprodes Northern logperch darter	1	0.020	Moderately Intolerant	--
Totals	75	13.345		

*DELT anomalies were observed on 6.6% (5) of the fish collected.
Index of Biotic Integrity (IBI) = 28 (Fair)
Modified Index of Well-Being (MIwb) = 7.0 (Fair)

Cuyahoga River Upstream of Southerly Wastewater Treatment Plant
October 16, 1997
Collection Distance: 0.5 km
Collection Method: Boat Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies
Dorosoma cepedianum Eastern gizzard shad	65	11.372	--	--
Hypentelium nigricans Northern hog sucker	16	4.426	Moderately Intolerant	--
Catostomus commersoni Common white sucker	17	3.854	Highly Tolerant	--
Cyprinus carpio Common carp	5	13.560	Highly Tolerant	--
Semotilus atromaculatus Creek chub	1	0.040	Highly Tolerant	--
Notropis atherinoides Common Emerald shiner	3	0.012	--	--
Notropis spilopterus Spotfin shiner	6	0.042	--	--
Pimephales notatus Bluntnose minnow	8	0.050	Highly Tolerant	--
Campostoma anomalum Central stoneroller minnow	5	0.140	--	--
Ictalurus punctatus Channel catfish	1	0.948	--	--
Ictalurus natalis Yellow bullhead	3	0.530	Highly Tolerant	--
Ictalurus nebulosus Brown bullhead	2	0.198	Highly Tolerant	--
Micropterus dolomieui Smallmouth bass	1	0.724	Moderately Intolerant	--

Cuyahoga River Upstream of Southerly Wastewater Treatment Plant
October 16, 1997

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies
Lepomis macrochirus Northern bluegill sunfish	2	0.040	Moderately Tolerant	--
Percina caprodes Northern logperch darter	3	0.058	Moderately Intolerant	--
Totals	138	35.994		

*DELT anomalies were observed on 0% (0) of the fish collected.
Index of Biotic Integrity (IBI) = 24 (Poor)
Modified Index of Well-Being (MIwb) = 7.9 (Fair)

Cuyahoga River Upstream of Southerly Wastewater Treatment Plant
August 4, 1998
Collection Distance: 0.5 km
Collection Method: Boat Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies
Dorosoma cepedianum Eastern gizzard shad	6	0.206	--	--
Moxostoma erythrurum Golden redhorse	2	0.112	Moderately Intolerant	--
Hypentelium nigricans Northern hog sucker	15	3.110	Moderately Intolerant	Eroded fin (1)
Catostomus commersoni Common white sucker	9	2.180	Highly Tolerant	Fin lesion (1)
Cyprinus carpio Common carp	15	18.522	Highly Tolerant	Fin lesion (1)
Carassius auratus Goldfish	1	0.204	Highly Tolerant	Body lesion (1)
Notropis spilopterus Spotfin shiner	10	0.060	--	--
Notropis stramineus Sand shiner	1	0.002	Moderately Intolerant	--
Pimephales notatus Bluntnose minnow	4	0.016	Highly Tolerant	--
Campostoma anomalum Central stoneroller minnow	2	0.004	--	--
Ictalurus punctatus Channel catfish	3	2.225	--	--
Ictalurus natalis Yellow bullhead	8	0.912	Highly Tolerant	Lip lesion (2)
Ictalurus nebulosus Brown bullhead	1	0.060	Highly Tolerant	--

Cuyahoga River Upstream of Southerly Wastewater Treatment Plant
August 4, 1998

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies
Micropterus dolomieui Smallmouth bass	2	0.016	Moderately Intolerant	--
Micropterus salmoides Largemouth bass	1	0.280	--	--
Lepomis cyanellus Green sunfish	5	0.060	Highly Tolerant	--
Lepomis macrochirus Northern bluegill sunfish	8	0.112	Moderately Tolerant	Body lesion (1)
Lepomis gibbosus Pumpkinseed sunfish	3	0.064	Moderately Tolerant	--
Percina caprodes Northern logperch darter	4	0.072	Moderately Intolerant	--
Green sunfish hybrid	1	0.048	--	--
Totals	101	28.265		

*DELT anomalies were observed on 6.9% (7) of the fish collected.
Index of Biotic Integrity (IBI) = 24 (Poor)
Modified Index of Well-Being (MIwb) = 7.5 (Fair)

Cuyahoga River Upstream of Southerly Wastewater Treatment Plant
September 30, 1998
Collection Distance: 0.5 km
Collection Method: Boat Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies
Dorosoma cepedianum Eastern gizzard shad	30	2.054	--	--
Moxostoma erythrurum Golden redhorse	1	0.008	Moderately Intolerant	--
Hypentelium nigricans Northern hog sucker	26	2.648	Moderately Intolerant	--
Catostomus commersoni Common white sucker	9	1.630	Highly Tolerant	Deformed tail (1) Fin lesion (1)
Cyprinus carpio Common carp	11	17.338	Highly Tolerant	Fin lesion (1)
Carassius auratus Goldfish	1	0.284	Highly Tolerant	Body lesion(1)
Semotilus atromaculatus Creek chub	1	0.006	Highly Tolerant	--
Notropis atherinoides Common Emerald shiner	2	0.016	--	--
Notropis cornutus Common shiner	2	0.012	--	--
Notropis spilopterus Spotfin shiner	5	0.040	--	--
Notropis stramineus Sand shiner	2	0.008	Moderately Intolerant	--
Pimephales notatus Bluntnose minnow	2	0.018	Highly Tolerant	--
Ictalurus punctatus Channel catfish	3	0.750	--	--

Cuyahoga River Upstream of Southerly Wastewater Treatment Plant
September 30, 1998

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies
Ictalurus natalis Yellow bullhead	3	0.408	Highly Tolerant	--
Pomoxis annularis White crappie	1	0.133	--	--
Ambloplites rupestris Northern rockbass	5	0.294	--	--
Micropterus dolomieui Smallmouth bass	3	0.044	Moderately Intolerant	--
Lepomis cyanellus Green sunfish	7	0.136	Highly Tolerant	--
Lepomis gibbosus Pumpkinseed sunfish	4	0.136	Moderately Tolerant	Body tumor (1)
Totals	118	25.963		

*DELT anomalies were observed on 4.2% (5) of the fish collected.
Index of Biotic Integrity (IBI) = 26 (Fair)
Modified Index of Well-Being (MIwb) = 7.5 (Fair)

Cuyahoga River Downstream of Southerly Wastewater Treatment Plant
September 15, 1997
Collection Distance: 0.5 km
Collection Method: Boat Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies
Dorosoma cepedianum Eastern gizzard shad	4	1.012	--	--
Hypentelium nigricans Northern hog sucker	2	0.450	Moderately Intolerant	--
Cyprinus carpio Common carp	8	12.274	Highly Tolerant	--
Notropis spilopterus Spotfin shiner	4	0.012	--	--
Notropis stramineus Sand shiner	1	0.002	Moderately Intolerant	--
Pimephales notatus Bluntnose minnow	2	0.004	Highly Tolerant	--
Ictalurus natalis Yellow bullhead	7	1.534	Highly Tolerant	Deformed dorsal (1)
Ictalurus nebulosus Brown bullhead	1	0.204	Highly Tolerant	--
Totals	29	15.492		

*DELT anomalies were observed on 3.44% (1) of the fish collected.
Index of Biotic Integrity (IBI) = 14 (Very Poor)
Modified Index of Well-Being (MIwb) = 4.7 (Very Poor)

Cuyahoga River Downstream of Southerly Wastewater Treatment Plant
October 16, 1997
Collection Distance: 0.5 km
Collection Method: Boat Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies
Dorosoma cepedianum Eastern gizzard shad	78	20.380	--	--
Salmo gairdneri Rainbow trout	2	1.850	--	--
Moxostoma erythrurum Golden redhorse	1	0.642	Moderately Intolerant	--
Hypentelium nigricans Northern hog sucker	8	1.614	Moderately Intolerant	--
Catostomus commersoni Common white sucker	29	6.574	Highly Tolerant	Dorsal lesion (1)
Cyprinus carpio Common carp	19	33.250	Highly Tolerant	Body tumor (1)
Notropis atherinoides Common Emerald shiner	7	0.040	--	--
Notropis spilopterus Spotfin shiner	4	0.016	--	--
Ictalurus punctatus Channel catfish	1	0.600	--	--
Ictalurus nebulosus Brown bullhead	1	0.130	Highly Tolerant	--
Morone chrysops White bass	1	0.020	--	--
Micropterus dolomieui Smallmouth bass	1	0.500	Moderately Intolerant	--
Lepomis macrochirus Northern bluegill sunfish	1	0.004	Moderately Tolerant	--

Cuyahoga River Downstream of Southerly Wastewater Treatment Plant
October 16, 1997

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies
Totals	153	65.620		

*DELT anomalies were observed on 1.30% (2) of the fish collected.
Index of Biotic Integrity (IBI) = 22 (Poor)
Modified Index of Well-Being (MIwb) = 7.4 (Fair)

Cuyahoga River Downstream of Southerly Wastewater Treatment Plant
August 4, 1998
Collection Distance: 0.5 km
Collection Method: Boat Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies
Dorosoma cepedianum Eastern gizzard shad	63	3.224	--	--
Moxostoma erythrurum Golden redhorse	8	2.080	Moderately Intolerant	--
Hypentelium nigricans Northern hog sucker	12	2.072	Moderately Intolerant	--
Catostomus commersoni Common white sucker	8	1.688	Highly Tolerant	Lip lesion (1)
Cyprinus carpio Common carp	22	30.729	Highly Tolerant	Body lesion (1)
Semotilus atromaculatus Creek chub	1	0.004	Highly Tolerant	--
Notropis spilopterus Spotfin shiner	11	0.046	--	--
Notropis stramineus Sand shiner	1	0.008	Moderately Intolerant	--
Ictalurus punctatus Channel catfish	3	1.885	--	Body lesion (1)
Ictalurus natalis Yellow bullhead	1	0.120	Highly Tolerant	--
Micropterus dolomieui Smallmouth bass	2	0.036	Moderately Intolerant	--
Lepomis cyanellus Green sunfish	4	0.040	Highly Tolerant	Deformed tail (1)
Lepomis macrochirus Northern bluegill sunfish	5	0.042	Moderately Tolerant	--

Cuyahoga River Downstream of Southerly Wastewater Treatment Plant
August 4, 1998

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies
Lepomis gibbosus Pumpkinseed sunfish	3	0.040	Moderately Tolerant	--
Percina caprodes Northern logperch darter	1	0.012	Moderately Intolerant	--
Aplodinotus grunniens Freshwater drum	2	2.700	Moderately Tolerant	--
Green sunfish hybrid	1	0.050	--	--
Totals	148	44.776		

*DELT anomalies were observed on 2.7% (4) of the fish collected.
Index of Biotic Integrity (IBI) = 24 (Poor)
Modified Index of Well-Being (MIwb) = 7.5 (Fair)

Cuyahoga River Downstream of Southerly Wastewater Treatment Plant
September 30, 1998
Collection Distance: 0.5 km
Collection Method: Boat Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies
Dorosoma cepedianum Eastern gizzard shad	39	3.989	--	--
Moxostoma erythrurum Golden redhorse	11	3.764	Moderately Intolerant	Eroded fin (1)
Hypentelium nigricans Northern hog sucker	12	2.774	Moderately Intolerant	Eroded tail (1)
Catostomus commersoni Common white sucker	8	2.942	Highly Tolerant	Body lesion (1)
Cyprinus carpio Common carp	13	27.331	Highly Tolerant	Eroded fin(1) Fin lesion (1)
Notropis spilopterus Spotfin shiner	6	0.034	--	--
Notropis stramineus Sand shiner	1	0.006	Moderately Intolerant	--
Pimephales notatus Bluntnose minnow	5	0.046	Highly Tolerant	--
Ictalurus punctatus Channel catfish	2	0.540	--	--
Ictalurus natalis Yellow bullhead	1	0.090	Highly Tolerant	--
Ambloplites rupestris Northern rockbass	1	0.110	--	--
Micropterus dolomieui Smallmouth bass	4	0.314	Moderately Intolerant	--
Lepomis cyanellus Green sunfish	4	0.044	Highly Tolerant	--

Cuyahoga River Downstream of Southerly Wastewater Treatment Plant
September 30, 1998

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies
Lepomis macrochirus Northern bluegill sunfish	2	0.037	Moderately Tolerant	--
Lepomis gibbosus Pumpkinseed sunfish	1	0.020	Moderately Tolerant	--
Percina caprodes Northern logperch darter	4	0.050	Moderately Intolerant	--
Etheostoma blenniodes Greenside darter	1	0.004	Moderately Intolerant	--
Totals	115	42.095		

*DELT anomalies were observed on 4.3% (5) of the fish collected.
Index of Biotic Integrity (IBI) = 28 (Fair)
Modified Index of Well-Being (MIwb) = 7.6 (Fair)

Cuyahoga River at Lower Harvard Avenue
September 16, 1997
Collection Distance: 0.5 km
Collection Method: Boat Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies
Dorosoma cepedianum Eastern gizzard shad	29	7.136	--	--
Moxostoma erythrurum Golden redhorse	1	0.070	Moderately Intolerant	--
Hypentelium nigricans Northern hog sucker	2	0.284	Moderately Intolerant	--
Catostomus commersoni Common white sucker	13	5.040	Highly Tolerant	Dorsal lesion (1) Lip lesion (1)
Cyprinus carpio Common carp	8	16.550	Highly Tolerant	Deformed eye (1)
Notropis atherinoides Common Emerald shiner	9	0.036	--	--
Notropis spilopterus Spotfin shiner	5	0.010	--	--
Morone chrysops White bass	1	0.040	--	--
Lepomis macrochirus Northern bluegill sunfish	2	0.020	Moderately Tolerant	--
Totals	70	29.186		

*DELT anomalies were observed on 4.2% (3) of the fish collected.
Index of Biotic Integrity (IBI) = 16 (Poor)
Modified Index of Well-Being (MIwb) = 6.4 (Fair)

Cuyahoga River at Lower Harvard Avenue
October 17, 1997
Collection Distance: 0.5 km
Collection Method: Boat Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies
Dorosoma cepedianum Eastern gizzard shad	57	12.624	--	--
Hypentelium nigricans Northern hog sucker	1	0.160	Moderately Intolerant	--
Cyprinus carpio Common carp	3	13.589	Highly Tolerant	--
Notropis atherinoides Common Emerald shiner	5	0.020	--	--
Pimephales notatus Bluntnose minnow	1	0.002	Highly Tolerant	--
Ictalurus natalis Yellow bullhead	1	0.330	Highly Tolerant	--
Morone chrysops White bass	1	0.004	--	--
Lepomis gibbosus Pumpkinseed sunfish	1	0.040	Moderately Tolerant	--
Totals	70	26.769		

*DELT anomalies were observed on 0% (0) of the fish collected.
Index of Biotic Integrity (IBI) = 20 (Poor)
Modified Index of Well-Being (MIwb) = 5.7 (Poor)

Cuyahoga River Lower Harvard Avenue
August 5, 1998
Collection Distance: 0.5 km
Collection Method: Boat Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies
Dorosoma cepedianum Eastern gizzard shad	5	0.664	--	--
Catostomus commersoni Common white sucker	9	2.700	Highly Tolerant	--
Cyprinus carpio Common carp	20	61.660	Highly Tolerant	Deformed fin(1) Body lesions (2)
Carassius auratus Goldfish	1	0.192	Highly Tolerant	Body lesions (1)
Semotilus atromaculatus Creek chub	1	0.004	Highly Tolerant	--
Notropis atherinoides Common Emerald shiner	1	0.008	--	--
Pimephales notatus Bluntnose minnow	1	0.010	Highly Tolerant	--
Ictalurus natalis Yellow bullhead	2	0.262	Highly Tolerant	--
Ambloplites rupestris Northern rockbass	1	0.092	--	--
Micropterus salmoides Largemouth bass	2	0.240	--	--
Lepomis cyanellus Green sunfish	3	0.070	Highly Tolerant	Fin lesion(1)
Lepomis macrochirus Northern bluegill sunfish	8	0.198	Moderately Tolerant	--
Lepomis gibbosus Pumpkinseed sunfish	5	0.180	Moderately Tolerant	--

Cuyahoga River Lower Harvard Avenue
August 5, 1998

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies
Bluegill sunfish hybrid	1	0.020	--	--
Totals	60	66.300		

*DELT anomalies were observed on 8.3% (5) of the fish collected.
Index of Biotic Integrity (IBI) = 22 (Poor)
Modified Index of Well-Being (MIwb) = 4.8 (Very Poor)

Cuyahoga River Lower Harvard Avenue
October 2, 1998
Collection Distance: 0.5 km
Collection Method: Boat Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies
Dorosoma cepedianum Eastern gizzard shad	86	6.015	--	Body lesion (1)
Moxostoma erythrurum Golden redhorse	2	0.230	Moderately Intolerant	--
Hypentelium nigricans Northern hog sucker	3	1.200	Moderately Intolerant	--
Catostomus commersoni Common white sucker	1	0.620	Highly Tolerant	--
Cyprinus carpio Common carp	3	12.939	Highly Tolerant	--
Micropterus dolomieui Smallmouth bass	3	0.900	Moderately Intolerant	--
Lepomis macrochirus Northern bluegill sunfish	2	0.100	Moderately Tolerant	--
Lepomis gibbosus Pumpkinseed sunfish	2	0.130	Moderately Tolerant	--
Aplodinotus grunniens Freshwater drum	1	0.620	Moderately Tolerant	--
Totals	103	22.754		

*DELT anomalies were observed on 0.97% (1) of the fish collected.
Index of Biotic Integrity (IBI) = 22 (Poor)
Modified Index of Well-Being (MIwb) = 6.1 (Poor)

APPENDIX K
EUCLID CREEK ELECTROFISHING SURVEY
1998

Introduction

The Northeast Ohio Regional Sewer District's (NEORSD's) Water Quality and Industrial Surveillance department (WQIS) performed quantitative electrofish sampling on Euclid Creek in 1998 utilizing its 17' Coffelt aluminum electrofishing boat and generator-powered longline electrofishing equipment. Fish were identified to species level, weighed, counted, examined for the presence of DELT anomalies (deformities, eroded fins, lesions and tumors), and returned to the stream where they were collected.

Longline electrofishing consists of wading in an upstream direction for a distance of 150-200 meters and sampling all habitat types including undercut banks, brush piles, log jams, boulders and other submerged structures. Fish are then netted and placed in a nylon floating live well where they are later processed. Boat electrofishing consists of sampling all habitat types within a sampling zone, which is 0.5 kilometers in length, while moving from upstream to downstream. In zones with extensive woody debris and abundant cover, a slower boat speed is necessary to maneuver the boat. Stunned fish are collected and placed in an on-board live well for later processing. Ohio EPA protocols require two or three individual sampling passes to assess fish community health at each site.

The electrofishing data collected by NEORSD were compiled and used to calculate two Ohio EPA indices, the Index of Biotic Integrity (IBI) and the Modified Index of Well Being (MIwb), which are used to assess fish community health. The IBI incorporates 12 metrics representing structural and functional attributes of a fish community. Structural attributes are based upon fish community aspects such as fish numbers and diversity. Functional attributes are based upon fish community aspects such as feeding strategies, environmental tolerances and disease symptoms. The metrics are individually scored by comparing the results obtained at the survey site with values expected at reference sites located in the same geographic ecoregion. The summation of the 12 individual metric scores provides an IBI score between 12 and 60 and an associated narrative rating (*Exceptional, Good, Fair, or Poor*) of fish community health.

The MIwb, which is based upon the structural aspects of a fish community, is calculated at sites which have a tributary drainage area greater than 20 square miles. The MIwb incorporates the following four fish community measures: number of individuals, biomass, the Shannon Diversity Index based on numbers of fishes, and the Shannon Diversity Index based on weight of fishes. The MIwb score is the result of a mathematical calculation using the formula:

$$MIwb = 0.5\,lnN + 0.5\,lnB + \overline{H}(No.) + \overline{H}(Wt.)$$

where:

N = Relative numbers of all species excluding species designated "highly tolerant"

B = Relative weights of all species excluding species designated "highly tolerant"

$\overline{H}(No.)$ = Shannon Diversity Index based on numbers

$\overline{H}(Wt.)$ = Shannon Diversity Index based on weight

Shannon Diversity Index

$$\overline{H} = -\sum\left[\left(\frac{n_i}{N}\right)log_e\left(\frac{n_i}{N}\right)\right]$$

where:

n_i = Relative numbers or weight of species

N = Total number or weight of the sample

Detailed descriptions of sampling and analysis methods utilized in fish surveys, including IBI and MIwb calculations and the relationship between narrative ratings and index scores can be found in Ohio EPA's *Biological Criteria for the Protection of Aquatic Life* (1987) and *Compendium of Biological Results from Ohio Rivers, Streams and Lakes* (1989).

Results and Conclusions

Electrofishing was performed at the following Euclid Creek sites:

Site #4:	Mayfield Road
Site #3:	North Branch at Highland Picnic Area (Euclid Creek Reservation)
Site #2:	South Branch at Highland Picnic Area (Euclid Creek Reservation)
Site #1:	South of the St. Clair Avenue bridge
Site #0.5:	North of Lake Shore Boulevard

Investigators assessed aquatic habitat at each site using Ohio EPA's Qualitative Habitat Evaluation Index (QHEI). QHEI scores ranged from 50 at Site #4 to 78.5 at Site #1. According to Ohio EPA's *The Qualitative Habitat Evaluation Index (QHEI): Rationale, Methods, and Application*, "Stream reaches with QHEI scores averaging >

60 will likely have the potential to attain the WWH use" (p. 40). Figure K-1 shows QHEI scores for the Euclid Creek electrofishing sites. QHEI field sheets are located in Appendix D of the 1996-1998 Greater Cleveland Area Environmental Water Quality Assessment report.

Electrofish sampling was conducted three times at each location during the 1998 field season. Except for the second and third pass at Site #0.5, where NEORSD's 17' Coffelt electrofishing boat was used, electrofishing was conducted using the longline stream bank electroshocker. Because investigators determined that the habitat at Site #0.5 was inappropriate for the longline electrofishing method, results from the first pass at this site were disregarded for the purposes of this investigation. The IBI was calculated at all of the above sites. The MIwb was calculated only at Sites #0.5 and #1, where the tributary drainage area is greater than 20 square miles.

Each of the Euclid Creek sites has been assigned the Warmwater Habitat (WWH) aquatic life use designation by the Ohio EPA. Index scores must fall into the *Good* range to meet biological criteria. The minimum score required to meet the WWH IBI criterion is 38 for wading sites and 40 for headwater and boat sites. The minimum score required to meet the MIwb criterion is 7.9 for wading sites and 8.7 for boat sites.

The Euclid Creek sites, which were electrofished by NEORSD in 1998, obtained scores in the *Poor* to *Fair* ranges. A summary of 1998 Euclid Creek electrofishing results is presented in Table K-1. Additional tables which, for each sampling event, list the species collected, number of individuals, weights, pollution tolerances and incidence of DELT anomalies, can be found at the end of this report. Index of Biotic Integrity and MIwb scores are displayed graphically in Figures K-2 through K-5.

Fish species collected north of Lake Shore Boulevard at Site #0.5 included golden red horse, common white sucker, sunfish, rock bass, round goby, rainbow trout, smallmouth bass and largemouth bass. Because of the influence of Lake Erie on Site #0.5, these results were not unexpected. All of the species listed above tend to be found in lake or lacustrine habitats.

NEORSD investigators collected large percentages of pollution tolerant fish at each Euclid Creek sample location in 1998. The average proportion of pollution tolerant fish collected ranged from approximately 32% at Site #0.5 to approximately 63% at Site #2. According to Ohio EPA's *Biological Criteria for the protection of Aquatic Life: Volume II*, tolerant fish species tend toward community predominance with decreasing water and/or habitat quality (p. 4-29). The proportion of pollution tolerant fish collected at each site is shown in Table K-1 and displayed graphically in Figures K-6 and K-7.

During routine dry weather sampling conducted on Euclid Creek from 1993 through 1998, NEORSD investigators occasionally measured bacteria levels in excess of Ohio EPA's Primary Contact recreational use designation criteria at Sites 0.5, 1, and 4. (See Appendix B of the NEORSD's 1993-1995 and 1996-1998 Greater Cleveland Area Environmental Water Quality Assessment reports.) Several dry weather discharges to Euclid Creek containing elevated bacterial levels were observed in 1998 during

NEORSD's RPSD Phase I stream survey. During the Easterly CSO Phase II Facilities Plan Dry Weather Outfall Survey, which was also conducted in 1998, elevated concentrations of bacteria and ammonia were also measured. The elevated ammonia levels (9.5-24.6 mg/L) may have been a stress on the Euclid Creek fish communities. Although the elevated concentrations of *E. coli* and fecal coliform bacteria may not directly impact the fish community, they may indicate the presence of other pollutants which could cause an adverse impact on the fish community.

Table K-1
Northeast Ohio Regional Sewer District
1998 Euclid Creek Fish Collection Summary

Site #	Location	Date	Fish Collected (#)	Tolerant Fish (%)	DELT Anomalies (%)	Index of Biotic Integrity		Modified Index of Well-Being	
						Numerical Score	Narrative Rating	Numerical Score	Narrative Rating
4	Mayfield Road	6/29/98	558	58.9	0.0	28	Fair		
		8/20/98	1061	35.5	0.1	30	Fair		
		10/12/98	1128	47.6	0.0	32	Fair		
		Average	916	47.3	0.0	30	Fair		
3	North Branch, Highland Picnic Area	6/24/98	359	68.2	0.6	26	Poor		
		8/19/98	703	67.8	0.1	26	Poor		
		10/7/98	867	50.5	0.1	30	Fair		
		Average	643	62.2	0.3	27.3	Poor		
2	South Branch, Highland Picnic Area	6/24/98	397	77.8	0.0	26	Poor		
		8/19/98	927	76.0	0.9	26	Poor		
		10/7/98	1887	36.5	0.1	32	Fair		
		Average	1070	63.4	0.3	28	Fair		
1	Upstream St. Clair Ave	6/24/98	428	68.4	0.0	30	Fair	5.7	Poor
		8/20/98	611	49.2	0.0	26	Poor	6.1	Fair
		10/12/98	670	47.6	0.4	26	Poor	6.5	Fair
		Average	570	55.1	0.1	27.3	Poor	6.1	Fair
0.5	North of Lake Shore Blvd	8/21/98	76	23.6	0.0	26	Fair	5.1	Poor
		10/6/98	224	40.1	0.0	30	Fair	6	Poor
		Average	150	31.9	0.0	28	Fair	5.6	Poor

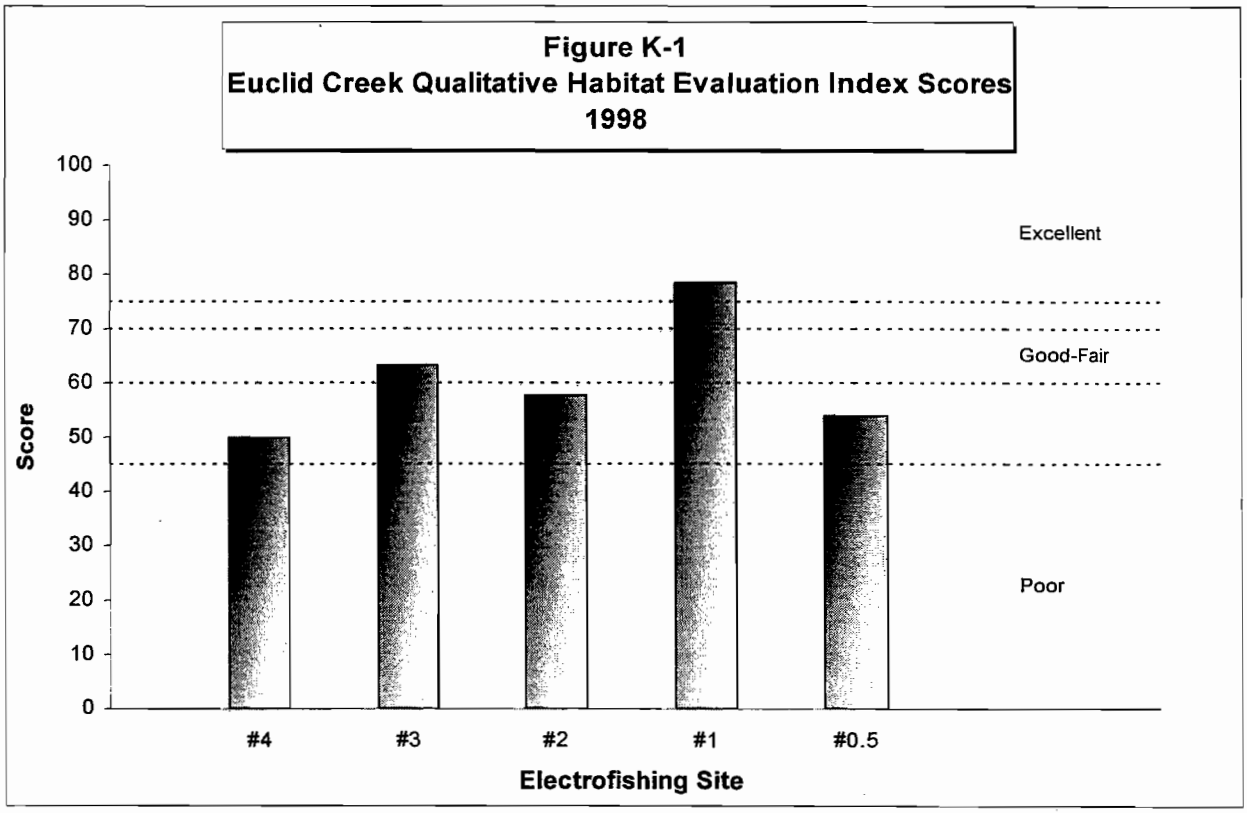


Figure K-2
Index of Biotic Integrity Scores
Euclid Creek, 1998

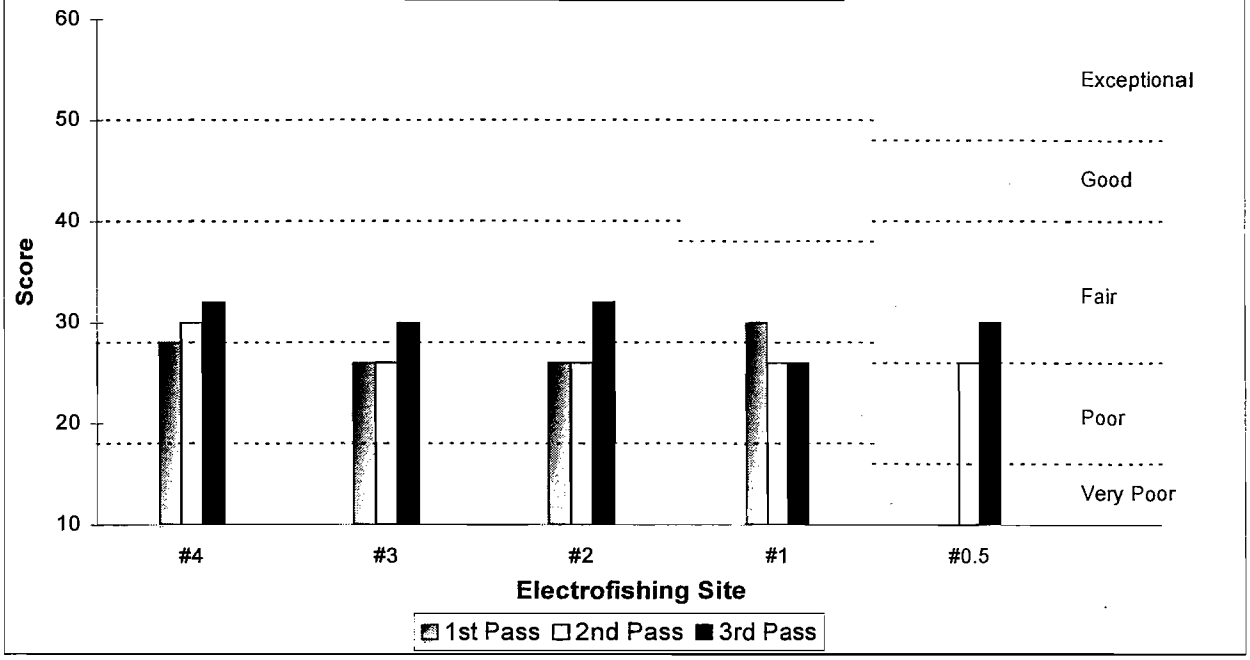


Figure K-3
Average Index of Biotic Integrity Scores
Euclid Creek, 1998

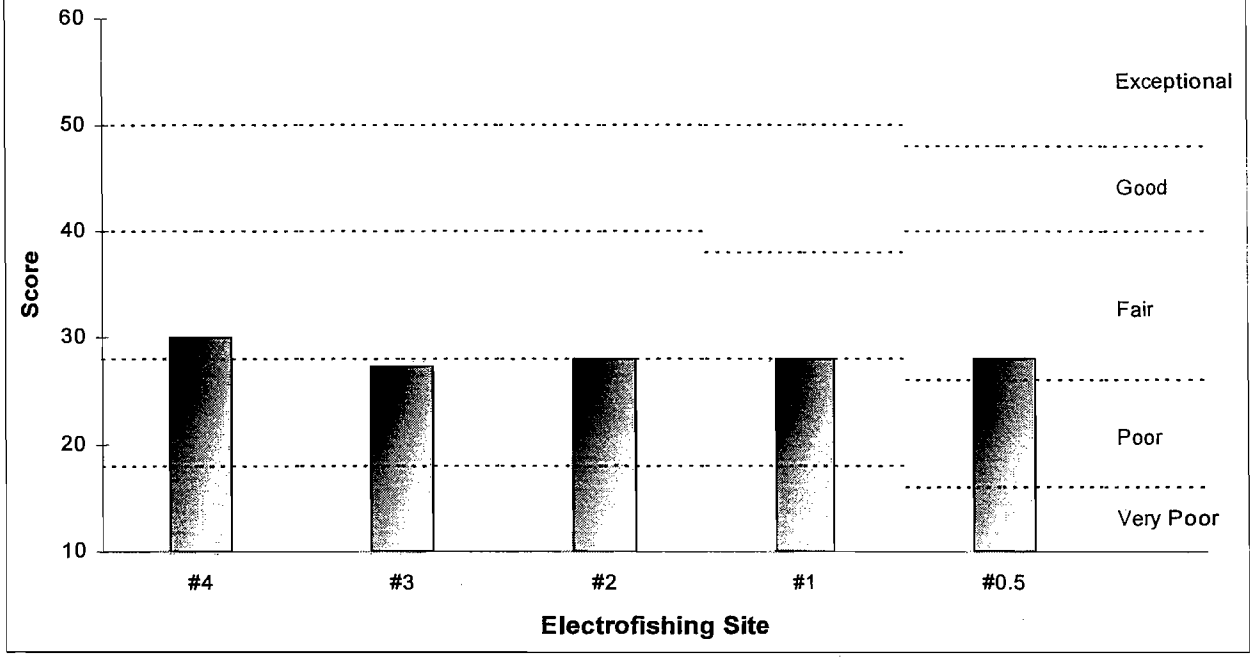


Figure K-4
Modified Index of Well-Being Scores
Euclid Creek, 1998

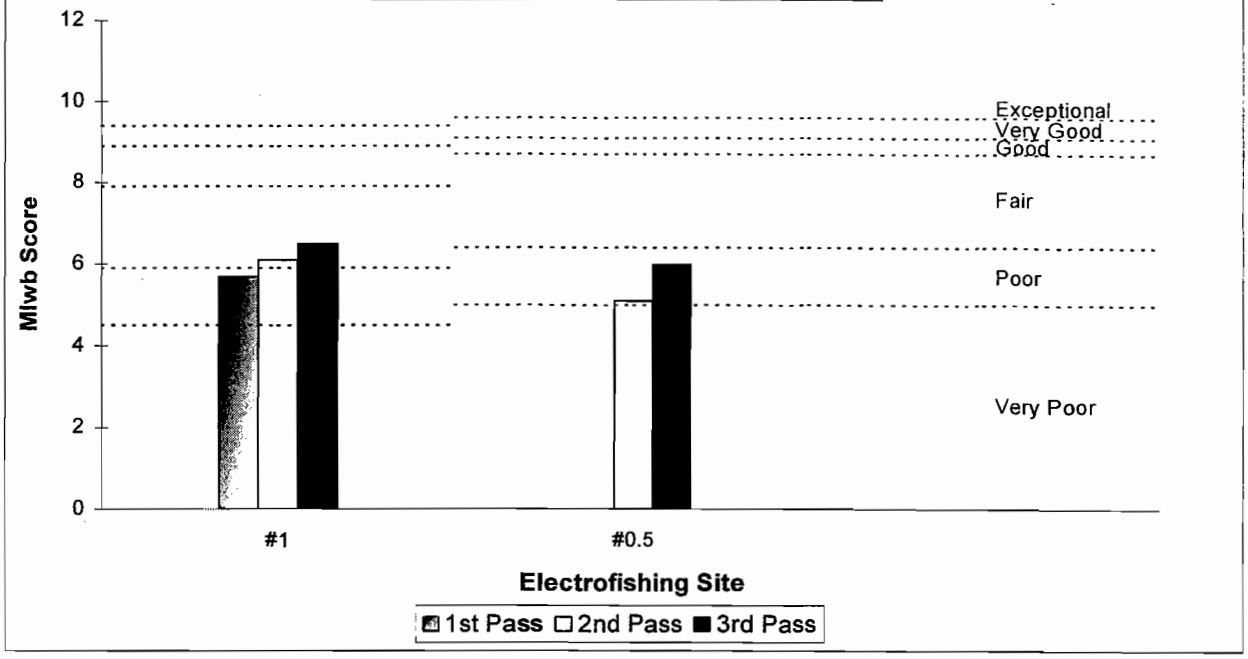


Figure K-5
Average Modified Index of Well-Being Scores
Euclid Creek, 1998

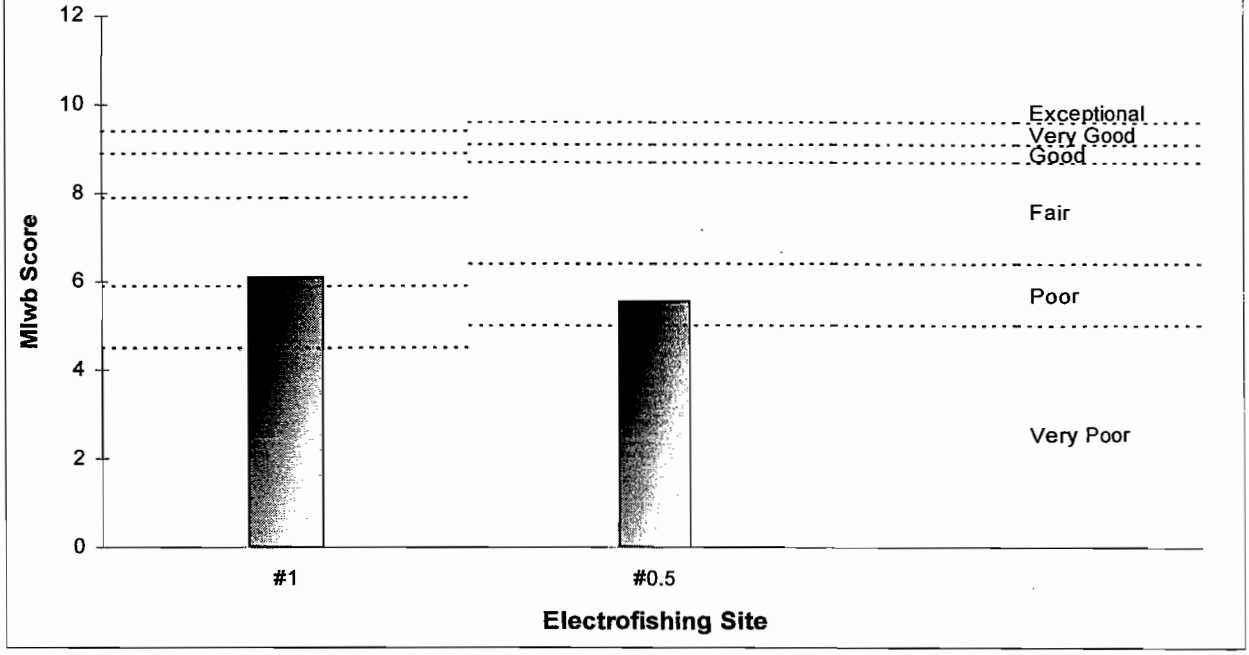


Figure K-6
Proportion of Pollution Torerant Fish Collected
Euclid Creek, 1998

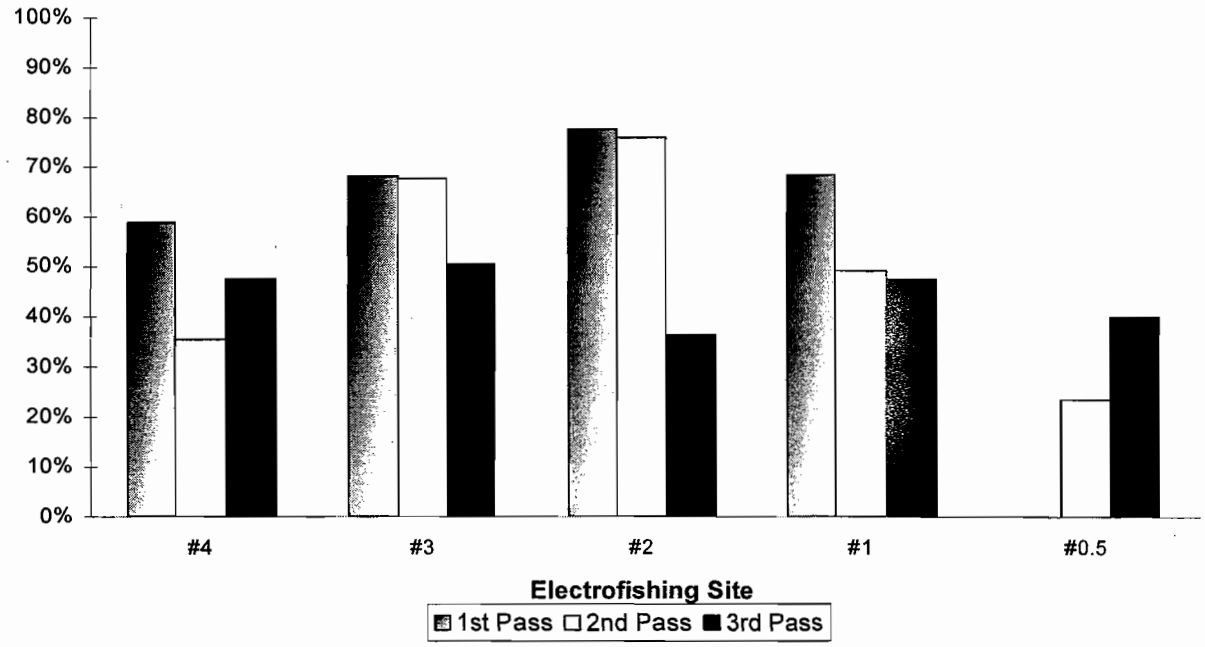
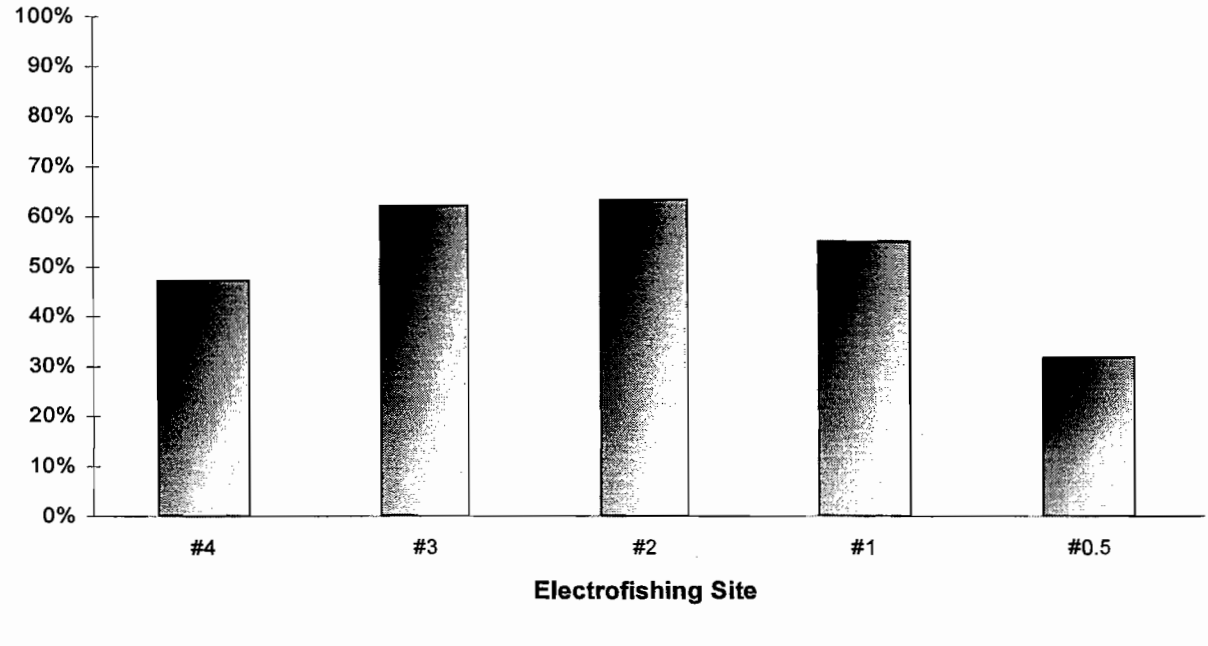


Figure K-7
Average Proportion of Pollution Torerant Fish Collected
Euclid Creek, 1998



Euclid Creek Site #4 - Mayfield Road
June 29, 1998
Collection Distance: 0.2 km
Collection Method: Longline Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies
Carassius auratus Goldfish	1	0.030	Highly Tolerant	--
Rhinicthys atratulus Blacknose dace	26	0.110	Highly Tolerant	--
Semotilus atromaculatus Creek chub	302	2.129	Highly Tolerant	--
Campostoma anomalum Central stoneroller minnow	225	1.342	--	--
Lepomis macrochirus Northern bluegill sunfish	4	0.014	Moderately Tolerant	--
Totals	558	3.625		

* DELT anomalies were observed on 0% (0) of the fish collected
Index of Biotic Integrity (IBI) = 28 (Fair)

Euclid Creek Site #4 - Mayfield Road
August 20, 1998
Collection Distance: 0.2 km
Collection Method: Longline Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies
Rhinicthys atratulus Blacknose dace	64	0.268	Highly Tolerant	--
Semotilus atromaculatus Creek chub	312	1.307	Highly Tolerant	Dorsal lesion (1)
Campostoma anomalum Central stoneroller minnow	668	2.334	--	--
Ictalurus nebulosus Brown bullhead	1	0.160	Highly Tolerant	--
Lepomis gibbosus Pumpkinseed sunfish	16	0.084	Moderately Tolerant	--
Totals	1061	4.153		

*DELT anomalies were observed on 0.09% (1) of the fish collected.
Index of Biotic Integrity (IBI) = 30 (Fair)

Euclid Creek Site #4 - Mayfield Road
October 12, 1998
Collection Distance: 0.2 km
Collection Method: Longline Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies
Rhinicthys atratulus Blacknose dace	70	0.280	Highly Tolerant	--
Semotilus atromaculatus Creek chub	462	1.992	Highly Tolerant	--
Pimephales promelas Northern fathead minnow	5	0.018	Highly Tolerant	--
Campostoma anomalum Central stoneroller minnow	587	2.566	--	--
Lepomis macrochirus Northern bluegill sunfish	1	0.006	Moderately Tolerant	--
Lepomis gibbosus Pumpkinseed sunfish	2	0.014	Moderately Tolerant	--
Bluegill hybrid	1	0.006	--	--
Totals	1128	4.882		

*DELT anomalies were observed on 0% (0) of the fish collected.
Index of Biotic Integrity (IBI) = 32 (Fair)

Euclid Creek Site #3 - North Branch, Highland Picnic Area
June 24, 1998
Collection Distance: 0.2 km
Collection Method: Longline Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies
Catostomus commersoni Common white sucker	8	0.502	Highly Tolerant	--
Notemigonus crysoleucas Golden shiner	1	0.010	Highly Tolerant	--
Rhinicthys atratulus Blacknose dace	143	0.452	Highly Tolerant	--
Semotilus atromaculatus Creek chub	50	0.364	Highly Tolerant	--
Pimephales promelas Northern fathead minnow	16	0.110	Highly Tolerant	Deformed mouth (1)
Pimephales notatus Bluntnose minnow	3	0.016	Highly Tolerant	--
Campostoma anomalum Central stoneroller minnow	97	0.697	--	--
Ictalurus nebulosus Brown bullhead	2	0.282	Highly Tolerant	--
Lepomis cyanellus Green sunfish	22	0.488	Highly Tolerant	--
Lepomis macrochirus Northern bluegill sunfish	7	0.196	Moderately Tolerant	Dorsal lesion (1)
Lepomis gibbosus Pumpkinseed sunfish	10	0.458	Moderately Tolerant	--
Totals	359	3.575		

*DELT anomalies were observed on 0.55% (2) of the fish collected.
Index of Biotic Integrity (IBI) = 26 (Poor)

Euclid Creek Site #3 - North Branch, Highland Picnic Area
August 19,1998
Collection Distance: 0.2 km
Collection Method: Longline Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies
Catostomus commersoni Common white sucker	2	0.044	Highly Tolerant	--
Rhinicthys atratulus Blacknose dace	155	0.418	Highly Tolerant	--
Semotilus atromaculatus Creek chub	258	0.846	Highly Tolerant	--
Pimephales notatus Bluntnose minnow	14	0.082	Highly Tolerant	--
Campostoma anomalum Central stoneroller minnow	197	0.911	--	--
Ictalurus natalis Yellow bullhead	7	0.346	Highly Tolerant	--
Lepomis cyanellus Green sunfish	41	0.783	Highly Tolerant	Eroded tail (1)
Lepomis macrochirus Northern bluegill sunfish	15	0.111	Moderately Tolerant	--
Lepomis gibbosus Pumpkinseed sunfish	12	0.102	Moderately Tolerant	--
Ambloplites rupestrus Rock bass	1	0.010	--	
Bluegill hybrid	1	0.020	--	
Totals	703	3.673		

* DELT anomalies were observed on 0.14% (1) of the fish collected
Index of Biotic Integrity (IBI) = 26 poor

Euclid Creek Site #3 - North Branch, Highland Picnic Area
October 7, 1998
Collection Distance: 0.2 km
Collection Method: Longline Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies
Notemigonus crysoleucas Golden shiner	1	0.010	Highly Tolerant	--
Rhinicthys atratulus Blacknose dace	300	0.840	Highly Tolerant	--
Semotilus atromaculatus Creek chub	103	0.374	Highly Tolerant	--
Pimephales promelas Northern fathead minnow	1	0.006	Highly Tolerant	--
Pimephales notatus Bluntnose minnow	13	0.040	Highly Tolerant	--
Campostoma anomalum Central stoneroller minnow	387	1.174	--	--
Ictalurus natalis Yellow bullhead	4	0.012	Highly Tolerant	--
Lepomis cyanellus Green sunfish	16	0.398	Highly Tolerant	Eroded fin (1)
Lepomis macrochirus Northern bluegill sunfish	37	0.154	Moderately Tolerant	--
Lepomis gibbosus Pumpkinseed sunfish	2	0.012	Moderately Tolerant	--
Bluegill hybrid	3	0.018	--	--
Totals	867	3.038		

*DELT anomalies were observed on 0.11% (1) of the fish collected
Index of Biotic Integrity (IBI) = 30 (Fair)

Euclid Creek Site #2 - South Branch, Highland Picnic Area
June 24, 1998
Collection Distance: 0.2 km
Collection Method: Longline Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies
Catostomus commersoni Common white sucker	14	1.146	Highly Tolerant	--
Rhinicthys atratulus Blacknose dace	167	0.653	Highly Tolerant	--
Semotilus atromaculatus Creek chub	114	1.895	Highly Tolerant	--
Pimephales notatus Bluntnose minnow	1	0.006	Highly Tolerant	--
Campostoma anomalum Central stoneroller minnow	67	0.602	--	--
Lepomis cyanellus Green sunfish	13	0.264	Highly Tolerant	--
Lepomis macrochirus Northern bluegill sunfish	19	0.074	Moderately Tolerant	--
Lepomis gibbosus Pumpkinseed sunfish	2	0.052	Moderately Tolerant	--
Totals	397	4.692		

*DELT anomalies were observed on 0% (0) of the fish collected.
Index of Biotic Integrity (IBI) = 26 (Poor)

Euclid Creek Site #2 - South Branch, Highland Picnic Area
August 19, 1998
Collection Distance: 0.2 km
Collection Method: Longline Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies
Catostomus commersoni Common white sucker	31	1.614	Highly Tolerant	Deformed Eye (1) Lesions (2)
Rhinicthys atratulus Blacknose dace	287	0.938	Highly Tolerant	--
Semotilus atromaculatus Creek chub	367	4.492	Highly Tolerant	Deformed tail (2) Lesions (2)
Pimephales promelas Northern fathead minnow	2	0.010	Highly Tolerant	--
Pimephales notatus Bluntnose minnow	13	0.082	Highly Tolerant	--
Campostoma anomalum Central stoneroller minnow	178	1.632	--	--
Ictalurus nebulosus Brown bullhead	2	0.150	Highly Tolerant	Lip lesion (1)
Lepomis cyanellus Green sunfish	3	0.070	Highly Tolerant	--
Lepomis macrochirus Northern bluegill sunfish	43	0.296	Moderately Tolerant	--
Lepomis gibbosus Pumpkinseed sunfish	1	0.020	Moderately Tolerant	--
Totals	927	9.304		

*DELT anomalies were observed on 0.86% (8) of the fish collected.
Index of Biotic Integrity (IBI) = 26 (Poor)

Euclid Creek Site #2 - South Branch, Highland Picnic Area
October 7, 1998
Collection Distance: 0.2 km
Collection Method: Longline Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies
Catostomus commersoni Common white sucker	28	1.186	Highly Tolerant	--
Carassius auratus Goldfish	1	0.084	Highly Tolerant	--
Rhinicthys atratulus Blacknose dace	403	1.378	Highly Tolerant	--
Semotilus atromaculatus Creek chub	230	2.938	Highly Tolerant	Deformed Spine (1) Eroded tail (1)
Pimephales notatus Bluntnose minnow	15	0.096	Highly Tolerant	--
Campostoma anomalum Central stoneroller minnow	1176	5.412	--	--
Ictalurus natalis Yellow bullhead	3	0.020	Highly Tolerant	--
Lepomis cyanellus Green sunfish	9	0.130	Highly Tolerant	--
Lepomis macrochirus Northern bluegill sunfish	14	0.088	Moderately Tolerant	--
Lepomis gibbosus Pumpkinseed sunfish	6	0.062	Moderately Tolerant	--
Bluegill hybrid	2	0.008	--	--
Totals	1887	11.402		

*DELT anomalies were observed on 0.10% (2) of the fish collected.
Index of Biotic Integrity (IBI) = 32 (Fair)

Euclid Creek Site #1 - Upstream of St. Clair Avenue
June 24,1998
Collection Distance: 0.2 km
Collection Method: Longline Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies
Catostomus commersoni Common white sucker	11	0.930	Highly Tolerant	--
Rhinicthys atratulus Blacknose dace	208	0.829	Highly Tolerant	--
Semotilus atromaculatus Creek chub	70	1.396	Highly Tolerant	--
Pimephales promelas Northern fathead minnow	2	0.018	Highly Tolerant	--
Pimephales notatus Bluntnose minnow	1	0.004	Highly Tolerant	--
Campostoma anomalum Central stoneroller minnow	130	1.429	--	--
Ictalurus nebulosus Brown bullhead	1	0.012	Highly Tolerant	--
Lepomis macrochirus Northern bluegill sunfish	3	0.016	Moderately Tolerant	--
Lepomis gibbosus Pumpkinseed sunfish	2	0.018	Moderately Tolerant	--
Totals	428	4.652		

*DELT anomalies were observed on 0 % (0) of the fish collected.
Index of Biotic Integrity (IBI) = 30 (Fair)
Modified Index of Well-Being (MIwb) = 5.7 (Poor)

Euclid Creek Site #1 - Upstream of St. Clair Avenue
August 20, 1998
Collection Distance: 0.2 km
Collection Method: Longline Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies
Catostomus commersoni Common white sucker	3	0.300	Highly Tolerant	--
Rhinicthys atratulus Blacknose dace	180	0.630	Highly Tolerant	--
Semotilus atromaculatus Creek chub	115	1.469	Highly Tolerant	--
Pimephales notatus Bluntnose minnow	3	0.022	Highly Tolerant	--
Campostoma anomalum Central stoneroller minnow	303	2.482	--	--
Lepomis gibbosus Pumpkinseed sunfish	7	0.040	Moderately Tolerant	--
Totals	611	4.943		

*DELT anomalies were observed on 0% (0) of the fish collected.
Index of Biotic Integrity (IBI) = 26 (Poor)
Modified Index of Well-Being (MIwb) = 6.1 (Fair)

Euclid Creek Site #1 - Upstream of St. Clair Avenue
October 12, 1998
Collection Distance: 0.2 km
Collection Method: Longline Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies
Catostomus commersoni Common white sucker	14	0.642	Highly Tolerant	--
Rhinicthys atratulus Blacknose dace	163	0.610	Highly Tolerant	--
Semotilus atromaculatus Creek chub	108	1.426	Highly Tolerant	Deformed tail (2) Deformed spine (1)
Pimephales notatus Bluntnose minnow	32	0.136	Highly Tolerant	--
Campostoma anomalum Central stoneroller minnow	340	2.980	--	--
Lepomis cyanellus Green sunfish	2	0.042	Highly Tolerant	--
Lepomis macrochirus Northern bluegill sunfish	2	0.016	Moderately Tolerant	--
Lepomis gibbosus Pumpkinseed sunfish	6	0.058	Moderately Tolerant	--
Bluegill hybrid	3	0.028	--	--
Totals	670	5.938		

*DELT anomalies were observed on 0.44% (3) of the fish collected.
Index of Biotic Integrity (IBI) = 26 (Poor)
Modified Index of Well-Being (MIwb) = 6.5 (Fair)

Euclid Creek Site #0.5 - Lake Shore Boulevard
June 23, 1998
Collection Distance: 0.2 km
Collection Method: Longline Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies
Moxostoma erythrurum Golden redhorse	1	0.002	Moderately Intolerant	--
Catostomus commersoni Common white sucker	19	0.032	Highly Tolerant	--
Carassius auratus Goldfish	6	0.014	Highly Tolerant	--
Semotilus atromaculatus Creek chub	6	0.011	Highly Tolerant	--
Notropis stramineus Sand shiner	1	0.004	Moderately Intolerant	--
Pimephales notatus Bluntnose minnow	12	0.018	Highly Tolerant	--
Campostoma anomalum Central stoneroller minnow	2	0.004	--	--
Ictalurus nebulosus Brown bullhead	2	0.818	Highly Tolerant	--
Lepomis macrochirus Northern bluegill sunfish	3	0.008	Moderately Tolerant	--
Lepomis gibbosus Pumpkinseed sunfish	4	0.026	Moderately Tolerant	--
Totals	56	0.937		

*DELT anomalies were observed on 0% (0) of the fish collected.
Index of Biotic Integrity (IBI) = 20 (Poor)
Modified Index of Well-Being (MIwb) = 2.6 (Very Poor)

Euclid Creek Site #0.5 - Lake Shore Boulevard
August 21, 1998
Collection Distance: 0.5 km
Collection Method: Boat Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies
Catostomus commersoni Common white sucker	6	0.214	Highly Tolerant	--
Cyprinus carpio Common carp	4	0.082	Highly Tolerant	--
Semotilus atromaculatus Creek chub	1	0.004	Highly Tolerant	--
Pimephales notatus Bluntnose minnow	7	0.030	Highly Tolerant	--
Campostoma anomalum Central stoneroller minnow	1	0.004	--	--
Ambloplites rupestris Northern rockbass	3	0.098	--	--
Lepomis macrochirus Northern bluegill sunfish	1	0.012	Moderately Tolerant	--
Lepomis gibbosus Pumpkinseed sunfish	51	0.330	Moderately Tolerant	--
Neogobius melanostomus Round goby	2	0.014	--	--
Totals	76	0.788		

*DELT anomalies were observed on 0% (0) of the fish collected.
Index of Biotic Integrity (IBI) = 26 (Fair)
Modified Index of Well-Being (MIwb) = 5.1 (Poor)

Euclid Creek Site #0.5 - Lake Shore Boulevard
October 6, 1998
Collection Distance: 0.5 km
Collection Method: Boat Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies
Salmo gairdneri Rainbow trout	7	10.753	--	--
Catostomus commersoni Common white sucker	54	0.888	Highly Tolerant	--
Semotilus atromaculatus Creek chub	19	0.200	Highly Tolerant	--
Notropis stramineus Sand shiner	4	0.012	Moderately Intolerant	--
Pimephales notatus Bluntnose minnow	15	0.118	Highly Tolerant	--
Campostoma anomalum Central stoneroller minnow	3	0.030	--	--
Ictalurus natalis Yellow bullhead	1	0.040	Highly Tolerant	--
Ambloplites rupestris Northern rockbass	6	0.232	--	--
Micropterus dolomieui Smallmouth bass	4	0.112	Moderately Intolerant	--
Micropterus salmoides Largemouth bass	2	0.018	--	--
Lepomis cyanellus Green sunfish	1	0.020	Highly Tolerant	--
Lepomis macrochirus Northern bluegill sunfish	33	0.187	Moderately Tolerant	--
Lepomis gibbosus Pumpkinseed sunfish	60	0.532	Moderately Tolerant	--

Euclid Creek Site #0.5 - Lake Shore Boulevard
October 6, 1998

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies
Neogobius melanostomus Round goby	15	0.078	--	--
Totals	224	13.220		

*DELT anomalies were observed on 0% (0) of the fish collected.
Index of Biotic Integrity (IBI) = 30 (Fair)
Modified Index of Well-Being (MIwb) = 6.0 (Poor)

APPENDIX L
BLODGETT CREEK AND ROCKY RIVER ELECTROFISHING SURVEYS
1994 AND 1996

Introduction

The Strongsville "A" Wastewater Treatment Plant (WWTP), which discharged treated effluent into Blodgett Creek, was decommissioned on July 18, 1994. Wastewater previously tributary to the Strongsville "A" plant now flows to the Northeast Ohio Regional Sewer District's (NEORSD's) Southerly Wastewater Treatment Center via the west leg of the Southwest Interceptor (SWI). NEORSD conducted quantitative electrofishing surveys on Blodgett Creek, upstream and downstream of the Strongsville "A" plant, and on the Rocky River, upstream and downstream of Blodgett Creek in 1994 and 1996. These surveys were conducted in an effort to evaluate and compare fish community health on Blodgett Creek and on the Rocky River before and after the Strongsville "A" Wastewater Treatment Plant was decommissioned. Electrofishing was conducted on the following dates:

Sampling Location	1994 Sampling Dates	1996 Sampling Dates
Blodgett Creek, Upstream and Downstream of the Strongsville "A" WWTP	May 17 June 17 July 11	 August 19 October 7
Rocky River, Upstream and Downstream of the Blodgett Creek Confluence	May 18 July 12	 August 22 October 8

Fish were collected by generator powered longline method and electrofishing zones were 0.2 kilometers in length. The zone upstream of the Strongsville "A" plant ended approximately 25 feet upstream of the effluent discharge. The zone downstream of the effluent started at the bridge at Marks Road and continued downstream approximately 0.2 km. Fish collected at each site were identified to the species level, weighed, counted and examined for the presence of external anomalies including DELTs (deformities, eroded fins, lesions and tumors.)

Data collected were used to calculate two indices of fish community health, the Index of Biotic Integrity (IBI) and the Modified Index of Well Being (MIwb). A corresponding narrative rating of *Exceptional*, *Good*, *Fair* or *Poor*, was assigned to the fish community at each site based upon index scores. Detailed descriptions of sampling and analysis methods utilized in fish surveys, including IBI and MIwb calculations and the relationship between narrative ratings and index scores can be found in Ohio EPA's *Biological Criteria for the Protection of Aquatic Life* (1987) and *Compendium of Biological Results from Ohio Rivers, Streams and Lakes* (1989).

Sampling Results and Discussion

Ohio EPA's Qualitative Habitat Evaluation Index (QHEI) was utilized to assess aquatic habitat conditions at the Blodgett Creek sites in 1994 and 1996 and at the Rocky River sites in 1994. According to Ohio EPA's *The Qualitative Habitat Evaluation Index (QHEI): Rationale, Methods, and Application*, "Stream reaches with QHEI scores averaging > 60 will likely have the potential to attain the WWH use" (p. 40). Blodgett Creek and Rocky River QHEI scores are listed below and are displayed graphically in Figure L-1 at the end of this report. QHEI field sheets can be found in Appendix D of the 1996-1998 Greater Cleveland Area Environmental Water Quality Assessment report.

	1994		1996	
Electrofishing Site	Score	Narrative Rating	Score	Narrative Rating
Rocky River Upstream of Blodgett Creek	71.5	Good		
Blodgett Creek Upstream of Strongsville "A" WWTP	79.5	Excellent	65.25	Good-Fair
Blodgett Creek Downstream of Strongsville "A" WWTP	69.5	Good	64.5	Good-Fair
Rocky River Downstream of Blodgett Creek	82.0	Excellent		

The minimum IBI score needed to meet Warmwater Habitat criteria at headwater sites such as the Blodgett Creek sites is 40 (*Good*). The minimum IBI and MIwb scores needed to meet Warmwater Habitat criteria for wading sites such as the Rocky River sites are 38 (*Good*) and 7.9 (*Good*), respectively. Because Blodgett Creek's drainage area is less than 20 square miles, the Modified Index of Well Being (MIwb) is not applicable.

Average IBI scores were in the *Poor* range in 1994 and in 1996 on Blodgett Creek upstream of the former Strongsville "A" WWTP. At the downstream site, no fish were collected during any of the three sampling events in 1994, resulting in an average IBI score in the *Very Poor* range. In 1996, however, after the Strongsville "A" WWTP was decommissioned, an average of 477 fish were collected at the downstream site during each sampling event, and the average score improved to the *Poor* range.

Upstream of Blodgett Creek on the Rocky River, average IBI scores improved from the *Marginally Good* range in 1994 to the *Good* range in 1996. MIwb scores, however, which were in the *Marginally Good* range in 1994, decreased slightly, and were in the *Fair* range in 1996. Downstream of Blodgett Creek, average IBI and MIwb scores both improved from 1994 to 1996. IBI scores moved from the *Marginally Good* range to the *Good* range while MIwb scores improved from *Fair* to *Marginally Good*. The *Good* IBI scores at the Rocky River sites in 1996 indicate that these sites were meeting Ohio EPA's Warmwater Habitat aquatic life criterion of 38.

Average IBI and MIwb scores for Blodgett Creek and Rocky River are shown graphically in Figures L-2 through L-4. Tables, which for each sampling event, list the species collected, number of individuals, weights, pollution tolerances and incidence of DELT anomalies, can be found at the end of this report.

NEORSD investigators collected grab samples for chemical and bacteriological analysis at the Blodgett Creek and Rocky River sites in 1994 and 1996. Nine samples were collected and analyzed at each Blodgett Creek site in 1994. At the upstream site, bacteriological data revealed excursions from Ohio EPA's primary contact recreational use designation fecal coliform criterion of 2,000 colonies/100 mL on three occasions as listed below:

Blodgett Creek, Upstream of the Strongsville "A" WWTP	
Date	Fecal Coliforms/100 mL
May 3, 1994	21,000
June 8, 1994	2,400
June 22, 1994	7,000

Chemical parameters met warmwater habitat criteria at the upstream Blodgett Creek site in 1994.

Downstream of the Strongsville "A" WWTP, the Primary Contact recreational use criterion for fecal coliform was exceeded on June 8, 1994. Fecal coliform was measured at 4,100 organisms per 100 mL on this date. Chemical parameters measured by NEORSD met the Warmwater Habitat criteria at the downstream site in 1994. Ammonia concentrations, however, were elevated (8.2 to 12.7 mg/L) and approached the Warmwater Habitat criterion of 13 mg/L in all samples collected at the downstream location. These elevated ammonia concentrations may have been the reason no fish were collected downstream of the treatment plant by investigators in 1994.

In 1996, chemical and fecal coliform bacteriological data at both Blodgett Creek sites met Warmwater Habitat and Primary Contact use criteria. Ammonia concentrations decreased after the wastewater treatment plant was decommissioned. The highest ammonia concentration obtained in 1996 was 0.1 mg/L. Average Blodgett Creek ammonia concentrations for 1994 and 1996 are shown graphically in Figure L-5.

On the Rocky River, upstream and downstream of Blodgett Creek, seven water samples were collected at each site in 1994. Although the Primary Contact recreational use criterion was met, the iron criterion was exceeded at both Rocky River sites in 1994, with a concentration of 1.2 mg/L measured on July 11, 1994. All other chemical parameters were within Warmwater Habitat criteria.

In 1996, six water samples were collected on Rocky River upstream and downstream of Blodgett Creek. The fecal coliform criterion was exceeded upstream of Blodgett Creek on one occasion (July 23, 1996 - 2,600 per 100 mL). Samples collected on Rocky River downstream of Blodgett Creek met both chemical and bacteriological water quality criteria.

According to "Fish Communities as Indicators of Environmental Degradation," by Kurt D. Fausch et al, in *Biological Indicators of Stress in Fish*, the following are the nine primary underlying assumptions of the Index of Biotic Integrity concerning how stream fish communities change with environmental degradation.

1) *The number of all native species and those in specific taxa or habitat guilds decline*
2) *The number of intolerant species decline*
3) *The proportion of individuals that are members of tolerant species increase*
4) *The proportion of insectivores and carnivores decline*
5) *The proportion of trophic generalists and omnivores increase*
6) *Fish abundance declines*
7) *The proportion of lithophilic spawning fish (fish requiring silt free substrates to spawn) declines and the number of hybrid fish increase*
8) *The incidence of DELT and external anomalies increases*
9) *Introduced species increase*

Because NEORSD collected no fish downstream of the Strongsville "A" WWTP in 1994, it is not possible to examine the sampling results at this location utilizing most of Fausch's assumptions. One assumption which can be applied to these results, however, is number 6, which states that fish abundance declines with environmental degradation. The average number of fish collected increased from zero in 1994 to 477 in 1996. This increase is indicative of an improvement in water quality.

One fish community metric evaluated in the IBI scoring is the proportion of "Pioneering Species" present. According to Ohio EPA's *Biological Criteria for the Protection of Aquatic Life: Volume II*, Pioneering species are, "... the first to reinvade sections of headwater streams that have been desiccated by prolonged periods of dry weather. These species also predominate in unstable environments that have been affected by temporal desiccation and/or anthropogenic stresses." In the two electrofishing passes made in 1996 on Blodgett Creek downstream of the former treatment plant, 75 percent of the total number of fish collected were classified as pioneering species (Creek chub, and Bluntnose minnow). This indicates that the area may have been stressed by the treatment plant effluent discharge.

The following is an examination of Fausch's nine assumptions as they relate to the Rocky River fish community upstream and downstream of Blodgett Creek (Table L-2).

Assumptions 1 and 2: The number of native and intolerant species collected upstream and downstream of Blodgett Creek increased from 1994 to 1996. An absence of intolerant species would indicate some type of stress on the environment. An increase in both metrics indicates an improvement in the water quality.

Assumption 3: A decrease in the proportion of tolerant species, upstream and downstream of Blodgett Creek was observed from 1994 to 1996 (19.4% in 1994 versus 14.7% in 1996 at the upstream location and 28% in 1994 versus 16.9% in 1996 at the downstream location). According to Ohio EPA's *Biological Criteria for the Protection of Aquatic Life: Volume II*, tolerant fish species tend toward community predominance with decreasing water or habitat quality. Assuming that habitat quality remains the same, a decrease in the proportion of tolerant fish indicates an improvement in water quality.

Assumption 4: The percentage of insectivores and carnivores increased from 1994 to 1996, upstream and downstream of Blodgett Creek (13.2% at the upstream location and 7.5% at the downstream location). As stream water quality improves, the insect population increases and the percentage of fish which feed on insects increases. The increase in insectivores and carnivores indicates an improvement in the water quality.

Assumption 5: The proportion of omnivores and generalist feeding fish increased upstream and downstream of Blodgett Creek from 1994 to 1996 (2.5% at the upstream location and 30% at the downstream location), indicating an increase in environmental degradation.

Assumption 6: Average fish numbers decreased at both the upstream and downstream locations from 1994 to 1996 (173.5 at the upstream location, 55 at the downstream location). Investigators are unable to explain why fewer fish were collected in 1996. A decrease in fish abundance indicates an environmental degradation.

Assumption 7: Lithophilic spawning fish require clean gravel or cobble for successful reproduction and are the most environmentally sensitive of the fish spawning guilds. Sampling results showed an increase in the proportion of lithophilic spawning fish from 1994 to 1996 upstream and downstream of Blodgett Creek. A 13.5% increase in lithophilic fish was noted upstream of Blodgett Creek and a 3.6% increase was observed at the downstream location. An increase in lithophilic spawning fish indicates an improvement in the water quality.

Assumption 8: A decline in the incidence of external anomalies from 1994 to 1996 (0.6%) was evident at the upstream site. However, an increase in the occurrence of external anomalies during the same time period was evident at the downstream site (3.25%). The increase in external anomalies at the downstream location 1996 was due to an increase in the number of fish with blackspot disease and not an increase in DELT (deformities, eroded fins, lesions and tumors) anomalies. One of 284 fish collected in 1996 on Rocky River downstream of Blodgett Creek had a body lesion. According to Ohio EPA's *Biological Criteria for the Protection of Aquatic Life: Volume II*, blackspot is not included in the IBI scoring metric because the presence of this infestation may be natural and not related to environmental degradation. An increase in

the incidence of DELT anomalies, however, is an indication of stress or environmental degradation.

Assumption 9: Little change in the proportion of introduced species was observed from 1994 to 1996 at either location (0.4% decrease upstream of Blodgett Creek, 0.25% decrease at the downstream location). The common carp was the only introduced species collected in 1994. No introduced species were collected in 1996. This decrease in the collection of introduced species is an indication of an environmental improvement.

Seven of nine of Fausch's assumptions (#1, #2, #3, #4, #5, #7 and #9) indicate an improvement in the Rocky River water quality both upstream and downstream of Blodgett Creek. According to Fausch et al, the two remaining assumptions, #6 and #8, may indicate a decline in water quality. The increase in anomalies considered by assumption #8 was attributed to a greater number of fish infested with blackspot disease. According to the Ohio EPA, however, the presence of this disease may be natural and not related to environmental degradation.

Summary and Conclusions

The average Index of Biotic Integrity score on Blodgett Creek upstream of the former Strongsville "A" WWTP was unchanged from 1994 to 1996. Downstream of the former WWTP, however, IBI scores improved from *Very Poor* in 1994 to *Poor* in 1996. Habitat conditions, as measured by Ohio EPA's Qualitative Habitat Evaluation Index, remained relatively constant during this time period. Chemical data, however, indicate that ammonia concentrations downstream of the former WWTP decreased following the plant's decommissioning and the diversion of wastewater to the west leg of the Northeast Ohio Regional Sewer District's Southwest Interceptor. The increased abundance of fish collected at the downstream location in 1996 may be related to the decreased ammonia concentrations. Although fish community scores on Blodgett Creek downstream of the decommissioned treatment plant are still poor, the "Pioneering" fish species are beginning to repopulate the downstream site and a recovery has begun.

Average IBI scores improved from 1994 to 1996, both upstream and downstream of Blodgett Creek on the Rocky River. IBI scores at both of these sites met Ohio EPA's Warmwater Habitat criterion of 38 (*Good*) in 1996. While average MIwb scores were slightly higher at the downstream site in 1996 than in 1994, the opposite was true at the upstream location. The average ammonia concentration measured by NEORSD investigators downstream of Blodgett Creek on the Rocky River decreased from 1.9 mg/L in 1994 to 0.07 mg/L in 1996.

Improved Index of Biotic Integrity scores at the downstream Blodgett Creek site may be attributable to the decommissioning of the Strongsville "A" WWTP and subsequent diversion of wastewater to the West Leg of NEORSD's Southwest Interceptor. Although some of the improvement in IBI scores on Rocky River downstream of Blodgett Creek from 1994 to 1996 may be attributable to the decommissioning of the

Strongsville "A" WWTP, IBI scores on Rocky River, upstream of Blodgett Creek also improved during the same time period, indicating the possible presence of other positive influences on the Rocky River fish community.

Table L-1

Application of Fausch's Nine Assumptions to Average Blodgett Creek Electroshocking Data

1994 and 1996

Upstream of Strongsville "A" WWTP

Year	Native Species (#)	Intolerant Species (#)	Tolerant Species (%)	Insectivores and Carnivores (%)	Generalists and Omnivores (%)	Fish Numbers (#)	Lithophilic Spawners (%)	External Anomalies (%)	Introduced Species (%)
1994	7	0	98.2	0.26	98.2	388	4.2	0.17	0
1996	5	0	99.9	0	99.9	465	35.5	0.2	0
Difference	-2	0	1.7	-0.26	1.7	77	31.3	0.03	0

Downstream of Strongsville "A" WWTP

Year	Native Species (#)	Intolerant Species (#)	Tolerant Species (%)	Insectivores and Carnivores (%)	Generalists and Omnivores (%)	Fish Numbers (#)	Lithophilic Spawners (%)	External Anomalies (%)	Introduced Species (%)
1994	0	0	0	0	0	0	0	0	0
1996	4	0	100	0	100	477	23.9	0.1	0
Difference	4	0	100	0	100	477	23.9	0.1	0

Table L-2

Application of Fausch's Nine Assumptions to Average Rocky River Electroshocking Data

1994 and 1996

Upstream of Blodgett Creek

Year	Native Species (#)	Intolerant Species (#)	Tolerant Species (%)	Insectivores and Carnivores (%)	Generalists and Omnivores (%)	Fish Numbers (#)	Lithophilic Spawners (%)	External Anomalies (%)	Introduced Species (%)
1994	16	4	19.4	61	13.2	462.5	26.4	0.6	0.4
1996	18	5	14.7	74.2	15.7	289	39.9	0	0
Difference	2	1	-4.7	13.2	2.5	-173.5	13.5	-0.6	-0.4

Downstream of Blodgett Creek

Year	Native Species (#)	Intolerant Species (#)	Tolerant Species (%)	Insectivores and Carnivores (%)	Generalists and Omnivores (%)	Fish Numbers (#)	Lithophilic Spawners (%)	External Anomalies (%)	Introduced Species (%)
1994	15	4	28	68.5	29	197	53.8	0.25	0.25
1996	19	5	16.9	76	59	142	57.4	3.5	0
Difference	4	1	-11.1	7.5	30	-55	3.6	3.25	-0.25

Figure L-1
Blodgett Creek and Ricky River
Qualitative Habitat Evaluation Index Scores,
1994 and 1996

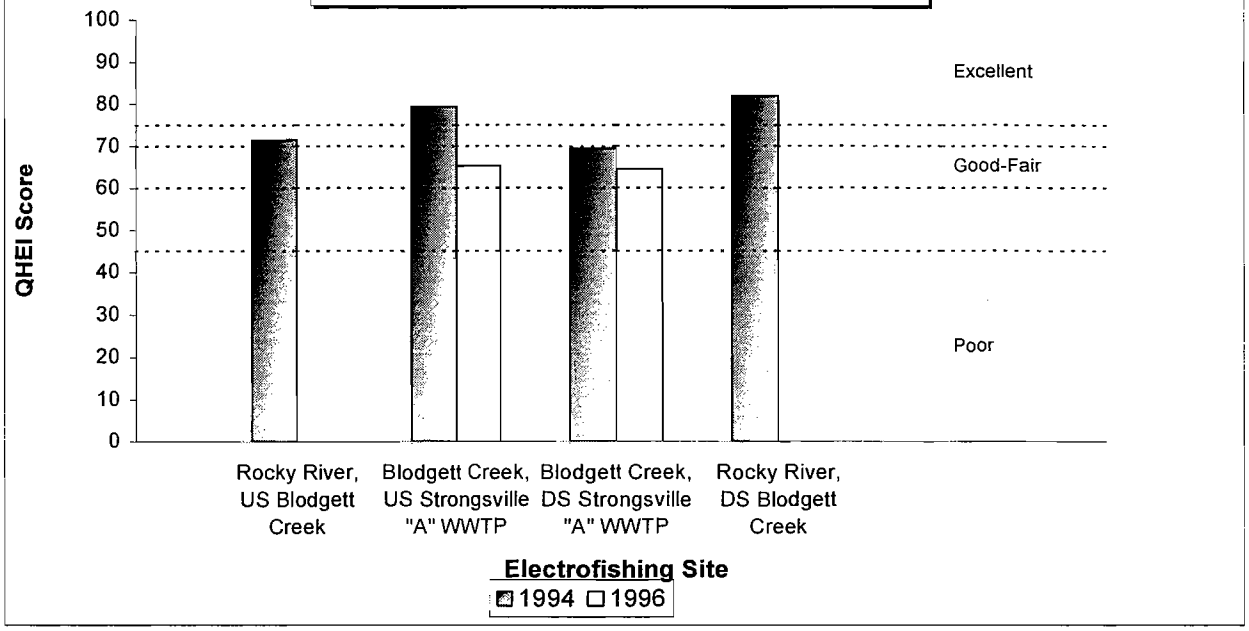


Figure L-2
Average Index of Biotic Integrity Scores
Blodgett Creek, 1994 and 1996

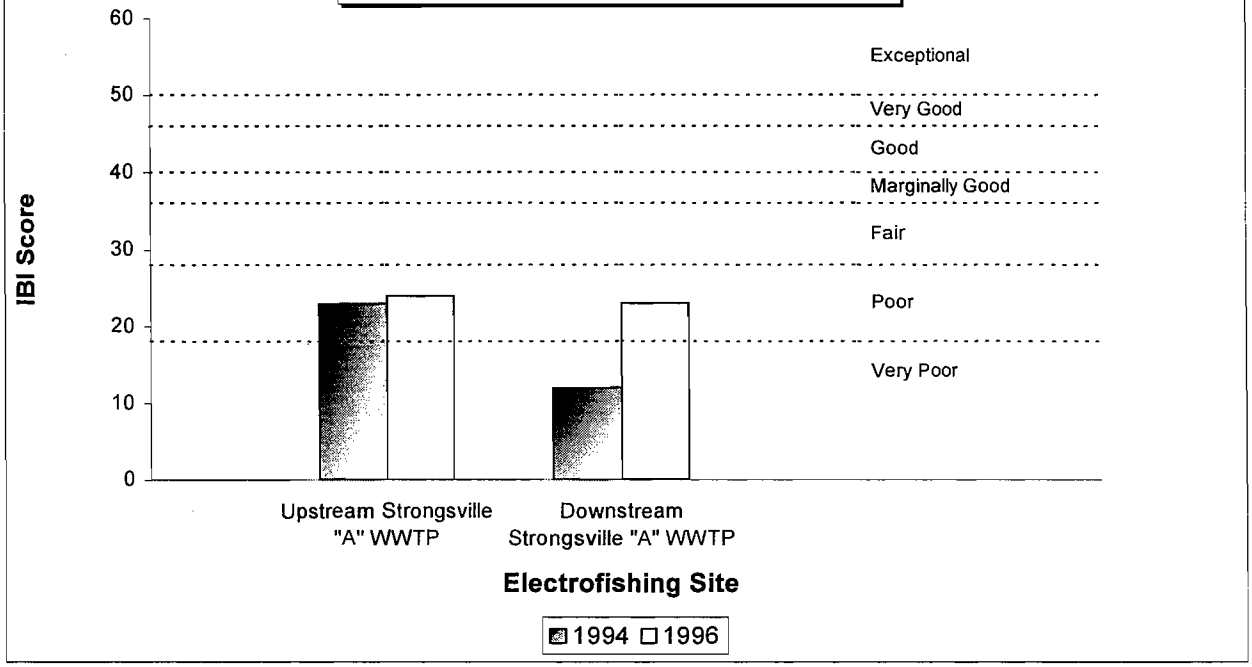


Figure L-3
Average Index of Biotic Integrity Scores
Rocky River, 1994 and 1996

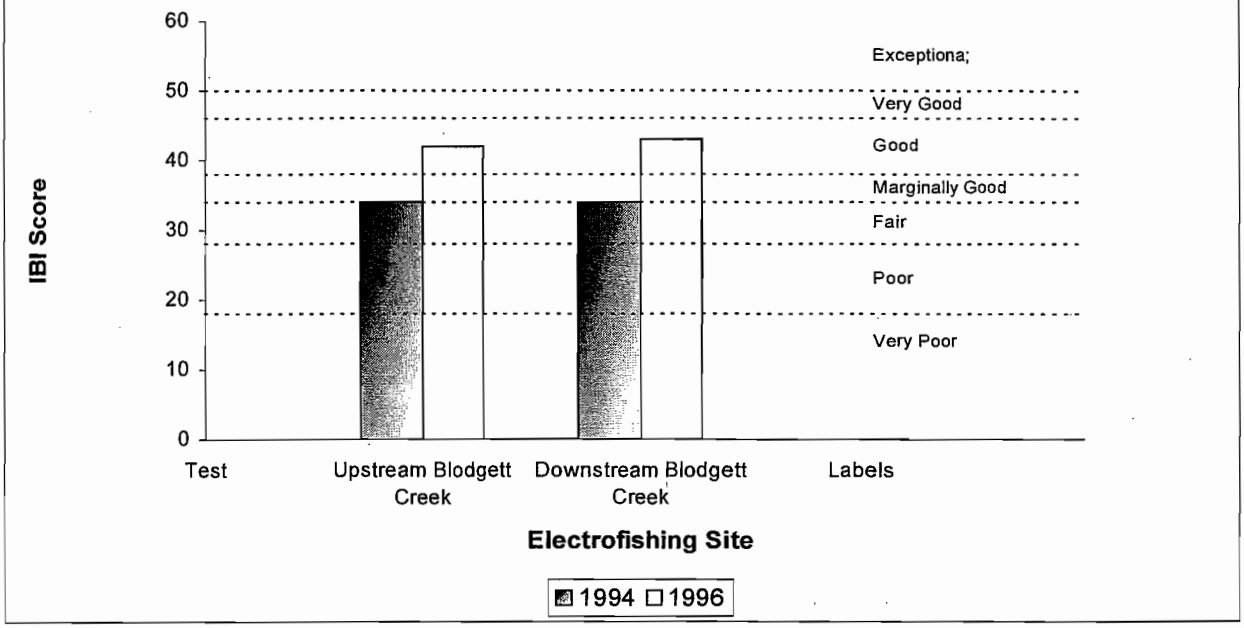


Figure L-4
Average Modified Index of Well-Being Scores
Rocky River, 1994 and 1996

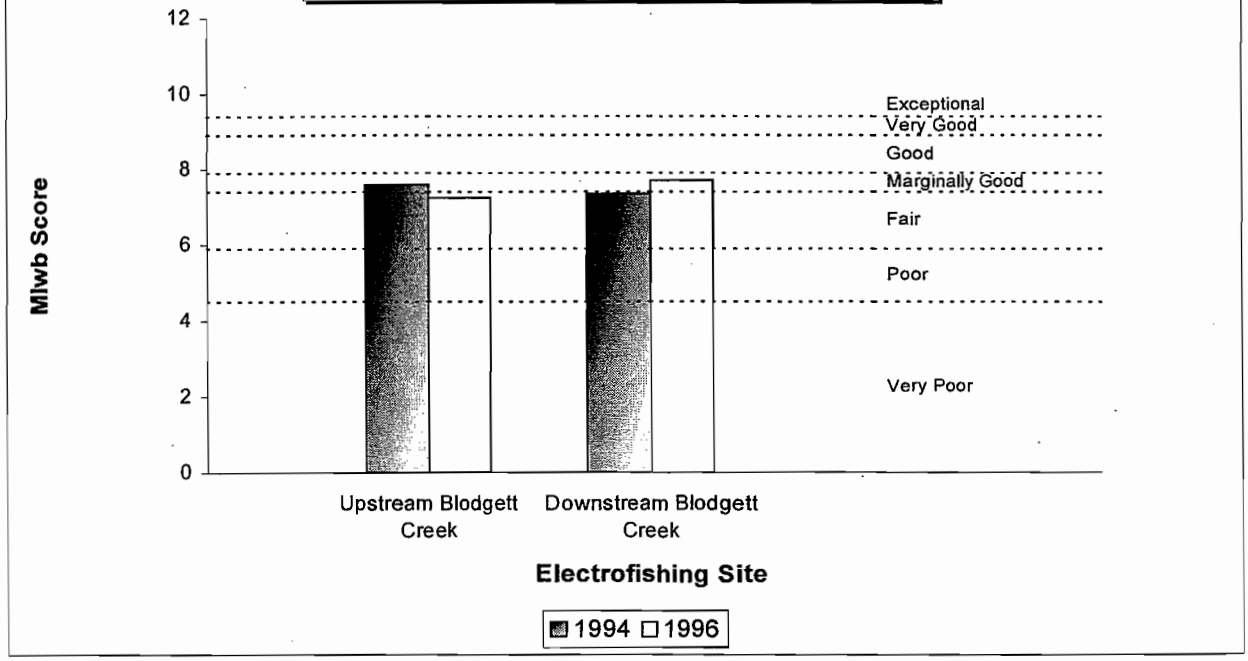
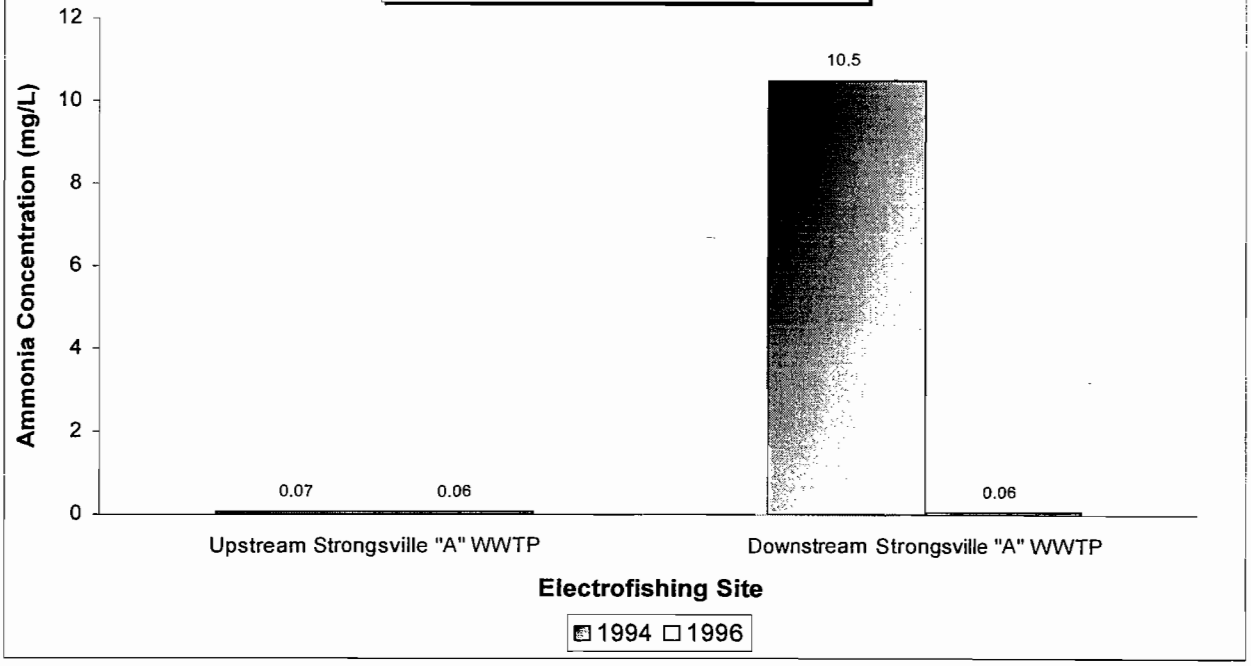


Figure L-5
Average Ammonia Concentrations
Blodgett Creek, 1994 and 1996



Blodgett Creek: Upstream of Strongsville "A" WWTP
Sample Date: 5/17/94
Collection Distance: 0.2 km
Collection Method: Longline Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies #	DELT Anomalies Description
Rhinicthys atratulus Blacknose dace	7	-	Highly Tolerant	0	--
Semotilus atromaculatus Creek chub	223	-	Highly Tolerant	0	--
Micropterus salmoides Largemouth bass	1	-	--	0	--
Totals	231	0.000		0	

*DELT anomalies were observed on 0.0% of the fish collected.
Index of Biotic Integrity (IBI) = 22 (Poor)

Blodgett Creek: Upstream of Strongsville"A" WWTP
Sample Date: 7/11/94
Collection Distance: 0.2 km
Collection Method: Longline Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	#	DELT Anomalies Description
Rhinicthys atratulus Blacknose dace	12	-	Highly Tolerant	0	--
Semotilus atromaculatus Creek chub	494	-	Highly Tolerant	2	Body lesions
Pimephales promelas Northern fathead minnow	1	-	Highly Tolerant	0	--
Campostoma anomalum Central stoneroller minnow	6	-	--	0	--
Micropterus salmoides Largemouth bass	1	-	--	0	--
Totals	514	0.000		2	

*DELT anomalies were observed on 0.4% of the fish collected.
Index of Biotic Integrity (IBI) = 24 (Poor)

Blodgett Creek: Upstream of Strongsville "A"
Sample Date: 8/19/96
Collection Distance: 0.2 km
Collection Method: Longline Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies #	DELT Anomalies Description
Catostomus commersoni Common white sucker	8	0.036	Highly Tolerant	0	--
Rhinicthys atratulus Blacknose dace	154	0.476	Highly Tolerant	0	--
Semotilus atromaculatus Creek chub	340	1.896	Highly Tolerant	2	Tail lesion Mouth lesion
Pimephales notatus Bluntnose minnow	36	0.174	Highly Tolerant	0	--
Totals	538	2.582		2	

*DELT anomalies were observed on 0.4% of the fish collected.
Index of Biotic Integrity (IBI) = 20 (Poor)

Blodgett Creek: Upstream of Strongsville "A"
Sample Date: 10/07/96
Collection Distance: 0.2 km
Collection Method: Longline Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies #	DELT Anomalies Description
Catostomus commersoni Common white sucker	2	0.014	Highly Tolerant	0	--
Rhinicthys atratulus Blacknose dace	166	0.670	Highly Tolerant	0	--
Semotilus atromaculatus Creek chub	212	1.358	Highly Tolerant	0	--
Pimephales notatus Bluntnose minnow	11	0.070	Highly Tolerant	0	--
Campostoma anomalum Central stoneroller minnow	1	0.004	--	0	--
Totals	392	2.116		0	

*DELT anomalies were observed on 0.0% of the fish collected.
Index of Biotic Integrity (IBI) = 28 (Fair)

Blodgett Creek: Downstream of Strongsville "A" WWTP
Sample Date: 5/17/94
Collection Distance: 0.2 km
Collection Method: Longline Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies #	DELT Anomalies Description

No Fish Collected

*DELT anomalies were observed on 0.0% of the fish collected.
Index of Biotic Integrity (IBI) = 12 (Very Poor)

Blodgett Creek: Downstream of Strongsville "A" WWTP
Sample Date: 6/17/94
Collection Distance: 0.2 km
Collection Method: Longline Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	#	DELT Anomalies Description

No Fish Collected

*DELT anomalies were observed on 0.0% of the fish collected.
Index of Biotic Integrity (IBI) = 12 (Very Poor)

Blodgett Creek: Downstream of Strongsville "A" WWTP
Sample Date: 8/19/96
Collection Distance: 0.2 km
Collection Method: Longline Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies #	DELT Anomalies Description
Catostomus commersoni Common white sucker	13	0.084	Highly Tolerant	0	--
Rhinicthys atratulus Blacknose dace	121	0.184	Highly Tolerant	0	--
Semotilus atromaculatus Creek chub	294	2.024	Highly Tolerant	0	--
Pimephales notatus Bluntnose minnow	5	0.020	Highly Tolerant	0	--
Totals	433	2.312		0	

*DELT anomalies were observed on 0.0% of the fish collected.
Index of Biotic Integrity (IBI) = 24 (Poor)

Blodgett Creek: Downstream of Strongsville "A" WWTP
Sample Date: 10/07/96
Collection Distance: 0.2 km
Collection Method: Longline Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies #	DELT Anomalies Description
Catostomus commersoni Common white sucker	18	0.182	Highly Tolerant	0	--
Rhinicthys atratulus Blacknose dace	76	0.180	Highly Tolerant	0	--
Semotilus atromaculatus Creek chub	408	3.816	Highly Tolerant	1	Body lesion
Pimephales notatus Bluntnose minnow	19	0.130	Highly Tolerant	0	--
Totals	521	4.308		1	

*DELT anomalies were observed on 0.2% of the fish collected.
Index of Biotic Integrity (IBI) = 22 (Poor)

Rocky River: Upstream of Blodgett Creek
Sample Date: 5/18/94
Collection Distance: 0.2 km
Collection Method: Longline Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies #	DELT Anomalies Description
Hypentelium nigricans Northern hog sucker	38	3.918	Moderately Intolerant	1	Deformed fins
Catostomus commersoni Common white sucker	32	4.756	Highly Tolerant	1	Body lesion
Notropis cornutus Common shiner	2	0.082	--	0	--
Notropis stramineus Sand shiner	134	0.400	Moderately Intolerant	0	--
Pimephales notatus Bluntnose minnow	17	0.062	Highly Tolerant	0	--
Campostoma anomalum Central stoneroller minnow	4	0.018	--	0	--
Ambloplites rupestris Northern rockbass	6	0.608	--	0	--
Micropterus dolomieui Smallmouth bass	18	3.379	Moderately Intolerant	1	Caudal lesion
Lepomis macrochirus Northern bluegill sunfish	1	0.002	Moderately Tolerant	0	--
Etheostoma blenniodes Greenside darter	46	0.178	Moderately Intolerant	0	--
Totals	298	13.403		3	

*DELT anomalies were observed on 1.0% of the fish collected.
Index of Biotic Integrity (IBI) = 36 (Marginally Good)
Modified Index of Well-Being (MIwb) 7.4 (Marginally Good)

Rocky River: Upstream of Blodgett Creek
Sample Date: 7/12/94
Collection Distance: 0.2 km
Collection Method: Longline Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies #	DELT Anomalies Description
Hypentelium nigricans Northern hog sucker	74	0.682	Moderately Intolerant	0	--
Catostomus commersoni Common white sucker	51	0.542	Highly Tolerant	0	--
Cyprinus carpio Common carp	4	0.016	Highly Tolerant	0	--
Notropis cornutus Common shiner	1	0.002	--	0	--
Notropis spilopterus Spotfin shiner	10	0.032	--	0	--
Notropis stramineus Sand shiner	138	0.290	Moderately Intolerant	0	--
Ericymba buccata Silverjaw minnow	3	0.022	--	0	--
Pimephales notatus Bluntnose minnow	74	0.144	Highly Tolerant	0	--
Campostoma anomalum Central stoneroller minnow	195	0.588	--	0	--
Ambloplites rupestris Northern rockbass	11	0.404	--	0	--
Micropterus dolomieui Smallmouth bass	12	0.244	Moderately Intolerant	0	--
Micropterus salmoides Largemouth bass	1	0.002	--	0	--
Lepomis cyanellus Green sunfish	2	0.014	Highly Tolerant	0	--

Rocky River: Upstream of Blodgett Creek
Sample Date: 7/12/94

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies #	DELT Anomalies Description
Etheostoma blenniodes Greenside darter	39	0.192	Moderately Intolerant	0	--
Ethestoma nigrum Johnny darter	12	0.038	--	0	--
Totals	627	3.212		0	

*DELT anomalies were observed on 0.0% of the fish collected.
Index of Biotic Integrity (IBI) = 32 (Fair)
Modified Index of Well-Being (MIwb) 7.8 (Marginally Good)

Rocky River: Upstream of Blodgett Creek
Sample Date: 8/22/96
Collection Distance: 0.2 km
Collection Method: Longline Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies #	DELT Anomalies Description
Hypentelium nigricans Northern hog sucker	22	1.918	Moderately Intolerant	0	--
Catostomus commersoni Common white sucker	19	1.152	Highly Tolerant	0	--
Semotilus atromaculatus Creek chub	6	0.016	Highly Tolerant	0	--
Notropis cornutus Common shiner	9	0.066	--	0	--
Notropis spilopterus Spotfin shiner	2	0.008	--	0	--
Notropis stramineus Sand shiner	29	0.130	Moderately Intolerant	0	--
Ericymba buccata Silverjaw minnow	2	0.008	--	0	--
Pimephales notatus Bluntnose minnow	33	0.178	Highly Tolerant	0	--
Campostoma anomalum Central stoneroller minnow	41	0.480	--	0	--
Ictalurus melas Black bullhead	2	0.008	Moderately Tolerant	0	--
Ambloplites rupestris Northern rockbass	17	0.502	--	0	--
Micropterus dolomieui Smallmouth bass	28	0.276	Moderately Intolerant	0	--
Lepomis cyanellus Green sunfish	4	0.054	Highly Tolerant	0	--

Rocky River: Upstream of Blodgett Creek
Sample Date: 8/22/96

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies #	DELT Anomalies Description
Lepomis macrochirus Northern bluegill sunfish	2	0.018	Moderately Tolerant	0	--
Etheostoma blenniodes Greenside darter	67	2.860	Moderately Intolerant	0	--
Ethestoma caeruleum Rainbow darter	2	0.008	Moderately Intolerant	0	--
Ethestoma flabellare Fantail darter	2	0.004	--	0	--
Ethestoma nigrum Johnny darter	4	0.008	--	0	--
Totals	291	7.694		0	

*DELT anomalies were observed on 0.0% of the fish collected.
Index of Biotic Integrity (IBI) = 42 (Good)
Modified Index of Well-Being (Mlwb) 7.9 (Good)

Rocky River: Upstream of Blodgett Creek
Sample Date: 10/08/96
Collection Distance: 0.2 km
Collection Method: Longline Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies #	DELT Anomalies Description
Hypentelium nigricans Northern hog sucker	38	2.422	Moderately Intolerant	0	--
Catostomus commersoni Common white sucker	2	0.142	Highly Tolerant	0	--
Notropis cornutus Common shiner	1	0.002	--	0	--
Notropis stramineus Sand shiner	71	0.266	Moderately Intolerant	0	--
Ericymba buccata Silverjaw minnow	9	0.046	--	0	--
Pimephales notatus Bluntnose minnow	31	0.114	Highly Tolerant	0	--
Campostoma anomalum Central stoneroller minnow	17	0.194	--	0	--
Ambloplites rupestris Northern rockbass	11	0.222	--	0	--
Micropterus dolomieui Smallmouth bass	19	0.296	Moderately Intolerant	0	--
Etheostoma blenniodes Greenside darter	67	0.304	Moderately Intolerant	0	--
Ethestoma caeruleum Rainbow darter	2	0.006	Moderately Intolerant	0	--
Ethestoma nigrum Johnny darter	19	0.044	--	0	--
Totals	287	4.058		0	

Rocky River: Upstream of Blodgett Creek
Sample Date: 10/08/96

Species	Number	Weight (kg)	Pollution Tolerance	#	DELT Anomalies Description
*DELT anomalies were observed on	0.0%	of the fish collected.			
Index of Biotic Integrity (IBI) =	42	(Good)			
Modified Index of Well-Being (MIwb)	6.6	(Fair)			

Rocky River: Downstream of Blodgett Creek
Sample Date: 5/18/94
Collection Distance: 0.2 km
Collection Method: Longline Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies #	DELT Anomalies Description
Hypentelium nigricans Northern hog sucker	12	0.860	Moderately Intolerant	0	--
Catostomus commersoni Common white sucker	15	2.952	Highly Tolerant	0	--
Rhinicthys atratulus Blacknose dace	1	0.002	Highly Tolerant	0	--
Notropis cornutus Common shiner	1	0.092	--	0	--
Campostoma anomalum Central stoneroller minnow	1	0.010	--	0	--
Ambloplites rupestris Northern rockbass	26	1.834	--	1	Body lesions
Micropterus dolomieui Smallmouth bass	26	3.786	Moderately Intolerant	0	--
Lepomis macrochirus Northern bluegill sunfish	8	0.472	Moderately Tolerant	0	--
Etheostoma blenniodes Greenside darter	27	0.148	Moderately Intolerant	0	--
Ethestoma caeruleum Rainbow darter	2	0.006	Moderately Intolerant	0	--
Totals	119	10.162		1	

*DELT anomalies were observed on 0.8% of the fish collected.
Index of Biotic Integrity (IBI) = 32 (Fair)
Modified Index of Well-Being (MIwb) 7.1 (Fair)

Rocky River: Downstream of Blodgett Creek
Sample Date: 7/12/94
Collection Distance: 0.2 km
Collection Method: Longline Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies #	DELT Anomalies Description
Hypentelium nigricans Northern hog sucker	28	3.122	Moderately Intolerant	0	--
Catostomus commersoni Common white sucker	84	6.665	Highly Tolerant	0	--
Cyprinus carpio Common carp	1	0.002	Highly Tolerant	0	--
Notropis cornutus Common shiner	14	0.470	--	0	--
Notropis spilopterus Spotfin shiner	2	0.008	--	0	--
Notropis stramineus Sand shiner	2	0.004	Moderately Intolerant	0	--
Pimephales notatus Bluntnose minnow	2	0.002	Highly Tolerant	0	--
Campostoma anomalum Central stoneroller minnow	20	0.040	--	0	--
Ambloplites rupestris Northern rockbass	27	1.585	--	0	--
Micropterus dolomieui Smallmouth bass	49	2.389	Moderately Intolerant	0	--
Lepomis cyanellus Green sunfish	8	0.034	Highly Tolerant	0	--
Lepomis macrochirus Northern bluegill sunfish	10	0.046	Moderately Tolerant	0	--
Etheostoma blenniodes Greenside darter	27	0.008	Moderately Intolerant	1	Enlarged eye

Rocky River: Downstream of Blodgett Creek
Sample Date: 7/12/94

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies #	DELT Anomalies Description
Etheostoma maculata Blackside darter	1	0.002	--	0	--
Totals	275	14.377		1	

*DELT anomalies were observed on 0.4% of the fish collected.
Index of Biotic Integrity (IBI) = 36 (Marginally Good)
Modified Index of Well-Being (MIwb) 7.6 (Marginally Good)

Rocky River: Downstream of Blodgett Creek
Sample Date: 8/22/96
Collection Distance: 0.2 km
Collection Method: Longline Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies #	DELT Anomalies Description
Moxostoma erythrurum Golden redhorse	1	0.110	Moderately Intolerant	0	--
Hypentelium nigricans Northern hog sucker	31	3.434	Moderately Intolerant	0	--
Catostomus commersoni Common white sucker	16	1.688	Highly Tolerant	0	--
Semotilus atromaculatus Creek chub	3	0.006	Highly Tolerant	0	--
Notropis cornutus Common shiner	6	0.268	--	0	--
Notropis spilopterus Spotfin shiner	1	0.004	--	0	--
Notropis stramineus Sand shiner	1	0.004	Moderately Intolerant	0	--
Pimephales notatus Bluntnose minnow	6	0.020	Highly Tolerant	0	--
Campostoma anomalum Central stoneroller minnow	15	0.198	--	0	--
Ambloplites rupestris Northern rockbass	11	0.998	--	1	Body lesion
Micropterus dolomieui Smallmouth bass	11	0.996	Moderately Intolerant	0	--
Lepomis cyanellus Green sunfish	1	0.040	Highly Tolerant	0	--
Lepomis macrochirus Northern bluegill sunfish	2	0.068	Moderately Tolerant	0	--

Rocky River: Downstream of Blodgett Creek
Sample Date: 8/22/96

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies #	DELT Anomalies Description
Lepomis gibbosus Pumpkinseed sunfish	1	0.022	Moderately Tolerant	0	--
Etheostoma blenniodes Greenside darter	52	0.372	Moderately Intolerant	0	--
Ethestoma caeruleum Rainbow darter	5	0.016	Moderately Intolerant	0	--
Ethestoma flabellare Fantail darter	2	0.008	--	0	--
Ethestoma nigrum Johnny darter	5	0.012	--	0	--
Totals	170	8.264		1	

*DELT anomalies were observed on 0.6% of the fish collected.
Index of Biotic Integrity (IBI) = 46 (Very Good)
Modified Index of Well-Being (MIwb) 7.8 (Marginally Good)

Rocky River: Downstream of Blodgett Creek
Sample Date: 10/08/96
Collection Distance: 0.2 km
Collection Method: Longline Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies #	DELT Anomalies Description
Moxostoma erythrurum Golden redhorse	2	0.366	Moderately Intolerant	0	--
Hypentelium nigricans Northern hog sucker	18	1.072	Moderately Intolerant	0	--
Catostomus commersoni Common white sucker	17	1.208	Highly Tolerant	0	--
Semotilus atromaculatus Creek chub	2	0.008	Highly Tolerant	0	--
Notropis cornutus Common shiner	1	0.002	--	0	--
Notropis stramineus Sand shiner	12	0.044	Moderately Intolerant	0	--
Pimephales notatus Bluntnose minnow	3	0.006	Highly Tolerant	0	--
Campostoma anomalum Central stoneroller minnow	6	0.132	--	0	--
Ambloplites rupestris Northern rockbass	16	0.888	--	0	--
Micropterus dolomieui Smallmouth bass	22	1.600	Moderately Intolerant	0	--
Lepomis macrochirus Northern bluegill sunfish	1	0.002	Moderately Tolerant	0	--
Etheostoma blenniodes Greenside darter	13	0.092	Moderately Intolerant	0	--
Etheostoma maculata Blackside darter	1	0.010	--	0	--

Rocky River: Downstream of Blodgett Creek
Sample Date: 10/08/96

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies #	DELT Anomalies Description
Totals	114	5.430		0	

*DELT anomalies were observed on 0.0% of the fish collected.
Index of Biotic Integrity (IBI) = 40 (Good)
Modified Index of Well-Being (MIwb) 7.6 (Marginally Good)

APPENDIX M
BRANDYWINE CREEK ELECTROFISHING SURVEY
1998

Introduction

The Hudson Wastewater Treatment Plant (WWTP), which had discharged approximately 1.5 MGD of treated effluent to Brandywine Creek, was decommissioned during July 1998. Wastewater previously tributary to the plant now flows to the Northeast Ohio Regional Sewer District's (NEORSD's) Southerly Wastewater Treatment Center via the Cuyahoga Valley Interceptor (CVI). NEORSD's Water Quality and Industrial Surveillance department (WQIS) performed quantitative electrofish sampling on Brandywine Creek, upstream and downstream of the Hudson WWTP in 1998, utilizing its generator-powered longline electrofishing equipment. Fish were identified to species level, weighed, counted, examined for the presence of DELT anomalies (deformities, eroded fins, lesions and tumors), and returned to the stream where they were collected.

Longline electrofishing consists of wading in an upstream direction for a distance of 150-200 meters and sampling all habitat types including undercut banks, brush piles, log jams, boulders and other submerged structures. Fish are then netted and placed in a nylon floating live well where they are later processed. Ohio EPA protocols require two or three individual sampling passes to assess fish community health at each site.

The electrofishing data collected by NEORSD were compiled and used to calculate the Index of Biotic Integrity (IBI), which is used to assess fish community health. The IBI incorporates 12 metrics representing structural and functional attributes of a fish community. Structural attributes are based upon fish community aspects such as fish numbers and diversity. Functional attributes are based upon fish community aspects such as feeding strategies, environmental tolerances and disease symptoms. The metrics are individually scored by comparing the results obtained at the survey site with values expected at reference sites located in the same geographic ecoregion. The summation of the 12 individual metric scores provides an IBI score between 12 and 60 and an associated narrative rating (Exceptional, Good, Fair, or Poor) of fish community health.

Detailed descriptions of sampling and analysis methods utilized in fish surveys, including IBI calculations and the relationship between narrative ratings and index scores can be found in Ohio EPA's *Biological Criteria for the Protection of Aquatic Life* (1987) and *Compendium of Biological Results from Ohio Rivers, Streams and Lakes* (1989).

Results

The upstream fish sampling site was located at River Mile 8.0, while the downstream site began approximately 10 to 15 feet downstream of the former WWTP effluent

discharge. Electrofishing was performed at both Brandywine Creek locations on July 2 and September 11, 1998. Investigators assessed aquatic habitat conditions at each site using Ohio EPA's Qualitative Habitat Evaluation Index (QHEI).

Habitat conditions upstream of the WWTP included above average instream cover which consisted of undercut banks, overhanging vegetation, rootmats, rootwads, boulders, logs and woody debris. Cobble and gravel were the main substrate types, and the sinuosity of the creek was low to moderate with good development of riffle and runs. Maximum pool depth was greater than 3 feet with a riparian zone consisting of forest swamp. During the week of September 1, 1998, the Ohio Department of Transportation completed channel modifications and canopy removal to a segment of the creek which was approximately 100 feet long. The segment extends both upstream and downstream of the Ohio Turnpike bridge. Modifications included the removal of an accumulation of sediment under the bridge and the filling of a six-foot pool to a depth less than 2 feet. A QHEI Score of 75 was obtained at the upstream site.

The downstream site demonstrated below average instream cover with no rootwads, boulders, or deep pools. Poor development of riffles and runs was evident, while the predominant flood plain quality was shrub or old field. A QHEI score of 57.75 was obtained at the downstream site. According to Ohio EPA's *The Qualitative Habitat Evaluation Index (QHEI): Rationale, Methods, and Application*, "Stream reaches with QHEI scores averaging > 60 will likely have the potential to attain the WWH use" (p. 40). Brandywine Creek QHEI scores are shown graphically in Figure M-I. QHEI Field Sheets are located in Appendix D of the 1996-1998 Greater Cleveland Area Environmental Water Quality Assessment report.

Brandywine Creek has been assigned the Warmwater Habitat (WWH) aquatic life use designation by the Ohio EPA. Index scores must fall into the *Good* range (minimum score of 40 for wading sites such as these) to meet the WWH biological criteria. The Brandywine Creek sites electrofished by NEORSD in 1998 obtained average IBI scores in the *Fair* range. A summary of electrofishing results, which includes NEORSD scores obtained in 1998 as well as Ohio EPA scores from 1984 and 1996 is presented in Table M-1. Additional tables which, for each 1998 sampling event, list the species collected, number of individuals, weights, pollution tolerances and incidence of DELT anomalies, can be found at the end of this report. IBI scores from 1998 and average IBI scores from 1984-1998 are shown graphically in Figures M-2 and M-3.

Although average IBI scores have remained relatively constant both upstream and downstream of the Hudson WWTP since 1984, the proportion of fish species tolerant to pollution has decreased since 1984. The decrease in the proportion of pollution tolerant fish, which is shown graphically in Figure M-4, may be indicative of an improvement in water quality on Brandywine Creek.

Conclusions

Although the proportion of pollution tolerant fish collected on Brandywine Creek, both upstream and downstream of the Hudson WWTP has decreased since 1984, Index of Biotic Integrity scores for fish communities at the same locations have remained relatively constant. Future sampling may indicate whether the decommissioning of the Hudson WWTP and diversion of tributary wastewater to the NEORSD's Southerly Wastewater Treatment Center via the Cuyahoga Valley Interceptor will improve fish community health at these locations on Brandywine Creek.

Table M-1
Brandywine Creek Index of Biotic Integrity Scores
1984-1998

		Upstream Hudson WWTP		Downstream Hudson WWTP	
Date	Sampled By	Score	Narrative Rating	Score	Narrative Rating
7/2/98	NEORSD	34	Fair	30	Fair
9/11/98	NEORSD	36	Marginally Good	34	Marginally Good
1998 Average		35	Fair	32	Fair
8/2/96	OEPA			30	Fair
7/23/84	OEPA	32	Fair	28	Fair
8/15/84	OEPA	38	Marginally Good	38	Marginally Good
8/29/84	OEPA	34	Fair	24	Poor
1984 Average		35	Fair	30	Fair

Figure M-1
Brandywine Creek Qualitative Habitat Evaluation Index Scores
1998

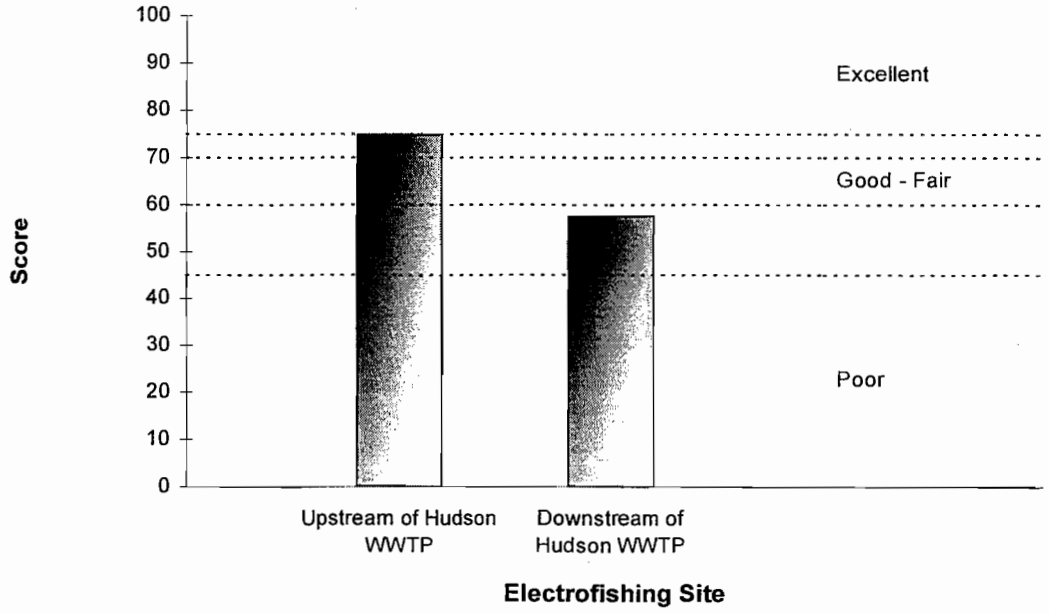


Figure M-2
Brandywine Creek Index of Biotic Integrity Scores
1998

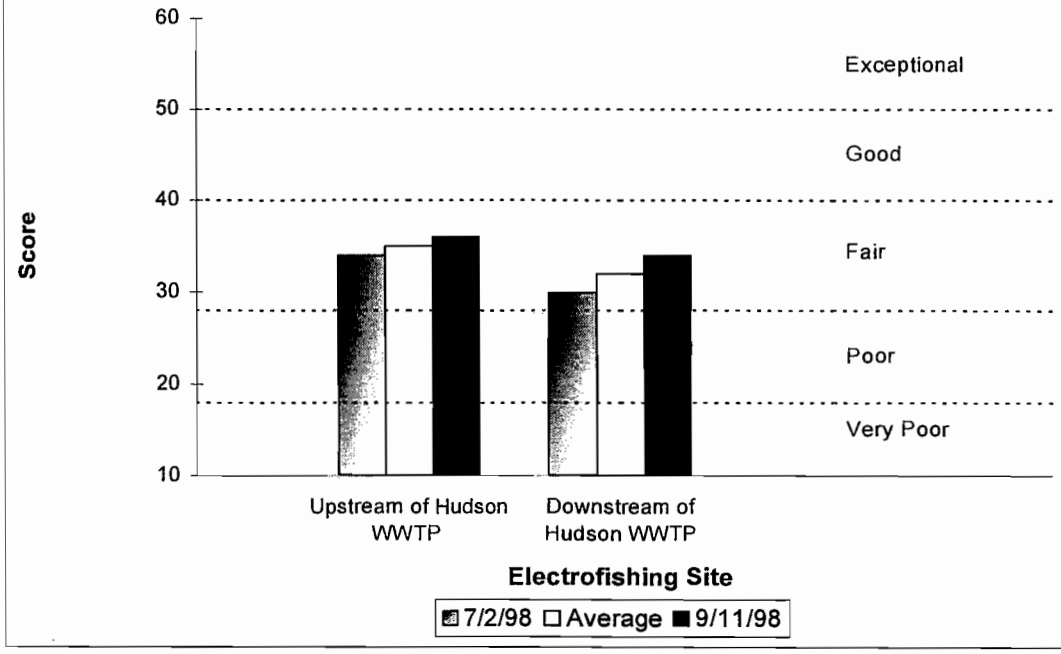


Figure M-3
Average Brandywine Creek Index of Biotic Integrity Scores
1984-1998

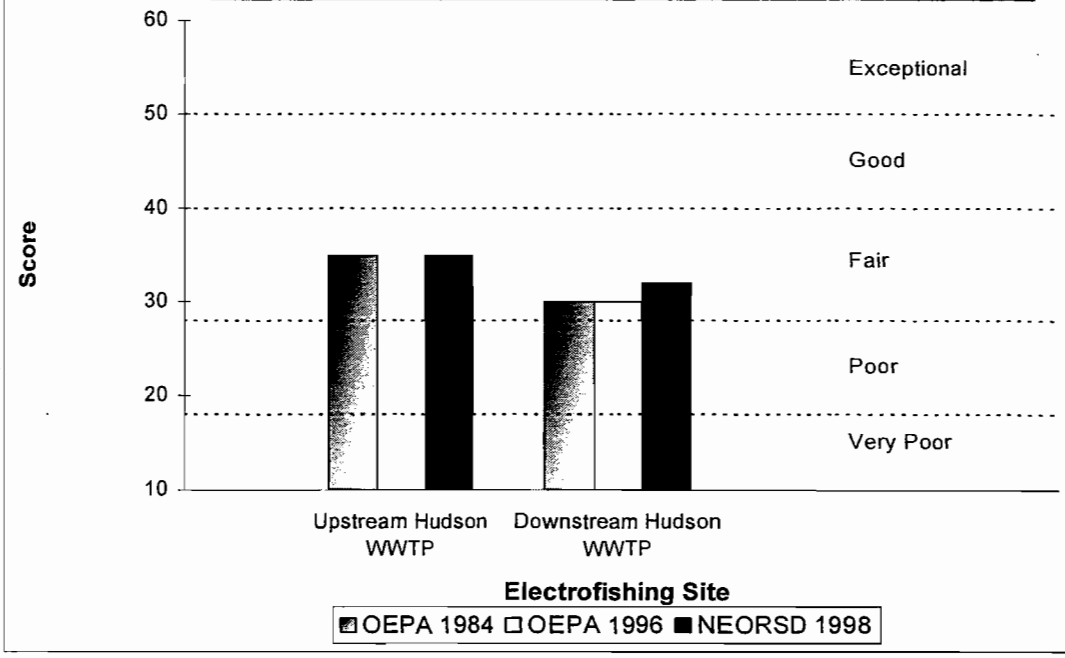
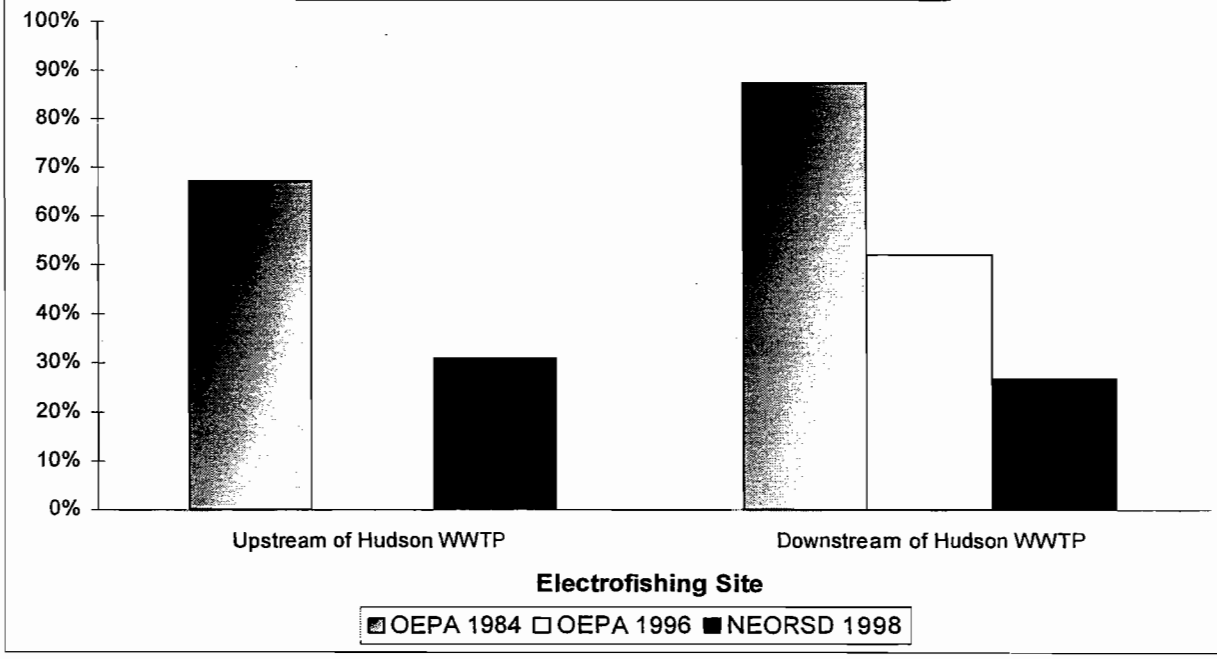


Figure M-4
Proportion of Highly Tolerant Fishes Collected
Brandywine Creek, 1984-1998



Brandywine Creek Upstream of Hudson Wastewater Treatment Plant
July 2, 1998
Collection Distance: 0.15 km
Collection Method: Longline Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies
Umbra limi Central mudminnow	2	0.012	Highly Tolerant	--
Catostomus commersoni Common white sucker	3	0.348	Highly Tolerant	--
Carassius auratus Goldfish	1	0.010	Highly Tolerant	--
Notemigonus crysoleucas Golden shiner	5	0.090	Highly Tolerant	Eroded tail (2)
Semotilus atromaculatus Creek chub	54	1.022	Highly Tolerant	--
Notropis cornutus Common shiner	9	0.088	--	--
Pimephales notatus Bluntnose minnow	7	0.032	Highly Tolerant	--
Campostoma anomalum Central stoneroller minnow	166	0.500	--	Dorsal lesion (1)
Ictalurus natalis Yellow bullhead	7	0.232	Highly Tolerant	--
Pomoxis annularis White crappie	39	0.600	--	Eroded tail (2)
Pomoxis nigromaculatus Black crappie	4	0.203	--	Eroded fin (1)
Micropterus salmoides Largemouth bass	18	0.072	--	--
Lepomis cyanellus Green sunfish	37	0.504	Highly Tolerant	--

Brandywine Creek Upstream of Hudson Wastewater Treatment Plant
July 2, 1998

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies
Lepomis macrochirus Northern bluegill sunfish	56	0.688	Moderately Tolerant	--
Lepomis gibbosus Pumpkinseed sunfish	8	0.224	Moderately Tolerant	Deformed nose (1)
Greensunfish hybrid	1	0.008	--	--
Totals	417	4.633		

*DELT anomalies were observed on 1.6% (7) of the fish collected.
Index of Biotic Integrity (IBI) = 34 (Fair)

Brandywine Creek Upstream of Hudson Wastewater Treatment Plant
September 11, 1998
Collection Distance: 0.15 km
Collection Method: Longline Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies
Catostomus commersoni Common white sucker	18	1.276	Highly Tolerant	Body lesion (1)
Notemigonus crysoleucas Golden shiner	2	0.008	Highly Tolerant	--
Semotilus atromaculatus Creek chub	72	1.428	Highly Tolerant	Body lesion (3)
Notropis comutus Common shiner	13	0.145	--	--
Pimephales notatus Bluntnose minnow	29	0.156	Highly Tolerant	--
Campostoma anomalum Central stoneroller minnow	169	0.704	--	--
Ictalurus natalis Yellow bullhead	34	0.408	Highly Tolerant	--
Pomoxis annularis White crappie	46	1.740	--	--
Micropterus salmoides Largemouth bass	11	0.220	--	--
Lepomis cyanellus Green sunfish	19	0.294	Highly Tolerant	Body tumor (1)
Lepomis macrochirus Northern bluegill sunfish	98	0.478	Moderately Tolerant	--
Lepomis gibbosus Pumpkinseed sunfish	8	0.110	Moderately Tolerant	--
Totals	519	6.967		

*DELT anomalies were observed on 0.96% (5) of the fish collected.
Index of Biotic Integrity (IBI) = 36 (Marginally Good)

Brandywine Creek Downstream of Hudson Wastewater Treatment Plant
July 2, 1998
Collection Distance: 0.2 km
Collection Method: Longline Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies
Umbra limi Central mudminnow	3	0.030		
Catostomus commersoni Common white sucker	2	0.074	Highly Tolerant	--
Semotilus atromaculatus Creek chub	25	0.322	Highly Tolerant	--
Pimephales notatus Bluntnose minnow	2	0.010	Highly Tolerant	--
Campostoma anomalum Central stoneroller minnow	14	0.062	--	--
Ictalurus natalis Yellow bullhead	1	0.240	Highly Tolerant	--
Pomoxis annularis White crappie	1	0.020	--	--
Ambloplites rupestris Northern rockbass	3	0.066	--	--
Micropterus salmoides Largemouth bass	1	0.002	--	--
Lepomis cyanellus Green sunfish	7	0.084	Highly Tolerant	--
Lepomis macrochirus Northern bluegill sunfish	17	0.176	Moderately Tolerant	--
Lepomis gibbosus Pumpkinseed sunfish	1	0.012	Moderately Tolerant	--
Bluegill/hybrid	2	0.034	--	--

Brandywine Creek Downstream of Hudson Wastewater Treatment Plant
July 2, 1998

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies
Totals	79	1.132		

*DELT anomalies were observed on 0% (0) of the fish collected.
Index of Biotic Integrity (IBI) = 30 (Fair)

Brandywine Creek Downstream of Hudson Wastewater Treatment Plant
September 11, 1998
Collection Distance: 0.2 km
Collection Method: Longline Electroshocking

Species	Number	Weight (kg)	Pollution Tolerance	DELT Anomalies
Umbra limi Central mudminnow	1	0.010	Highly Tolerant	--
Catostomus commersoni Common white sucker	20	0.178	Highly Tolerant	Fin lesion (1)
Semotilus atromaculatus Creek chub	45	0.328	Highly Tolerant	Body lesion (2)
Pimephales notatus Bluntnose minnow	14	0.070	Highly Tolerant	--
Campostoma anomalum Central stoneroller minnow	265	0.792	--	--
Ictalurus natalis Yellow bullhead	1	0.004	Highly Tolerant	--
Micropterus salmoides Largemouth bass	40	0.170	--	--
Lepomis cyanellus Green sunfish	12	0.154	Highly Tolerant	Deformed tail (1) Body tumor (1)
Lepomis macrochirus Northern bluegill sunfish	18	0.066	Moderately Tolerant	--
Totals	416	1.772		

*DELT anomalies were observed on 1.2% (5) of the fish collected.
Index of Biotic Integrity (IBI) = 34 (Fair)

APPENDIX N
LAKE ERIE AND TRIBUTARIES *E. COLI* SAMPLING
1997

Introduction

During the 1997 field season, the Northeast Ohio Regional Sewer District's Water Quality and Industrial Surveillance Department (WQIS) conducted *E. coli* bacteria sampling at three nearshore Lake Erie sites and eight sites on Lake Erie tributary streams. The sampling was conducted in conjunction with the United States Geological Survey's (USGS) "Factors Affecting *Escherichia coli* concentrations at Lake Erie Public Bathing Beaches" study.

USGS attempted to collect samples for their study under various conditions during the 1997 recreation season. Researchers had planned to collect samples on weekdays and weekends, before and after combined sewer overflow events, under various wind speed and wave height conditions, and when recreational use was high. Although the actual sampling schedule varied slightly, the original plans called for studies with durations of four days in May, seven days in June, 14 days in July, 14 days in August and four days in September. NEORSD attempted to collect samples on each day that USGS collected samples, plus the two days prior to the start of each study. NEORSD collected grab samples on 47 days from May through September 1997. Each sample collected was measured for dissolved oxygen and water temperature in the field and delivered to the NEORSD Analytical Services Department for analysis of *E. coli*, suspended solids, turbidity, total phosphorus and chlorides.

When conditions on Lake Erie were favorable, NEORSD collected samples by boat at the following locations:

- Rocky River at the Emerald Necklace Marina
- Nearshore Lake Erie, just west of West 117th Street (41° 29.60'N, 81° 46.35'W)
- Lake Erie Site E, offshore of Edgewater Beach
- Cuyahoga River at midstream, immediately downstream of the Conrail Railroad bridge

When conditions on Lake Erie precluded boating, NEORSD collected samples from land at the following locations:

- Rocky River at the Emerald Necklace Marina
- Lake Erie from the pier at the Carlyle Condominiums, 12900 Lake Avenue
- Cuyahoga River at NEORSD Site #20, behind Fagan's Restaurant

Regardless of weather conditions, samples were collected from land at the following locations:

Doan Brook at NEORSD Site #16, north of St. Clair Avenue, east of Martin Luther King, Jr. Drive

- Dugway Brook at NEORSD Site #12, just north of Lake Shore Boulevard
- Shaw Brook, just upstream of Lake Shore Boulevard
- Nine-Mile Creek at NEORSD Site #8a, approximately 50 feet north of Lake Shore Boulevard
- Green Creek, at the manhole in the sidewalk, north of the Sunoco station at the southeast corner of the intersection of East 156th Street and Lake Shore Boulevard
- Euclid Creek at Wildwood Park, downstream side of the bridge which connects the driveway to the parking area
- Lake Erie sample at the north end of VASJ Championship Drive (East 185th Street), on the property of the Hospice of the Western Reserve, weather permitting

NEORSD experienced mechanical difficulties with its boat throughout the summer of 1997. Because of these difficulties, all samples were collected by land on several occasions even though lake conditions were favorable for boating.

Collection Summary

Sample results are presented by site in Tables N-1 through N-11. Table N-12 shows the results of *E. coli* samples from NEORSD's 1997 Beach study collected at Edgewater and Euclid Beaches on the same dates which samples were collected for this study. Figure N-1 shows the geometric mean *E. coli* concentration of all samples collected at each sampling site during this project. Wet and dry weather samples were defined as follows for the purposes of this study.

When the average amount of rainfall measured by all NEORSD rain gauges on a given day was:

- greater than 0.1 inches and rain events began, in general, before 12:00 noon, samples collected that day were considered wet weather samples

- greater than 0.1 inches but less that 0.25 inches, samples collected the following day were considered wet weather samples

- greater than 0.25 inches, samples collected the following two days were considered wet weather samples

All other samples were considered dry weather samples.

Figures N-2 and N-3 show the geometric mean *E. coli* concentrations of samples collected at each site during dry weather and wet weather, respectively. Figure N-4 shows the increase in geometric mean *E. coli* concentration from dry weather to wet weather at each site. Figure N-5 shows the proportion of 30-day periods during the study in which recreational criteria were met at each site. (For the purposes of this

study, secondary contact recreational criteria were applied to the Dugway Brook, Shaw Brook, and Green Creek sites, which have not been assigned use designations by Ohio EPA.) Tables N-1 through N-12 summarize the bacteriological sampling results for each site. Table N-13 lists each site, in order from lowest to highest geometric mean bacteria concentration, for both dry and wet weather conditions.

Conclusions

Undesignated Sites

As expected, the sites which have not been assigned a recreational use designation by Ohio EPA tended to have higher geometric mean *E. coli* concentrations than the Primary Contact and Bathing Waters sites in both dry and wet weather. Sample results indicate that these sites tended not to meet even the Secondary Contact recreation standards during wet or dry weather conditions. An exception to this general conclusion, however, was the Green Creek site, which performed more like a Primary Contact Site.

Primary Contact Sites

Also as would be expected, the Primary Contact sites had geometric mean *E. coli* concentrations which were lower than those generally obtained at the undesignated sites, but higher than what was observed at the Bathing Waters sites. These sites tended to meet the Primary Contact criteria for *E. coli* occasionally during dry weather. As mentioned above, the Green Creek site, which is not designated, performed like the Primary Contact sites. Exceptions to the general conclusions for Primary Contact sites were observed at the Nine-Mile Creek site and the Cuyahoga River Site. The Nine-Mile Creek site, which performed more like an undesignated site, never met the Primary Contact criteria for *E. coli.* Only the Dugway and Shaw Brook sites had bacteria concentrations which were higher than those measured at the Nine-Mile Creek site in both dry and wet weather. The Cuyahoga River site was the only Primary Contact site which occasionally met the *E. coli* recreational criteria during wet weather.

Bathing Waters Sites

Geometric mean *E. coli* concentrations measured at the Bathing Waters sites were lower than those observed at either the Primary Contact sites or the undesignated sites. These sites tended to meet the *E. coli* recreational criteria at all times during dry weather and at least some of the time during wet weather. (Although the Edgewater Beach site met the recreational criteria during 100% of the 30-day periods in which samples were collected, only two wet weather samples were collected at this site.) The East 185th Street site, however, is an exception to this general conclusion for the Bathing Waters sites. Its performance with respect to recreational criteria was between that of the other Bathing Waters sites and the Primary Contact sites. Geometric mean *E. coli* concentrations were an order of magnitude higher at the East 185th Street site than at the Carlyle site in both dry and wet weather. Recreational criteria were met more than half the time at this site during dry weather, but not at all during wet weather. As expected, bacteria concentrations and performance, in terms of recreational criteria, at the East 185th Street site appear to be influenced by Lake Erie tributaries located east of the downtown Cleveland.

East vs. West

Geometric mean *E. coli* concentrations at tributaries located east of downtown Cleveland, with the exception of Nine-Mile Creek, increased by approximately an order of magnitude from dry weather to wet weather. Geometric mean *E. coli* concentrations at the Rocky and Cuyahoga River sites did not increase as dramatically. Utilizing *E. coli* data collected by NEORSD Analytical Services Department during its 1997 Beach Study (only on the dates on which samples were collected for this project) to calculate attainment of the Bathing Waters recreational criteria indicate the following results:

Proportion Of 30-Day Periods during Which Recreational Criteria Were Met

	Edgewater Beach	Euclid Beach
Dry Weather	57%	82%
Wet Weather	53%	14%

These results demonstrate that *E. coli* concentrations are influenced to a greater extent by wet weather on Lake Erie tributaries located east of downtown Cleveland and at Euclid Beach than on the Rocky and Cuyahoga Rivers and at Edgewater Beach.

Table N-1
Northeast Ohio Regional Sewer District
1997 Lake Erie and Tributaries *E. coli* Sampling

Rocky River at the Emerald Necklace Marina

Date	Sample ID	Dissolved Oxygen (mg/L)	Temperature °C	Suspended Solids (mg/L)	Phosphorous (mg/L)	Chlorides (mg/L)	*E. coli* (#/100 mL)	Turbidity (NTU)
5/18/97	1259-7	8.2	14.0	4	0.08	110	40	4.5
5/19/97	1269-7	7.6	16.5	16	0.51	66	3600	130
5/20/97	1282-7	9.0	16.0	16	0.06	64	1300	5
5/21/97	1300-7	9.0	13.0	13	0.17	82	210	20
5/22/97	1324-7	10.8	15.0	15	0.06	94	130	5.3
6/16/97	1501-7	7.5	21.0	21	0.09	98	125	2.6
6/17/97	1520-7	7.2	21.0	14	0.10	88	1900	5.4
6/18/97	1537-7	6.4	21.0	8	0.10	90	180	3.3
6/19/97	1559-7	8.5	19.5	5	0.09	102	100	1.8
6/20/97	1576-7	6.8	22.0	22	0.31	288	700	7.5
6/21/97	1590-7	6.5	24.0	24	0.11	106	160	3.7
6/22/97	1600-7	6.0	23.0	23	0.30	78	1400	5.8
6/23/97	1611-7	7.3	25.5	10	0.13	90	240	6.2
6/24/97	1646-7	6.0	25.0	10	0.12	114	260	3.8
*7/6/97	1726-7	7.9	22.0	28	0.16	104	140	13
7/7/97	1747-7	7.4	23.0	20	0.12	114	220	9.2
7/8/97	1762-7	7.5	18.5	31	0.04	126	180	18
7/9/97	1784-7	6.4	22.0	34	0.21	116	4500	17
7/10/97	1801-7	7.8	20.5	18	0.16	102	480	11
7/11/97	1823-7	7.3	20.5	15	0.13	96	130	7.2
*7/12/97	1834-7	6.6	23.5	14	0.13	102	230	7.7
7/13/97	1845-7	6.5	24.5	43	0.22	105	230	18
7/14/97	1865-7	5.6	26.0	20	0.16	114	110	17
7/15/97	1881-7	5.3	27.0	51	0.24	86	5000	52
7/16/97	1899-7	4.8	27.0	20	0.09	106	180	12
7/17/97	1952-7	7.0	27.0	26	0.18	102	200	12
7/18/97	1982-7	11.4	29.0	23	0.04	108	120	12
*8/2/97	2168-7	8.0	25.0	26	0.20	142	90	14
*8/3/97	2176-7	7.4	25.0	25	0.20	156	70	13
*8/4/97	2191-7	7.4	24.0	18	0.16	106	4000	13
8/5/97	2213-7	7.4	24.0	28	0.21	116	960	19
8/6/97	2231-7	10.6	24.0	18	0.21	142	640	12
8/7/97	2257-7	9.4	23.0	17	0.18	118	190	8.6
8/8/97	2286-7	9.0	23.5	15	0.20	140	120	7.2
8/9/97	2305-7	8.7	24.5	13	0.17		73	7.1
8/10/97	2315-7	6.8	25.0	12	0.15	164	110	8
8/11/97	2327-7	6.3	24.0	20	0.17	164	100	11
8/12/97	2339-7	7.3	22.0	14	0.20	134	900	5.5
8/13/97	2359-7	6.3	23.0	32	0.23	108	940	20
8/14/97	2380-7	6.3	20.5	20	0.21	80	410	12
8/15/97	2406-7	7.3	21.0	22	0.18	110	290	17
8/16/97	2418-7	7.3	22.5	49	0.25	86	4700	31
8/18/97	2432-7	8.8	21.5	208	0.50	48	3900	130
8/19/97	2458-7	8.4	20.0	88	0.30	82	510	53
8/20/97	2479-7	7.2	21.0	26	0.17	92	350	17
*9/2/97	2569-7	7.5	23.0	10	0.14	110	240	4.2
9/3/97	2591-7	7.2	20.0	22	0.18	100	2800	16

Minimum	40
Maximum	5,000
Geometric Mean	365

D.O. below criteria 0

ND-INT = No data, interference
AE = Analytical error
= Wet weather sample

*Samples collected by boat

Table N-2
Northeast Ohio Regional Sewer District
1997 Lake Erie and Tributaries *E. coli* Sampling

Lake Erie at the Carlyle Condominiums

Date	Sample ID	Dissolved Oxygen (mg/L)	Temperature °C	Suspended Solids (mg/L)	Phosphorous (mg/L)	Chlorides (mg/L)	*E. coli* (#/100 mL)	Turbidity (NTU)
5/18/97	1258-7	10.0	10.5	2	0.02	36	4	3.9
5/19/97	1268-7	10.4	11.0	12	0.04	24	620	10
5/20/97	1281-7	10.8	12.0	37	0.07	30	230	9.9
5/21/97	1299-7	10.0	13.0	113	0.21	54	280	46
5/22/97	1323-7	10.2	13.5	42	0.08	44	120	18
6/16/97	1500-7	8.4	14.0	1	0.04	16	<1	1.5
6/17/97	1517-7	9.1	18.0	24	0.06	22	520	9.8
6/18/97	1536-7	8.2	17.0	3	0.03	20	125	2.6
6/19/97	1558-7	9.5	18.0	2	0.03	22	10	1.6
6/20/97	1575-7	9.0	18.5	13	0.31	82	28	11
6/21/97	1589-7	10.0	19.0	<1	0.03	20	10	1.8
6/22/97	1599-7	9.2	20.5	1	0.03	20	50	1.5
6/23/97	1610-7	9.0	22.0	1	0.03	22	2	1.2
6/24/97	1645-7	8.4	20.0	<1	0.02	38	4	1.4
*7/6/97	1727-7	8.0	22.0	7	0.02	28	2	1.8
7/7/97	1746-7	8.0	22.5	4	<0.01	22	12	2.2
7/8/97	1761-7	8.2	22.0	3	0.04	42	13	1.7
7/9/97	1783-7	8.0	22.0	43	0.08	30	1400	12
7/10/97	1800-7	7.9	21.5	6	0.05	24	30	3.8
7/11/97	1822-7	7.6	22.0	2	0.04	28	10	2.1
*7/12/97	1836-7	7.5	22.0	<1	0.03	48	<5	1.2
7/13/97	1846-7	8.0	22.0	2	0.04	28	5	1.2
7/14/97	1864-7	7.3	22.0	<1	0.03	30	1	0.95
7/15/97	1880-7	9.8	23.0	2	0.04	26	180	1.6
7/16/97	1898-7	9.2	25.0	2	<0.01	20	5	1.2
7/17/97	1951-7	8.9	24.5	10	0.06	20	150	3.2
7/18/97	1981-7	7.8	26.0	1	0.04	22	7	1.4
*8/2/97	2167-7	7.4	23.5	<1	0.05	24	<4	2.1
*8/3/97	2177-7	7.5	23.5	<1	0.05	26	<4	1.1
*8/4/97	2190-7	7.4	24.0	1	0.02	38	145	1.2
8/5/97	2212-7	7.8	23.0	74	0.13	20	60	25
8/6/97	2230-7	7.8	23.0	8	0.05	58	20	4.8
8/7/97	2256-7	7.0	23.0	<1	0.03	28	6	1.2
8/8/97	2285-7	7.4	23.0	2	0.04	30	10	1.1
8/9/97	2304-7	6.3	23.0	<1	0.05	48	3	0.83
8/10/97	2314-7	6.6	23.0	<1	0.04	64	1	0.94
8/11/97	2326-7	7.3	23.0	2	0.04	48	5	0.86
8/12/97	2338-7	7.8	22.5	8	0.06	46	66	6.1
8/13/97	2358-7	7.6	23.0	24	0.08	32	230	7.8
8/14/97	2378-7	6.6	23.0	15	0.04	24	42	3.8
8/15/97	2405-7	7.6	22.0	6	0.06	28	44	4.7
8/16/97	2417-7	8.4	23.0	4	0.05	34	156	1.4
8/18/97	2431-7	8.5	22.5	29	0.12	28	100	17
8/19/97	2455-7	7.9	22.5	5	0.05	6	25	2.1
8/20/97	2478-7	7.3	23.0	6	0.08	60	16	2.8
*9/2/97	2570-7	6.7	23.0	<1	0.04	24	2	0.48
9/3/97	2590-7	8.2	21.0	200	0.30	16	810	83
Minimum							1	
Maximum							1,400	
Geometric Mean							27	
D.O. below critera		0						

ND-INT = No data, interference
AE = Analytical error
= Wet weather sample

*Samples collected by boat, west of West 117th Street

Table N-3
Northeast Ohio Regional Sewer District
1997 Lake Erie and Tributaries *E. coli* Sampling

*Lake Erie, Offshore of Edgewater Beach

Date	Sample ID	Dissolved Oxygen (mg/L)	Temperature °C	Suspended Solids (mg/L)	Phosphorous (mg/L)	Chlorides (mg/L)	*E. coli* (#/100 mL)	Turbidity (NTU)
5/18/97								
5/19/97								
5/20/97								
5/21/97								
5/22/97								
6/16/97								
6/17/97								
6/18/97								
6/19/97								
6/20/97								
6/21/97								
6/22/97								
6/23/97								
6/24/97								
7/6/97	1728-7	8.0	22.0	5	0.03	28	2	2.1
7/7/97								
7/8/97								
7/9/97								
7/10/97								
7/11/97	1821-7	6.9	22.0	4	0.03	46	10	2.9
7/12/97	1835-7	7.4	22.0	<1	0.04	50	10	2.2
7/13/97	1847-7	8.6	22.5	4	0.05	34	4	1.9
7/14/97								
7/15/97								
7/16/97								
7/17/97								
7/18/97								
8/2/97	2166-7	7.9	23.5	<1	0.05	34	2	2.6
8/3/97	2178-7	7.7	23.5	<1	0.03	34	<4	0.84
8/4/97	2189-7	8.0	24.0	1	<0.01	34	1	1
8/5/97								
8/6/97								
8/7/97								
8/8/97								
8/9/97								
8/10/97								
8/11/97								
8/12/97								
8/13/97								
8/14/97								
8/15/97								
8/16/97								
8/18/97								
8/19/97								
8/20/97								
9/2/97	2571-7	9.2	23.0	2	0.04	38	<4	1.1
9/3/97								
Minimum							1	
Maximum							10	
Geometric Mean							3	
D.O. below critera		0						

ND-INT = No data, interference
AE = Analytical error
= Wet weather sample

*Samples collected only on days when boat was used

Table N-4
Northeast Ohio Regional Sewer District
1997 Lake Erie and Tributaries *E. coli* Sampling

Cuyahoga River, Upstream of Conrail

Date	Sample ID	Dissolved Oxygen (mg/L)	Temperature °C	Suspended Solids (mg/L)	Phosphorous (mg/L)	Chlorides (mg/L)	*E. coli* (#/100 mL)	Turbidity (NTU)
5/18/97	1257-7	6.5	14.0	23	0.21	162	40	6
5/19/97	1267-7	6.5	16.0	33	0.24	152	1100	25
5/20/97	1280-7	3.8	17.0	83	0.29	166	2900	1.7
5/21/97	1298-7	4.8	16.5	40	0.56	114	450	32
5/22/97	1322-7	3.9	17.5	28	0.34	126	110	19
6/16/97	1499-7	4.8	21.5	13	0.15	126	24	10
6/17/97	1516-7	3.8	21.0	34	0.18	112	130	13
6/18/97	1535-7	3.1	21.0	19	0.14	102	1500	12
6/19/97	1557-7	4.4	21.0	23	0.18	140	140	11
6/20/97	1574-7	4.8	22.5	15	0.20	120	740	8
6/21/97	1588-7	5.0	21.0	2	0.13	120	200	3.2
6/22/97	1598-7	5.1	22.5	21	0.18	126	80	9.8
6/23/97	1612-7	3.2	24.0	12	0.16	126	130	9.3
6/24/97	1644-7	3.7	23.0	22	0.18	148	68	9.8
*7/6/97	1729-7	2.2	24.0	12	0.17	136	1400	6.5
7/7/97	1745-7	2.0	24.0	22	0.28	148	800	12
7/8/97	1760-7	2.8	25.0	31	0.21	132	1300	17
7/9/97	1782-7	1.6	24.0	44	0.25	166	820	22
7/10/97	1799-7	2.5	24.0	24	0.22	162	930	13
*7/11/97	1820-7	3.0	24.5	20	0.26	158	60	6.7
*7/12/97	1837-7	2.5	24.0	56	0.35	156	120	22
*7/13/97	1848-7	3.7	25.0	9	0.20	146	4	4.8
7/14/97	1863-7	4.3	25.0	8	0.22	152	29	6.3
7/15/97	1879-7	6.3	25.0	14	0.21	138	320	8.2
7/16/97	1897-7	4.5	25.0	16	0.16	140	140	7.8
7/17/97	1950-7	3.3	25.5	18	0.24	128	110	8.3
7/18/97	1980-7	1.8	28.0	23	0.34	152	160	12
*8/2/97	2165-7	1.8	26.0	14	0.25	190	30	12
*8/3/97	2179-7	3.0	25.0	19	0.19	146	10	7.2
*8/4/97	2188-7	2.3	26.0	8	0.18	182	250	4.6
8/5/97	2211-7	2.4	25.0	11	0.26	212	630	13
8/6/97	2229-7	2.7	25.0	11	0.24	196	2400	5.2
8/7/97	2255-7	2.2	25.0	14	0.24	226	9000	6.4
8/8/97	2284-7	2.3	25.0	15	0.26	198	3100	8
8/9/97	2303-7	2.9	25.0	15	0.25	208	3800	8.6
8/10/97	2313-7	4.5	25.0	13	0.22	170	1600	7.2
8/11/97	2325-7	2.3	25.0	12	0.22	186	240	4.8
8/12/97	2337-7	8.3	25.0	12	0.22	194	660	8.6
8/13/97	2357-7	1.5	26.0	12	0.32	238	513	6.6
8/14/97	2378-7	2.5	25.0	13	0.27	204	1300	7.9
8/15/97	2404-7	3.4	24.5	8	0.27	176	860	5.2
8/16/97	2416-7	3.0	24.0	18	0.28	178	26000	8.6
8/18/97	2430-7	5.0	21.5	63	0.33	96	620	57
8/19/97	2454-7	4.3	23.0	26	0.20	130	280	17
8/20/97	2477-7	4.3	23.0	26	0.23	112	400	14
*9/2/97	2572-7	2.6	24.5	8	0.20	160	28	6.2
9/3/97	2589-7	3.2	24.0	10	0.24	182	160	5.4

Minimum	4
Maximum	26,000
Geometric Mean	319

D.O. below criteria 2

ND-INT = No data, interference
AE = Analytical error
= Wet weather sample

*Sample collected by boat, downstream of the Conrail Railroad bridge.

Table N-5
Northeast Ohio Regional Sewer District
1997 Lake Erie and Tributaries *E. coli* Sampling

Doan Brook, North of St. Clair Avenue

Date	Sample ID	Dissolved Oxygen (mg/L)	Temperature °C	Suspended Solids (mg/L)	Phosphorous (mg/L)	Chlorides (mg/L)	*E. coli* (#/100 mL)	Turbidity (NTU)
5/18/97	1256-7	9.0	12.0	2	0.06	294	220	2.9
5/19/97	1266-7	4.4	15.0	20	0.18	188	24000	9.4
5/20/97	1279-7	7.5	13.0	17	0.10	192	8000	3.7
5/21/97	1297-7	6.2	13.0	67	0.29	224	14000	19
5/22/97	1321-7	6.6	13.0	7	0.10	270	1300	3
6/16/97	1498-7	8.1	18.0	2	0.09	116	55	2
6/17/97	1515-7	6.4	19.0	14	0.15	134	14000	5.2
6/18/97	1534-7	4.4	18.0	13	0.20	162	3300	4.2
6/19/97	1556-7	3.9	18.0	6	0.19	192	1300	2.7
6/20/97	1573-7	0.6	21.0	1	0.03	22	320000	2.5
6/21/97	1587-7	1.5	22.0	4	0.31	220	2400	3.8
6/22/97	1597-7	0.5	21.0	11	0.40	116	170000	9
6/23/97	1609-7	0.7	21.0	3	0.29	182	1000	3.2
6/24/97	1643-7	1.6	21.5	2	0.25	258	200	3.1
7/6/97	1736-7	7.3	22.0	18	0.07	82	50	3.6
7/7/97	1743-7	2.3	20.5	14	0.29	290	11000	6.3
7/8/97	1759-7	5.0	21.5	36	0.07	76	7000	5.2
7/9/97	1781-7	0.3	20.0	19	0.48	164	130	7.7
7/10/97	1798-7	4.3	20.5	112	0.33	70	7400	13
7/11/97	1830-7	5.5	21.5	2	0.13	66	110	1.5
7/12/97	1844-7	4.7	22.0	2	0.10	74	170	1.9
7/13/97	1855-7	5.3	22.0	26	0.15	80	410	3.2
7/14/97	1862-7	5.3	23.0	3	0.10	90	140	2.8
7/15/97	1878-7	3.3	23.0	8	0.18	152	640	3.8
7/16/97	1896-7	4.8	25.0	7	0.10	104	580	3.4
7/17/97	1949-7	3.1	25.5	15	0.18	86	460	4.7
7/18/97	1979-7	2.0	25.5	5	0.34	148	80	2.6
8/2/97	2175-7	4.1	22.0	17	0.24	146	420	9.2
8/3/97	2186-7	4.7	23.0	6	0.18	126	115	3.2
8/4/97	2198-7	2.0	21.0	18	0.35	68	30000	13
8/5/97	2210-7	3.4	21.0	28	0.26	124	4800	15.1
8/6/97	2228-7	4.0	21.5	6	0.22	108	1200	3.8
8/7/97	2254-7	5.7	22.0	2	0.10	64	500	1.5
8/8/97	2283-7	6.4	23.0	1	0.08	46	65	1.4
8/9/97	2302-7	5.8	22.0	6	0.08	72	51	1.2
8/10/97	2312-7	8.2	22.0	12	0.12	94	240	3.2
8/11/97	2324-7	3.9	22.0	12	0.18	136	170	4.6
8/12/97	2336-7	3.7	22.0	8	0.15	132	1800	3.2
8/13/97	2356-7	1.0	22.0	39	0.65	94	50000	13
8/14/97	2377-7	1.0	20.0	8	0.40	170	3800	3.3
8/15/97	2403-7	2.7	21.5	9	0.21	80	4000	2.7
8/16/97	2415-7	1.0	22.0	21	0.42	90	440000	8.9
8/18/97	2429-7	2.5	21.5	29	0.31	112	5100	5.3
8/19/97	2453-7	1.7	21.0	7	0.29	128	640	2.6
8/20/97	2476-7	2.2	21.5	4	0.18	100	250	1.4
9/2/97	2579-7	5.0	19.0	12	0.09	108	110	2.3
9/3/97	2588-7	1.0	20.0	20	0.78	68	27000	12
Minimum							50	
Maximum							440,000	
Geometric Mean							1,373	
D.O. below criteria		23						

ND-INT = No data, interference
AE = Analytical error
= Wet weather sample

Table N-6
Northeast Ohio Regional Sewer District
1997 Lake Erie and Tributaries *E. coli* Sampling

Dugway Brook, Downstream of Lake Shore Boulevard

Date	Sample ID	Dissolved Oxygen (mg/L)	Temperature °C	Suspended Solids (mg/L)	Phosphorous (mg/L)	Chlorides (mg/L)	*E. coli* (#/100 mL)	Turbidity (NTU)
5/18/97	1255-7	8.6	10.0	2	0.16	386	1800	7
5/19/97	1265-7	8.2	13.5	2	0.21	166	13000	9.3
5/20/97	1278-7	8.8	13.0	25	0.26	234	13000	11
5/21/97	1296-7	8.8	12.5	10	0.14	270	11000	9.6
5/22/97	1320-7	8.8	12.0	6	0.14	320	4700	6.5
6/16/97	1497-7	7.8	14.5	4	0.17	398	1600	9.8
6/17/97	1514-7	8.0	16.0	12	0.15	208	16000	11
6/18/97	1533-7	5.7	15.5	18	0.34	280	58000	11
6/19/97	1555-7	7.0	15.5	5	0.15	332	13000	4.4
6/20/97	1572-7	7.2	16.5	18	0.12	90	31000	9.2
6/21/97	1586-7	7.4	16.0	2	0.17	380	23000	6.2
6/22/97	1596-7	7.0	18.0	9	0.19	172	15000	6.7
6/23/97	1608-7	7.2	16.0	2	0.18	370	1600	7.7
6/24/97	1642-7	7.5	16.0	4	0.22	430	1500	8
7/6/97	1735-7	8.3	17.5	40	0.22	196	6200	25
7/7/97	1744-7	6.3	17.0	8	0.28	194	360	3.6
7/8/97	1758-7	6.5	17.0	6	0.39	380	50	7.3
7/9/97	1780-7	6.4	19.0	12	0.28	140	24000	6.8
7/10/97	1797-7	6.1	17.0	8	0.27	316	12000	8.3
7/11/97	1829-7	5.6	17.0	6	0.25	330	5600	7.4
7/12/97	1843-7	6.2	16.5	4	0.25	396	4000	8.7
7/13/97	1854-7	4.9	17.0	7	0.26	330	6500	8.6
7/14/97	1861-7	4.9	17.0	5	0.24	372	10000	8.5
7/15/97	1895-7	5.1	18.0	9	0.24	306	22000	9.9
7/16/97	1895-7	5.2	17.5	6	0.21	336	3400	9.5
7/17/97	1948-7	5.1	18.0	7	0.29	328	5000	9.7
7/18/97	1/18/97	4.4	18.5	12	0.34	340	15000	8.8
8/2/97	2174-7	2.1	18.0	4	0.47	316	4200	8.2
8/3/97	2165-7	2.8	18.5	68	0.79	306	720	14
8/4/97	2197-7	7.1	19.5	38	0.41	152	23000	31
8/5/97	2209-7	5.6	16.5	11	0.29	246	13000	12
8/6/97	2227-7	6.5	18.0	10	0.32	390	10000	7.9
8/7/97	2253-7	7.0	18.0	6	0.28	306	6600	8.1
8/8/97	2282-7	7.3	18.0	4	0.29	324	14600	7.4
8/9/97	2301-7	6.7	18.0	4	0.31	372	2300	6.4
8/10/97	2311-7	5.6	18.0	5	0.28	364	3600	7.1
8/11/97	2323-7	5.9	19.0	12	0.28	306	4900	8.8
8/12/97	2335-7	6.3	18.5	8	0.25	228	6200	7.2
8/13/97	2355-7	7.5	20.0	19	0.30	128	16000	17
8/14/97	2376-7	5.9	18.5	5	0.33	256	6700	6.8
8/15/97	2402-7	5.5	18.0	7	0.36	304	26000	9.2
8/16/97	2414-7	6.8	19.0	12	0.27	242	55000	7.6
8/18/97	2428-7	7.8	19.5	20	0.27	214	6900	8.8
8/19/97	2452-7	7.3	18.5	4	0.23	302	5100	4.7
8/20/97	2475-7	7.0	19.0	24	0.31	322	3900	4.7
9/2/97	2578-7	6.0	18.0	6	0.25	364	6300	6.7
9/3/97	2587-7	6.5	19.0	8	0.25	178	17000	9.1
Minimum							50	
Maximum							58,000	
Geometric Mean							6,759	
D.O. below 4.0		2						

ND-INT = No data, interference
AE = Analytical error
= Wet weather sample

Table N-7
Northeast Ohio Regional Sewer District
1997 Lake Erie and Tributaries *E. coli* Sampling

Shaw Brook, Upstream of Lake Shore Boulevard

Date	Sample ID	Dissolved Oxygen (mg/L)	Temperature °C	Suspended Solids (mg/L)	Phosphorous (mg/L)	Chlorides (mg/L)	*E. coli* (#/100 mL)	Turbidity (NTU)
5/18/97	1254-7	1.5	10.0	17	1.21	270	26000	11
5/19/97	1264-7	6.8	14.0	13	0.35	108	34000	14
5/20/97	1277-7	6.0	12.0	22	0.24	206	16000	11
5/21/97	1295-7	5.2	11.0	10	0.24	190	9500	8.5
5/22/97	1319-7	4.6	12.0	15	0.19	434	960	9.8
6/16/97	1496-7	2.9	16.0	8	0.26	ND-INT	2500	6.5
6/17/97	1513-7	2.9	17.0	14	0.51	94	250000	15
6/18/97	1532-7	2.7	16.0	20	0.29	346	32000	12
6/19/97	1554-7	1.2	16.0	11	0.25	526	3200	6.2
6/20/97	1571-7	0.5	18.0	10	0.32	761	2200	10
6/21/97	1585-7	0.5	20.0	6	0.38	906	3600	12
6/22/97	1595-7	1.0	19.5	14	0.23	114	15000	8.9
6/23/97	1607-7	0.5	19.0	6	0.40	536	1400	12
6/24/97	1641-7	0.7	21.0	8	0.36	806	1700	12
7/6/97	1734-7	0.7	17.5	15	0.34	716	400	9
7/7/97	1742-7	0.5	18.5	11	0.28	770	4000	9
7/8/97	1757-7	0.8	17.5	15	0.39	742	30000	8.4
7/9/97	1779-7	2.5	18.0	14	0.47	110	150000	9.6
7/10/97	1796-7	1.0	16.5	14	0.46	134	78000	9.7
7/11/97	1828-7	0.4	17.0	7	0.45	130	9400	6.8
7/12/97	1842-7	0.4	18.5	6	0.47	460	5200	8.6
7/13/97	1853-7	0.5	19.0	8	0.52	592	3800	8
7/14/97	1860-7	0.9	21.0	8	0.39	854	3700	7.5
7/15/97	1876-7	0.6	22.0	12	0.50	858	13000	13
7/16/97	1894-7	1.3	21.5	14	0.57	688	17000	13
7/17/97	1947-7	0.5	23.0	8	0.48	870	6000	8.7
7/18/97	1977-7	0.2	22.5	6	0.47	930	5600	7.4
8/2/97	2173-7	0.6	20.0	8	0.49	782	1800	13
8/3/97	2184-7	1.8	21.0	7	0.49	956	470	9.2
8/4/97	2196-7	4.0	21.0	18	0.33	76	32000	17
8/5/97	2208-7	1.5	19.0	10	0.34	96	16000	9.8
8/6/97	2226-7	0.9	18.0	6	0.35	350	750	9.4
8/7/97	2252-7	0.9	18.0	9	0.38	466	670	12
8/8/97	2281-7	0.8	17.5	10	0.42	562	620	13
8/9/97	2300-7	0.6	18.0	8	0.43	648	710	8
8/10/97	2310-7	0.8	19.0	10	0.49	744	1600	11
8/11/97	2322-7	0.7	20.0	8	0.50	932	1300	7.2
8/12/97	2334-7	2.9	18.0	12	0.27	484	3800	17
8/13/97	2354-7	4.3	22.0	10	0.23	86	36000	12
8/14/97	2375-7	2.4	19.0	5	0.21	220	1700	6.6
8/15/97	2401-7	0.9	19.0	7	0.25	288	2400	9
8/16/97	2413-7	1.8	21.5	10	0.28	86	210000	9.6
8/18/97	2427-7	3.5	20.5	6	0.18	140	3700	62
8/19/97	2451-7	2.9	18.5	4	0.17	290	1200	6.2
8/20/97	2474-7	1.9	19.0	AE	0.17	416	1000	6.5
9/2/97	2577-7	0.2	19.0	18	0.82	930	900	14
9/3/97	2586-7	1.2	18.0	15	0.50	72	22000	14
Minimum							400	
Maximum							250,000	
Geometric Mean							5,325	
D.O. below 4.0		41						

ND-INT = No data, interference
AE = Analytical error
= Wet weather sample

Table N-8
Northeast Ohio Regional Sewer District
1997 Lake Erie and Tributaries *E. coli* Sampling

Nine-Mile Creek, Downstream of Lake Shore Boulevard

Date	Sample ID	Dissolved Oxygen (mg/L)	Temperature °C	Suspended Solids (mg/L)	Phosphorous (mg/L)	Chlorides (mg/L)	*E. coli* (#/100 mL)	Turbidity (NTU)
5/18/97	1253-7	5.0	10.0	3	0.24	168	2200	3.5
5/19/97	1263-7	7.0	13.5	10	0.19	106	8300	11
5/20/97	1276-7	7.8	12.5	28	0.17	112	1500	14
5/21/97	1294-7	6.2	12.0	8	0.22	124	18000	7.7
5/22/97	1318-7	5.5	11.5	8	0.18	146	6400	4.8
6/16/97	1495-7	3.9	16.0	30	0.24	162	2500	7.5
6/17/97	1512-7	7.1	17.0	25	0.19	52	18000	15
6/18/97	1531-7	5.1	16.0	6	0.19	100	4400	3.8
6/19/97	1553-7	5.0	16.0	39	0.19	124	3800	3.9
6/20/97	1570-7	4.6	18.5	20	0.19	64	28000	9.5
6/21/97	1584-7	4.0	19.0	2	0.16	106	1100	2.7
6/22/97	1594-7	5.0	18.5	21	0.32	336	99000	13
6/23/97	1606-7	2.7	19.0	2	0.19	116	740	3.2
6/24/97	1640-7	3.0	19.5	3	0.19	166	580	2.8
7/6/97	1733-7	3.8	17.0	14	0.16	156	580	3.7
7/7/97	1741-7	3.3	19.0	5	0.13	136	800	3.7
7/8/97	1756-7	3.7	18.5	36	0.27	126	1100	17
7/9/97	1778-7	6.1	18.0	28	0.24	100	19000	12
7/10/97	1795-7	4.1	17.5	42	0.25	98	2400	13
7/11/97	1827-7	3.9	19.0	8	0.17	108	760	3.1
7/12/97	1841-7	4.2	19.0	4	0.17	146	830	3.3
7/13/97	1852-7	4.1	19.0	8	0.19	136	480	4.6
7/14/97	1859-7	4.0	20.0	146	0.38	174	780	32
7/15/97	1875-7	2.0	22.5	18	0.24	62	19000	11
7/16/97	1893-7	2.3	21.0	19	0.22	118	1100	6.7
7/17/97	1946-7	2.3	22.0	5	0.26	116	840	4.6
7/18/97	1976-7	2.2	22.0	2	0.21	118	1000	3.4
8/2/97	2172-7	2.3	20.0	19	0.44	104	1600	12
8/3/97	2183-7	2.3	21.0	20	0.48	108	650	7.3
8/4/97	2195-7	6.4	20.0	35	0.28	68	21000	22
8/5/97	2207-7	2.0	19.5	12	0.30	70	17000	6.7
8/6/97	2225-7	3.0	18.0	15	0.34	106	8800	8.8
8/7/97	2251-7	2.4	19.0	16	0.46	108	3200	7.3
8/8/97	2280-7	2.1	18.0	6	0.48	114	740	5.3
8/9/97	2299-7	2.2	18.5	3	0.48	124	630	3.3
8/10/97	2309-7	2.1	19.0	21	0.53	130	3200	7.3
8/11/97	2321-7	2.1	20.0	29	0.57	116	3500	6.2
8/12/97	2333-7	3.4	19.0	14	0.34	112	13000	5.7
8/13/97	2353-7	5.9	21.0	17	0.31	AE	3800	15
8/14/97	2374-7	1.8	19.0	9	0.39	80	6600	4.3
8/15/97	2400-7	1.5	19.0	11	0.46	112	5900	3.7
8/16/97	2412-7	2.5	21.0	11	0.26	62	27000	4.8
8/18/97	2426-7	4.0	20.5	15	0.29	70	6000	6.4
8/19/97	2450-7	2.6	18.5	5	0.32	120	4400	3
8/20/97	2473-7	2.6	19.0	10	0.44	128	1600	4.1
9/2/97	2576-7	2.2	20.0	38	0.64	108	3300	12
9/3/97	2585-7	4.0	18.5	16	0.31	50	13000	9.1
Minimum							480	
Maximum							99,000	
Geometric Mean							3,271	
D.O. below criteria		27						

No data, interference
Analytical error

= Wet weather sample

Table N-9
Northeast Ohio Regional Sewer District
1997 Lake Erie and Tributaries *E. coli* Sampling

Green Creek at Lake Shore Boulevard

Date	Sample ID	Dissolved Oxygen (mg/L)	Temperature °C	Suspended Solids (mg/L)	Phosphorous (mg/L)	Chlorides (mg/L)	*E. coli* (#/100 mL)	Turbidity (NTU)
5/18/97	1252-7	10.8	10.0	3	0.03	86	140	2.2
5/19/97	1262-7	10.0	12.0	1	0.05	54	6800	9
5/20/97	1275-7	10.4	11.5	22	0.16	86	5400	10
5/21/97	1293-7	10.6	11.0	4	0.05	60	430	4.7
5/22/97	1317-7	10.3	11.0	7	0.05	62	680	2.4
6/16/97	1494-7	10.0	14.0	2	0.07	70	94	2
6/17/97	1511-7	9.3	15.0	4	0.06	48	3400	6
6/18/97	1530-7	8.8	16.0	20	0.22	66	24000	11
6/19/97	1552-7	9.5	14.5	2	0.06	72	240	3.9
6/20/97	1569-7	9.6	15.0	2	0.14	68	260	2
6/21/97	1583-7	9.3	15.0	1	0.06	94	170	1.8
6/22/97	1593-7	9.0	15.5	2	0.70	64	1400	4.2
6/23/97	1605-7	9.0	15.0	2	0.06	78	900	2
6/24/97	1639-7	9.1	15.5	1	0.05	104	200	1.9
7/6/97	1732-7	9.8	16.5	8	0.05	90	110	1.4
7/7/97	1740-7	9.0	16.5	20	0.05	84	120	7.8
7/8/97	1755-7	9.0	16.5	1	0.04	60	50	1.1
7/9/97	1777-7	8.5	16.5	8	0.07	62	2000	5
7/10/97	1794-7	8.3	16.5	2	0.05	106	2000	1.7
7/11/97	1826-7	8.9	17.0	3	0.34	92	680	2
7/12/97	1840-7	9.2	19.0	4	0.06	82	270	1.5
7/13/97	1851-7	7.4	18.5	12	0.08	104	230	3.8
7/14/97	1858-7	9.0	17.0	18	0.08		130	4.2
7/15/97	1874-7	9.1	17.5	<1	0.07	78	4600	2.1
7/16/97	1892-7	9.0	17.5	3	0.04	112	860	1.8
7/17/97	1945-7	8.5	17.0	10	0.10	94	370	2.6
7/18/97	1975-7	8.8	17.5	1	0.07	90	160	1.6
8/2/97	2171-7	8.5	18.0	<1	0.10	102	70	3.1
8/3/97	2162-7	8.6	19.0	41	0.13	106	400	14
8/4/97	2194-7	8.6	18.5	6	0.08	56	7100	8
8/5/97	2206-7	8.3	18.5	4	0.08	106	350	20
8/6/97	2224-7	8.8	18.0	8	0.08	102	260	1.7
8/7/97	2250-7	8.5	18.0	22	0.11	114	220	4.6
8/8/97	2279-7	9.2	18.0	<1	0.20	126	65	1.2
8/9/97	2298-7	8.9	18.0	2	0.09	104	76	1.2
8/10/97	2308-7	8.0	18.0	8	0.10	120	150	2.8
8/11/97	2320-7	8.3	19.0	3	0.09	114	1100	1.2
8/12/97	2332-7	9.0	17.0	2	0.08	96	880	1.9
8/13/97	2352-7	8.7	19.5	4	0.13	48	2000	7.8
8/14/97	2373-7	8.2	19.0	1	0.07	88	310	1.7
8/15/97	2398-7	9.0	18.5	2	0.06	90	160	1.4
8/16/97	2411-7	9.7	19.0	2	0.06	74	3300	2.1
8/18/97	2425-7	9.5	19.5	2	0.08	46	550	3.1
8/19/97	2449-7	9.2	19.0	2	0.06	70	180	1.7
8/20/97	2472-7	8.2	19.0	23	0.11	76	140	6.3
9/2/97	2575-7	9.0	18.0	2	0.05	76	150	1.1
9/3/97	2584-7	8.6	18.0	1	0.10	50	2700	2.6

Minimum		50
Maximum		24,000
Geometric Mean		473
D.O. below 4.0	0	

No data, interference
Analytical error

= Wet weather sample

Table N-10
Northeast Ohio Regional Sewer District
1997 Lake Erie and Tributaries *E. coli* Sampling

Euclid Creek, Downstream of Lake Shore Boulevard

Date	Sample ID	Dissolved Oxygen (mg/L)	Temperature °C	Suspended Solids (mg/L)	Phosphorous (mg/L)	Chlorides (mg/L)	*E. coli* (#/100 mL)	Turbidity (NTU)
5/18/97	1251-7	10.8	14.0	15	0.04	170	240	4.4
5/19/97	1261-7	8.2	16.0	20	0.08	64	1800	12
5/20/97	1274-7	9.8	13.0	52	0.20	77	3700	30
5/21/97	1292-7	8.0	14.0	33	0.13	86	2200	22
5/22/97	1316-7	8.9	14.5	20	0.06	120	590	8.6
6/16/97	1493-7	7.5	19.0	6	0.09	106	185	4.5
6/17/97	1510-7	7.8	19.0	45	0.18	70	6300	4.8
6/18/97	1529-7	5.9	20.0	16	0.10	68	3600	6.4
6/19/97	1551-7	6.6	18.5	14	0.10	118	2600	1.6
6/20/97	1568-7	6.2	20.5	40	0.14	108	8000	16
6/21/97	1582-7	5.8	23.0	14	0.10	116	780	8.9
6/22/97	1592-7	4.7	23.0	28	0.12	120	4800	9.4
6/23/97	1604-7	5.1	23.5	9	0.09	124	280	7.2
6/24/97	1638-7	7.9	22.0	13	0.06	106	480	6
7/6/97	1731-7	8.1	22.5	20	0.04	70	100	2.7
7/7/97	1739-7	7.5	22.5	14	0.15	90	250	6.8
7/8/97	1754-7	8.2	22.5	25	0.08	62	190	5.8
7/9/97	1776-7	7.3	22.0	28	0.11	130	490	9.9
7/10/97	1793-7	7.2	20.5	8	0.06	1148	1500	4.8
7/11/97	1825-7	7.7	22.0	2	0.04	52	160	1.7
7/12/97	1839-7	7.5	24.0	5	0.04	110	80	3.4
7/13/97	1850-7	6.0	24.0	20	0.08	110	90	9.9
7/14/97	1857-7	5.4	25.0	22	0.10	112	120	14
7/15/97	1873-7	4.3	26.0	31	0.14	108	27000	30
7/16/97	1891-7	3.9	26.0	16	0.04	110	1300	8.6
7/17/97	1944-7	4.3	27.0	26	0.10	94	550	8.4
7/18/97	1974-7	2.4	28.0	10	0.07	500	350	5.4
8/2/97	2170-7	3.0	23.5	12	0.11	116	140	7.6
8/3/97	2181-7	4.6	25.0	14	0.07	146	110	4.7
8/4/97	2193-7	7.1	22.0	16	0.08	150	3800	12
8/5/97	2205-7	7.6	22.0	20	0.09	112	650	14
8/6/97	2223-7	7.2	22.0	13	0.09	116	60	6.6
8/7/97	2249-7	7.9	23.0	5	0.06	88	80	3.6
8/8/97	2278-7	8.6	23.0	3	0.07	90	40	2.8
8/9/97	2297-7	8.6	23.0	4	0.06	132	42	2.6
8/10/97	2307-7	6.7	24.0	8	0.06	128	45	3.9
8/11/97	2319-7	6.5	24.5	9	0.07	124	44	4.2
8/12/97	2331-7	6.1	21.0	4	0.06	150	140	3.7
8/13/97	2351-7	7.2	22.0	25	0.16	108	4600	18
8/14/97	2372-7	7.2	21.0	6	0.10	78	570	3.8
8/15/97	2398-7	8.5	22.0	6	0.08	80	120	3.3
8/16/97	2410-7	7.0	22.0	7	0.09	80	1000	6.1
8/18/97	2424-7	8.0	20.5	17	0.13	76	1100	8.4
8/19/97	2448-7	7.5	22.0	15	0.12	90	740	7.4
8/20/97	2471-7	6.5	22.0	22	0.12	94	270	6.2
9/2/97	2574-7	7.5	24.0	10	0.07	138	50	4.3
9/3/97	2583-7	7.2	20.0	9	0.12	114	7800	9.2
Minimum							40	
Maximum							27,000	
Geometric Mean							476	
D.O. below criteria		3						

ND-INT = No data, interference
AE = Analytical error
= Wet weather sample

Table N-11
Northeast Ohio Regional Sewer District
1997 Lake Erie and Tributaries *E. coli* Sampling

Lake Erie at East 185th Street

Date	Sample ID	Dissolved Oxygen (mg/L)	Temperature °C	Suspended Solids (mg/L)	Phosphorous (mg/L)	Chlorides (mg/L)	*E. coli* (#/100 mL)	Turbidity (NTU)
5/18/97	1250-7	10.3	11.0	3	0.06	36	186	4.8
5/19/97	1260-7	10.2	12.0	12	0.05	32	98	10
5/20/97	1273-7	10.8	11.0	24	0.06	46	2100	7.7
5/21/97	1291-7	10.6	12.0	37	0.08	31	290	17
5/22/97	1315-7	10.3	12.0	44	0.09	30	360	17
6/16/97	1492-7	11.0	17.0	2	0.05	40	7	109
6/17/97	1509-7	9.1	18.0	33	0.12	32	400	5.6
6/18/97	1528-7	8.9	17.0	2	0.05	24	860	2
6/19/97	1550-7	9.8	17.0	2	0.03	22	30	4.2
6/20/97	1567-7	9.8	18.0	2	0.50	30	10	1.4
6/21/97	1581-7	9.6	19.5	<1	0.06	34	65	1.7
6/22/97	1591-7	9.0	19.5	6	0.05	36	25	3.3
6/23/97	1603-7	9.1	21.0	1	0.03	56	16	1.7
6/24/97	1637-7	9.4	20.5	5	0.04	78	8	1.8
7/6/97	1730-7	8.7	22.5	7	0.03	30	120	1.7
7/7/97	1738-7	8.3	22.0	2	0.04	20	230	2.2
7/8/97	1753-7	8.4	22.0	1	0.05	16	400	1.1
7/9/97	1775-7	8.0	21.5	16	0.31	26	1600	3.3
7/10/97	1792-7	8.0	21.0	3	0.30	20	13000	2.7
7/11/97	1824-7	8.8	22.0	1	0.03	28	1900	1.3
7/12/97	1838-7	8.0	24.0	<1	0.03	22	40	1.2
7/13/97	1849-7	9.7	23.0	2	0.03	24	110	1.1
7/14/97	1856-7	9.8	23.0	1	0.03	22	38	1
7/15/97	1872-7	9.1	25.0	2	0.04	18	37	1.3
7/16/97	1890-7	9.9	24.5	2	0.01	24	10	1.2
7/17/97	1943-7	8.1	26.0	5	0.10	12	29	1.8
7/18/97	1973-7	7.4	25.0	1	0.20	24	6	1.8
8/2/97	2169-7	8.5	23.0	46	0.20	52	116	16
8/3/97	2180-7	10.0	23.0	6	0.05	39	<4	1.9
8/4/97	2192-7	9.0	24.0	2	0.07	30	10900	1.3
8/5/97	2204-7	8.2	22.0	172	0.69	50	940	53
8/6/97	2222-7	8.3	22.0	6	0.06	56	420	3.2
8/7/97	2248-7	8.7	22.0	8	0.04	AE	88	1.3
8/8/97	2277-7	8.3	22.5	<1	0.05	205	180	0.89
8/9/97	2296-7	7.3	22.0	1	0.04	40	228	1.7
8/10/97	2306-7	7.5	22.5	6	0.06	64	11	1.4
8/11/97	2318-7	8.0	23.5	8	0.05	32	12	1.4
8/12/97	2330-7	8.0	22.0	7	0.05	48	820	2.4
8/13/97	2350-7	8.5	23.0	47	0.13	30	35	16
8/14/97	2371-7	7.2	22.5	16	0.24	24	1500	3.3
8/15/97	2387-7	7.8	22.0	4	0.21	38	800	2.3
8/16/97	2409-7	9.2	23.0	9	0.04	30	168	0.99
8/18/97	2423-7	8.8	22.0	61	0.22	36	6000	16
8/19/97	2447-7	8.3	22.5	3	0.04	30	70	1.2
8/20/97	2470-7	7.6	22.0	7	0.05	34	54	2.2
9/2/97	2573-7	11.2	22.0	1	0.04	36	120	0.62
9/3/97	2582-7	8.3	20.0	170	0.28	30	1200	61
Minimum							6	
Maximum							13,000	
Geometric Mean							150	
D.O. below critera		0						

No data, interference
Analytical error

= Wet weather sample

Table N-12
Northeast Ohio Regional Sewer District
1997 Lake Erie and Tributaries *E. coli* Sampling

1997 Beach Study *E. coli* Results
(#/100 mL)

Date	Edgewater Beach	Euclid Beach
5/18/97	4	1
5/19/97	105	9
5/20/97	89	2035
5/21/97	124	727
5/22/97	141	92
6/16/97	16	37
6/17/97	122	375
6/18/97	28	212
6/19/97	14	21
6/20/97	32	100
6/21/97	84	100
6/22/97	190	340
6/23/97	120	40
6/24/97	51	900
7/6/97	34	26
7/7/97	170	18
7/8/97	56	5
7/9/97	40	66
7/10/97	30	21
7/11/97	30	72
7/12/97	18	42
7/13/97	35	26
7/14/97	25	160
7/15/97	580	95
7/16/97	91	34
7/17/97	820	90
7/18/97	42	18
8/2/97	110	153
8/3/97	48	45
8/4/97	200	140
8/5/97	760	340
8/6/97	50	30
8/7/97	230	36
8/8/97	2200	8
8/9/97	710	22
8/10/97	No Sample	No Sample
8/11/97	130	60
8/12/97	60	95
8/13/97	180	230
8/14/97	50	400
8/15/97	16	10
8/16/97	230	180
8/18/97	160	300
8/19/97	260	40
8/20/97	110	55
9/2/97	86	No Sample
9/3/97	310	No Sample
Minimum	4	1
Maximum	2,200	2,035
Geometric Mean	88	66

= Wet weather sample

Table N-13
E. coli Summary Data

	Bathing Waters Sites			Primary Contact Sites					*Undesignated Sites		
	Carlyle	Off Edgewater	East 185th	Rocky River	Cuyahoga	Doan	Nine-Mile	Euclid	Dugway	Shaw	Green
Dry Weather											
Minimum *E. coli* Concentration	1	2	4	40	4	50	480	40	50	400	50
Maximum *E. coli* Concentration	180	10	420	5,000	9,000	320,000	28,000	27,000	31,000	30,000	4,600
Geometric Mean *E. coli* Concentration	7	4	50	184	217	417	1,724	219	4,065	2,400	211
Wet Weather											
Minimum *E. coli* Concentration	2	1	16	100	60	110	740	120	1,600	1,200	160
Maximum *E. coli* Concentration	1,400	10	13,000	4,700	26,000	440,000	99,000	7,800	58,000	250,000	24,000
Geometric Mean *E. coli* Concentration	89	3	488	849	513	5,600	7,226	1,242	12,685	14,286	1,288
Proportion of 30-Day Periods During which Recreational Criteria were met											
Dry Weather	100%	100%	61%	27%	27%	20%	0%	37%	0%	0%	38%
Wet Weather	21%	100%	0%	0%	13%	0%	0%	0%	0%	0%	0%

*Secondary Contact Recreational Criteria were applied to undesignated sites.

Table N-14
Geometric Mean *E. coli* Concentrations

Dry Weather		Wet Weather	
Off Edgewater	4	Off Edgewater	3
Carlyle	7	Carlyle	89
East 185th	50	East 185th	488
Rocky River	184	Cuyahoga	513
Green	211	Rocky River	849
Cuyahoga	217	Euclid	1242
Euclid	219	Green	1288
Doan	417	Doan	5600
Nine-Mile	1724	Nine-Mile	7226
Shaw	2400	Dugway	12685
Dugway	4065	Shaw	14286

Figure N-1
Geometric Mean *E. coli* Concentrations (All Samples)

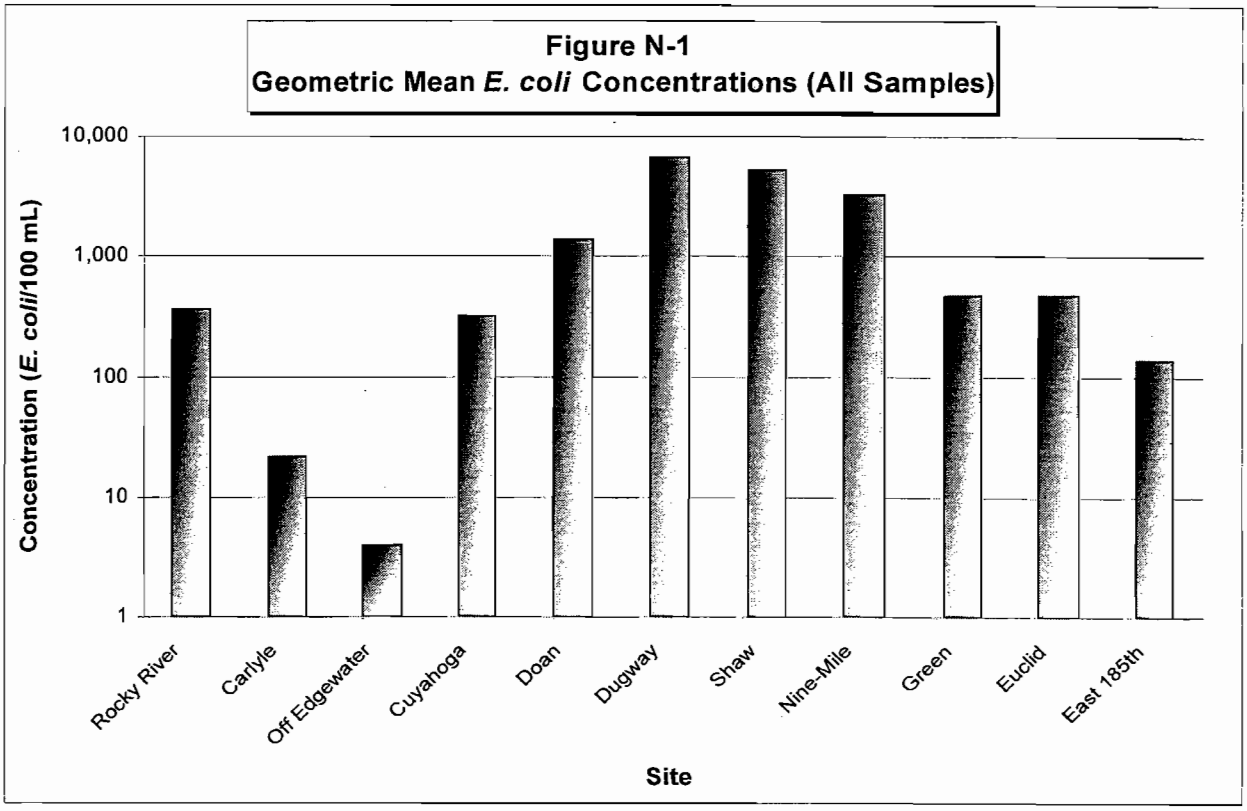


Figure N-2
Dry Weather Geometric Mean *E. coli* Concentrations

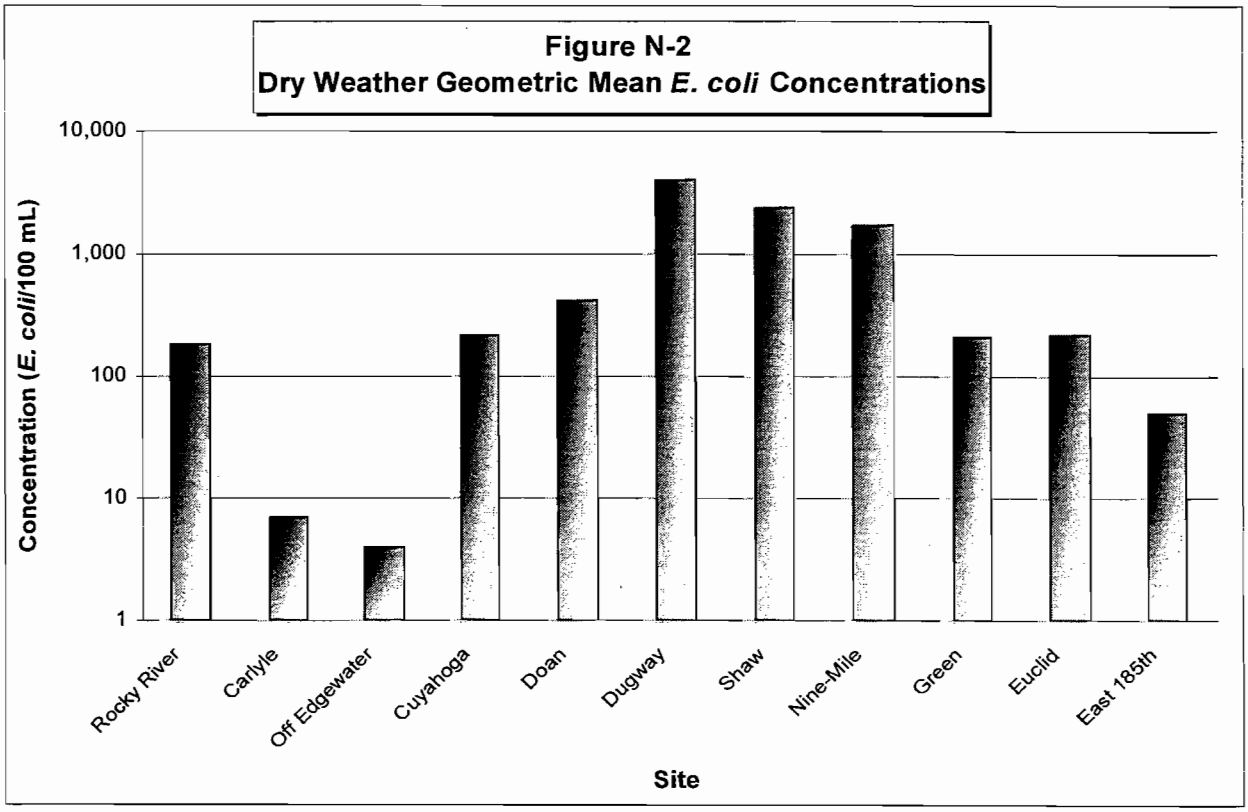


Figure N-3
Wet Weather Geometric Mean *E. coli* Concentrations

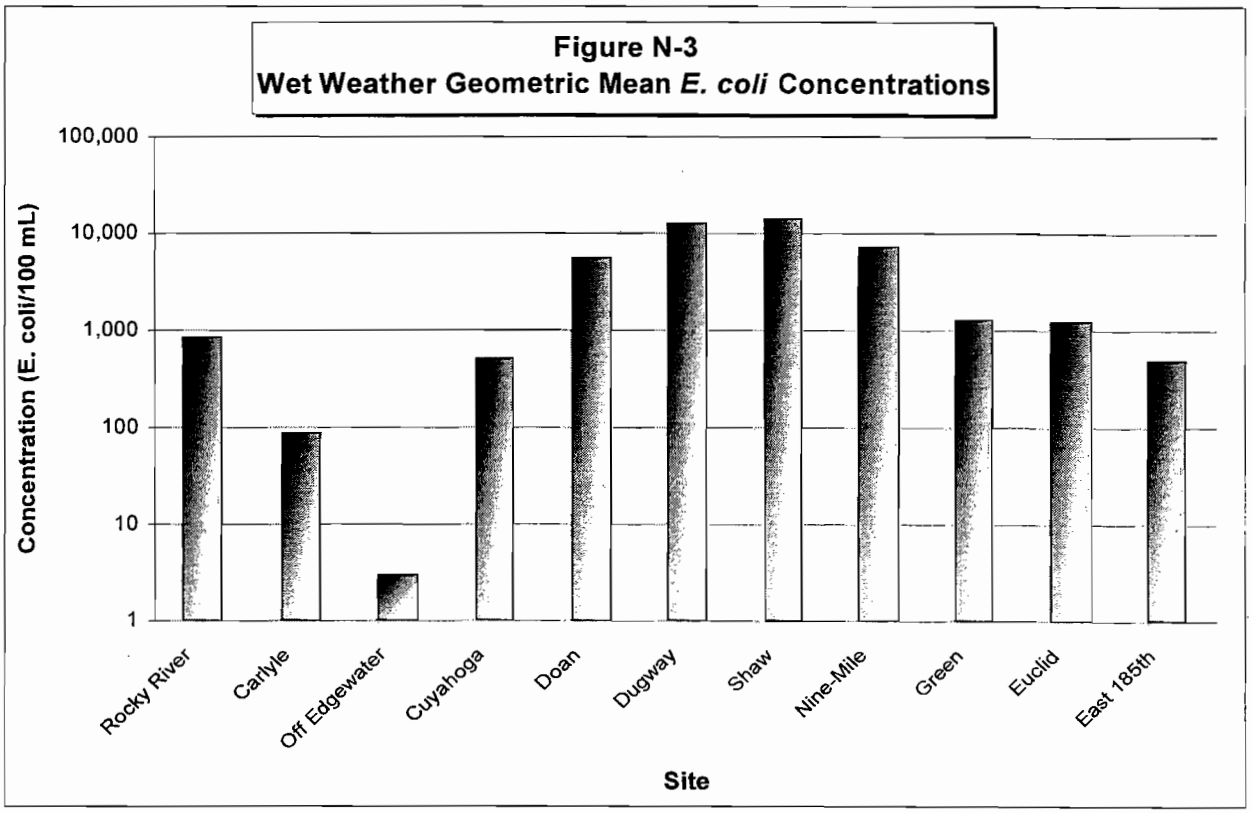


Figure N-4
Increase in Geometric Mean *E. coli* Concentration from Dry Weather to Wet Weather

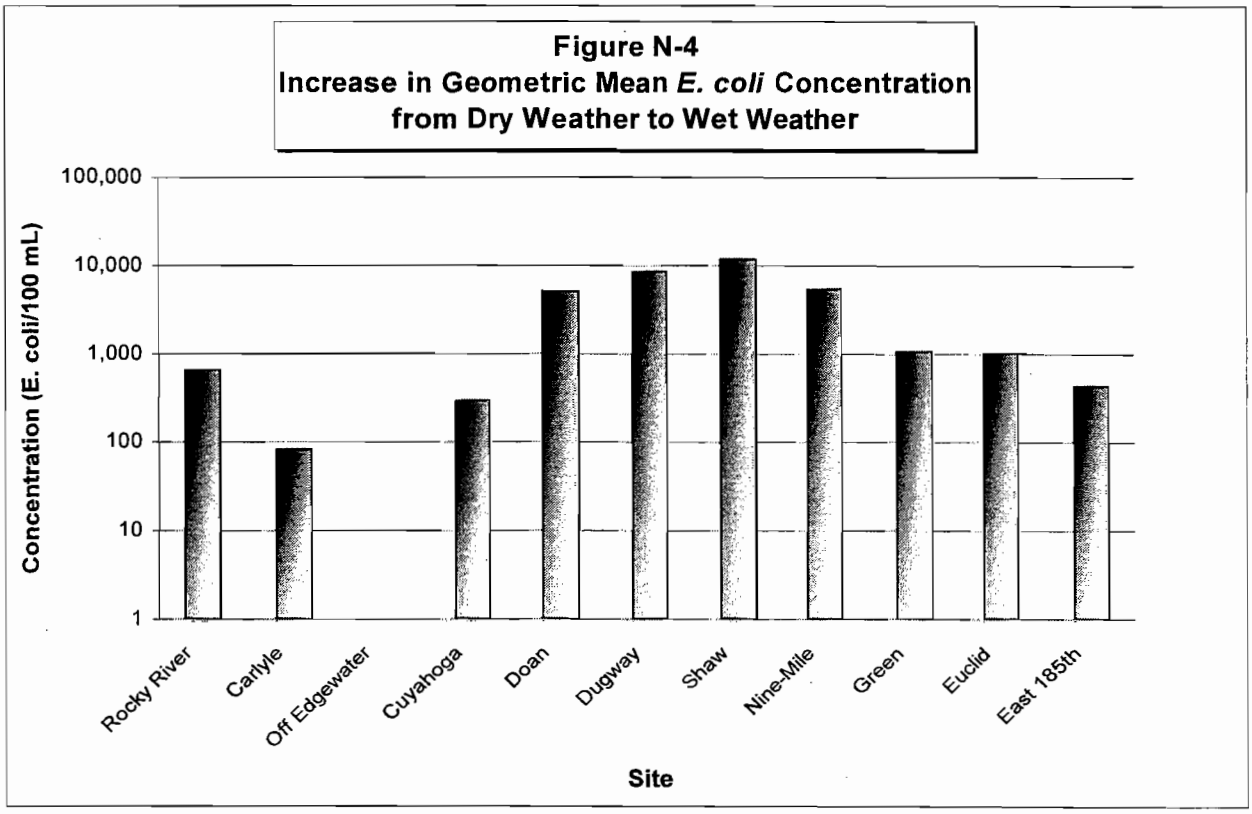
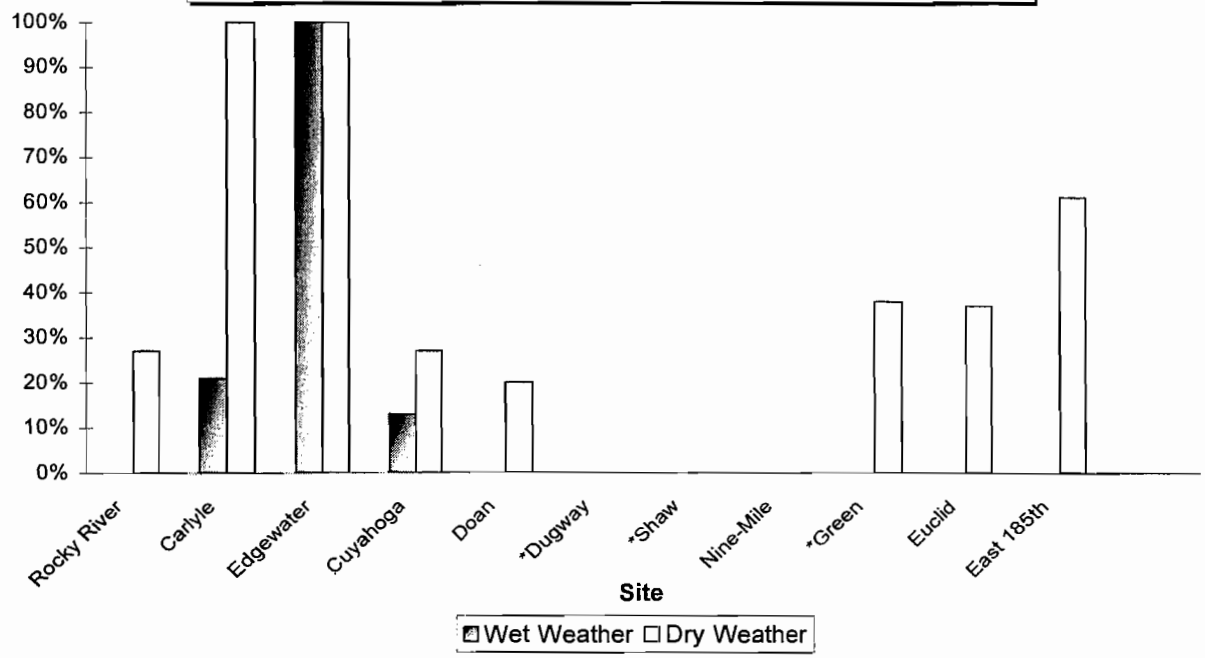


Figure N-5
30-Day Periods During Which Recreational Criteria Were Met



*Secondary contact recreational criteria were applied to sites which have not been assigned use designations by OEPA

APPENDIX O
CLEVELAND METROPARKS STREAM SAMPLING
1996 -1998

In 1991, Cleveland Metroparks began collecting water samples from area streams within the park system to monitor fecal coliform levels. Sixteen sites were selected on nine area streams within the Cleveland Metroparks for water quality monitoring (Table O-1). The sample locations have been designated Primary Contact Recreational Use by Ohio EPA with the exception of Big Creek 2, on the West Branch, which was designated Secondary Contact and Wolf Creek in Garfield Park, which has no current use designation.

Samples were collected, in general, on a monthly basis throughout 1996 – 1998, from all sample locations by Cleveland Metroparks Department of Park Operations personnel. Samples were obtained at least 24 hours following a rain event. The Cleveland Metroparks laboratory provided bacteriological analyses of all samples and reported the results to NEORSD.

A total of 384 samples were collected from 1996 to 1998. Fifteen of the 384 samples had concentrations which exceeded the Ohio EPA numerical criterion for Primary Contact Recreational Use of 2,000 organisms per 100mL at five of the sixteen sample locations (Figure O-1). At least three of the 15 exceedences may be attributable to wet weather events (Table O-7). NEORSD rain gauge data and the National Oceanic and Atmospheric Administration (NOAA) local climatological data were reviewed to determine if these exceedences could be related to wet weather events. Wet weather can cause sewage collection systems to become overloaded and overflow to surface waters via combined sewer overflows and/or sanitary sewer overflows. Storm water runoff from urban and agricultural areas to surface waters may also affect concentrations of fecal coliform. The fact that these samples were obtained within three days after a wet weather event may explain the elevated fecal coliform concentrations, since some elevated flows probably had not yet completely subsided.

In 1996, the "Rocky River 3" sample location at Barrett Road Ford had four exceedences. At least two of those exceedences may be attributable to an environmental disruption to the Rocky River at West Bridge Street, which was discovered by NEORSD investigators in 1996 (Refer to the Rocky River Problems and Remediation section for details). Ten of the 15 exceedences remain unexplained since wet weather did not appear to be related. They may be attributed to undetected dry weather sewer overflows, sewer leaks, septic tank discharges, or other urban/agricultural sources. However, it is unlikely that exceedences in samples collected July 9,1996 were attributable to individual dry weather sources since the Primary Contact criterion was simultaneously exceeded at numerous locations. A review of NEORSD Sewer Maintenance & Control records revealed no information that could explain these elevated levels.

The bacteriological sampling represents an ongoing effort by the Cleveland Metroparks to monitor area streams due to their high ecological importance and recreational use. In addition, the continued sampling will aid in the development of a more extensive bacteriological data base that would facilitate the response to sewage related water quality disruptions at these locations.

Table O-1
Cleveland Metroparks Stream Sampling
1996 – 1998 Site Locations

Rocky River 1	--	East Branch, Eastland Road Ford
Rocky River 2	--	Hilliard Road Bridge
Rocky River 3	--	East Branch, Barrett Road Ford
Big Creek 1	--	East Branch, Memphis Road
Big Creek 2	--	West Branch, Memphis Road
Big Creek 3	--	John Nagy Boulevard
Mill Creek	--	Garfield Park
Wolf Creek	--	Garfield Park
Tinkers Creek 1	--	Broadway Avenue
Tinkers Creek 2	--	Richmond Road
Chippewa Creek	--	Chippewa Creek Road at Ford
Euclid Creek 1	--	East Branch, Highland Road
Euclid Creek 2	--	West Branch, Highland Road
Chagrin River 1	--	Solon Road
Chagrin River 2	--	Wilson Mills Road
Cuyahoga River	--	State Route 82

Table O-2
1996 Cleveland Metroparks Stream Sampling
Fecal Coliform Concentrations
(organisms per 100 milliliters)

Sample Location	Sample Date									
	4/5	6/18	6/28	7/2	7/9	7/19	7/24	8/7	8/15	8/20
Rocky River 1	20	150	250	400	880	400	430	160	320	160
Rocky River 2	1050	340	370	320	220	400	280	200	110	200
Rocky River 3	30	350	950	2430	8900	1800	2900	850	520	7000
Big Creek 1	980	1710	900	800	2950	1200	1750	750	1160	380
Big Creek 2	50	650	770	1050	1320	450	260	850	440	250
Big Creek 3	1380	760	650	980	3400	810	1220	1250	480	530
Mill Creek	1880	3500	1900	4000	620	9000	10000	4100	5000	3200
Wolf Creek	140	800	550	290	3500	620	360	500	200	680
Tinkers Creek 1	440	380	330	280	430	1100	210	110	370	220
Tinkers Creek 2	580	400	570	710	1100	850	425	375	490	300
Chippewa Creek	10	120	90	110	50	60	30	30	20	40
Euclid Creek1	20	220	200	190	150	260	230	150	185	170
Euclid Creek 2	60	260	160	175	210	350	280	220	190	160
Chagrin River 1	30	110	230	130	90	460	220	110	175	200
Chagrin River 2	50	150	600	80	120	290	320	240	140	175
Cuyahoga River	90	780	1280	650	810	920	580	630	480	600

Table O-3
1997 Cleveland Metroparks Stream Sampling
Fecal Coliform Concentrations
(organisms per 100 milliliters)

Sample Location	Sample Date				
	4/7	4/16	6/9	7/14	7/21
Rocky River 1	60	580	230	275	225
Rocky River 2	260	1100	410	190	315
Rocky River 3	140	650	290	290	305
Big Creek 1	1200	350	920	880	725
Big Creek 2	570	1350	460	410	490
Big Creek 3	820	600	770	650	570
Mill Creek	90	360	1090	700	935
Wolf Creek	10	490	530	550	380
Tinkers Creek 1	1300	120	730	300	490
Tinkers Creek 2	1100	440	800	370	540
Chippewa Creek	10	10	50	40	45
Euclid Creek1	50	100	240	145	210
Euclid Creek 2	425	450	320	210	245
Chagrin River 1	45	90	100	90	105
Chagrin River 2	25	90	110	60	140
Cuyahoga River	150	220	650	525	660

Fecal Coliform Excursions from Ohio EPA Primary Contact Criterion

Table O-4
1998 Cleveland Metroparks Stream Sampling
Fecal Coliform Concentrations
(Organisms per 100 milliliters)

Sample Location	Sample Date								
	3/30	4/6	5/27	6/23	7/27	7/14	9/1	10/29	11/9
Rocky River 1	240	360	370	280	180	340	230	340	190
Rocky River 2	220	780	330	390	260	220	310	450	350
Rocky River 3	370	140	420	340	210	190	260	280	170
Big Creek 1	670	770	950	510	1100	520	600	880	590
Big Creek 2	620	40	310	250	340	160	290	500	310
Big Creek 3	1220	990	1350	530	1750	760	880	950	700
Mill Creek	680	640	1200	810	2000	3300	1150	2350	1150
Wolf Creek	1630	220	520	400	660	520	380	880	620
Tinkers Creek 1	210	110	580	490	330	550	480	650	390
Tinkers Creek 2	490	160	530	600	210	280	440	500	440
Chippewa Creek	65	5	20	50	10	60	30	20	50
Euclid Creek1	35	10	180	260	110	100	80	200	180
Euclid Creek 2	20	80	90	200	230	40	180	230	230
Chagrin River 1	45	10	110	80	40	70	50	130	60
Chagrin River 2	70	60	70	110	90	60	110	90	110
Cuyahoga River	490	540	760	630	450	180	520	730	550

Fecal Coliform Excursions from Ohio EPA Primary Contact Criterion

Table O-5
Cleveland Metroparks Stream Sampling
1996 - 1998 Fecal Coliform Concentrations
(Organisms Per 100 Milliliters)

Sample Location	N	Maximum	75th Percentile	Median	25th Percentile	Minimum	Geometric Mean
Rocky River 1	24	880	362.5	262.5	187.5	20	241
Rocky River 2	24	1100	392.5	317.5	220	110	325
Rocky River 3	24	8900	1035	345	270	30	486
Big Creek 1	24	2950	1115	880	652.5	350	860
Big Creek 2	24	1350	627.5	445	285	40	387
Big Creek 3	24	3400	1220	815	650	480	894
Mill Creek	24	10000	3500	1540	782.5	90	1550
Wolf Creek	24	3500	630	520	375	10	440
Tinkers Creek 1	24	1300	505	385	265	110	366
Tinkers Creek 2	24	1100	585	490	393.75	210	480
Chippewa Creek	24	120	52.5	40	20	5	32
Euclid Creek1	24	260	202.5	175	100	10	123
Euclid Creek 2	24	450	248.75	210	160	20	172
Chagrin River 1	24	460	130	95	57.5	30	89
Chagrin River 2	24	600	142.5	110	70	25	110
Cuyahoga River	24	1280	677.5	590	487.5	90	504

N = Number of samples collected during 1996 - 1998.

Table O-6
NEORSD Rain Gauge Site Locations

Rain Gauge Site	Address
Brecksville Jr. High School	27 Public Square
James Rhodes High School	5100 Biddulph Road
John Marshall High School	3952 West 140th Street
Maple Heights City Hall	5353 Lee Road
North Royalton City Hall	1384 Ridge Road
Parma City Hall	6611 Ridge Road

Table O-7
Cleveland Metroparks Sampling Events with Fecal Coliform Criterion Excursions Compared with Associated Rain Events Detected by NEORSD Rain Gauge Data and/or NOAA Local Climatological Data

SAMPLING EVENTS EXCEEDING CRITERIA			ASSOCIATED RAIN EVENTS		
Sampling Date	Sampling Location	Fecal Coliform Concentrations	Rain Event Date	Rain Gauge Location	Rainfall (Inches)
6/18/96	Mill Creek	3,500	6/14/96	Maple Heights City Hall	0.13
			6/16/96	Maple Heights City Hall	0.11
7/19/96	Mill Creek	9,000	7/15/96	Maple Heights City Hall	0.94
			7/16/96	Maple Heights City Hall	0.34
			7/19/96	Maple Heights City Hall	0.03
10/29/98	Mill Creek	2350	10/28/98	Maple Heights City Hall	0.02

Figure O-1
1996-1998 Cleveland Metroparks Fecal Coliform Concentrations
(Maximum, 75th Percentile, Median, 25th Percentile, Minimum)