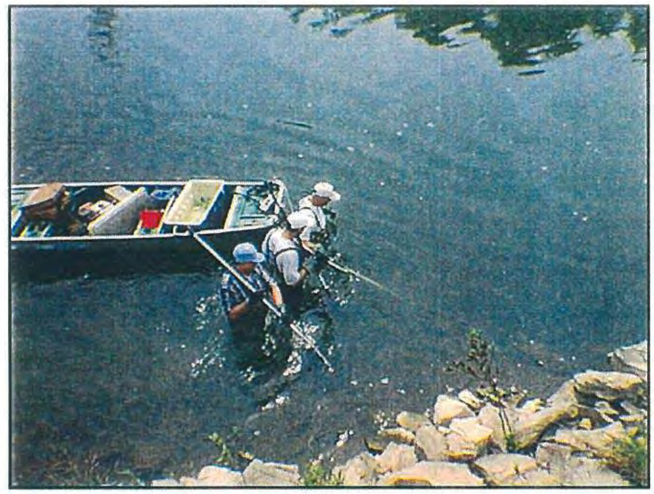
Long Term Control Plan

Newark, Ohio
Division of Water
Department of Wastewater

September 1998
Project 0821-194



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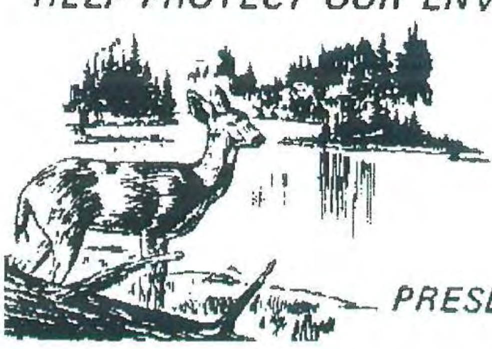

PRESERVE IT TO DESERVE IT

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LAND OF LEGEND
PAST AND FUTURE

DIVISION OF WATER AND WASTEWATER

September 30, 1998

Mr. Jan A. Rice, Environmental Specialist
Enforcement/Compliance Group
Division of Water Pollution Control
Ohio EPA, Central District Office
3232 Alum Creek Drive
P.O. Box 163669
Columbus, OH 43216-3669

RE: City of Newark
NPDES Permit 4PE00001*GD
Part 1, C, 6, Schedule of Compliance
Long Term Control Plan

Dear Mr. Rice:

In accordance with the provision of the referenced permit, we are transmitting herewith two copies of the City of Newark's Long Term Control Plan for your review. Should you have any questions or wish to discuss any portions of this report, please feel free to contact Roger Loomis or me at 740-349-6737.

Sincerely,

Joe Sawyer

Joseph E. Sawyer
Utilities Superintendent

JES/rl
Enclosures
c: Service Director
Roger Loomis (w/encl.)
Malcolm Pirnie File (w/encl.)
file

COMBINED SEWER SYSTEM LONG TERM CONTROL PLAN
NEWARK, OHIO

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COMBINED SEWER SYSTEM LONG TERM CONTROL PLAN
NEWARK, OHIO

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EXECUTIVE SUMMARY

ES.1 Discussion

The City of Newark owns and operates the City of Newark Wastewater Treatment Plant. The City is authorized to discharge pollutants from the plant and combined sewer overflow (CSO) structures under a National Pollution Discharge Elimination System (NPDES) permit issued by the Ohio Environmental Protection Agency (Ohio EPA), Permit No. 4PE00001*GD.

In the City's current NPDES permit effective October 1, 1995, the Ohio EPA required that a Combined Sewer System Long Term Control Plan (LTCP) be completed by October 1, 1998.

In accordance with the Ohio EPA's CSO Strategy, an extensive program was started in early 1996 to estimate the effects of CSOs (if any) on the water quality of streams in the Newark area. This program included the following elements:

- An aquatic life study of Newark area streams to assess their attainment of water quality standards. The aquatic life study was used to focus the attention of the LTCP on areas where apparent water quality impairments had been identified. The only apparent water quality impairment previously identified was in the North Fork Licking River (NFLR) at rivermile 0.1-0.2.

- A complete characterization of the combined sewer system tributary to the North Fork Licking River. This characterization was supported by field measurement of system flows and CSO discharges, rainfall measurement and CSO sampling. This data was used to develop and calibrate a hydraulic model of the combined sewer system.

- Sampling of Newark streams for fecal coliforms upstream and downstream of CSO discharges.

- Public Participation meetings to determine public concerns regarding the effects of CSO discharges on water quality and solicit opinions and ideas regarding existing stream uses and sewer rate cost implications.

- Sampling of stream sediment, river water, storm sewer discharges and combined sewer discharges to determine the cause of the apparent water quality impairment identified by the aquatic life study (i.e., NFLR rivermile 0.1-0.2).

- Toxicity testing of river water, storm sewer discharges and combined sewer overflows at the location of the apparent water quality impairment identified by the aquatic life study (i.e., NFLR rivermile 0.1-0.2).

ES.2 Conclusion

The program was started in 1996 to assess the potential effects of CSO discharges on water quality and was completed in the summer of 1998. As a result of these investigations, the City of Newark Combined Sewer System was found not to cause or significantly contribute to violations of water quality standards or impairment of designated uses. Thus, the City of Newark is a "Case 1" CSO community as defined in the Ohio EPA March 1995 CSO Strategy.

Although no water quality impacts due to CSOs were found, the City of Newark desired to be proactive in protecting the good water quality of its streams. Thus two areas of potential concern regarding the Combined Sewer System were identified:

- Protection of existing water quality attainment (Aquatic Life)
- Investigation of downstream fecal coliform sources

With these two goals in mind, the City of Newark Combined Sewer System Long Term Control Plan was developed and consists of the following items:

1. Implementation of Best Management Practices such as public education and storm drain stenciling.
2. Continued monitoring of the combined sewer system through flow monitoring activities.
3. Continued monitoring of the receiving stream using aquatic life studies of the stream.
4. Investigation of downstream fecal coliform sources between the City of Newark and the Dillon State Park beach.
5. Reclassification of the North Fork of the Licking River (between the confluence with the South Fork and the Manning St. bridge - Rivermile 1.6) from Warmwater Habitat to Modified Warmwater Habitat to reflect attainable water quality standards in this stream segment.
6. Continued implementation of the Nine Minimum Controls as outlined in the City's *Combined Sewer Overflow Operational and Maintenance Plan*

ES.3 Costs and Implementation Schedule

As discussed in more detail in Chapter 4, the activities included in the Long Term Control Plan amount to approximately 1.42% of the total 1997 revenue generated by the City of Newark Sewer Department. Some provisions of the LTCP are already included in the existing budget or can be implemented using existing forces and expenditures. Thus at this time it is not known if a rate increase will be required to implement the LTCP.

Figure 4-1 in Chapter 4 shows the implementation of the recommended plan over the next five years, assuming the plan is approved by January 1999.

ES.4 Compliance with Ohio EPA's CSO Strategy

The City's proactive approach matches well with the Ohio EPA's CSO Strategy. The Strategy requires a Case 1 community's Long Term Control Plan contain, at a minimum, monitoring and characterization of the Combined Sewer System and implementation of the Nine Minimum Controls. The City of Newark Long Term Control Plan meets these requirements:

Monitoring and Characterization:

The monitoring activities described below will verify water quality is protected and will support continued characterization of the sewer system:

- Continue periodic flow monitoring to measure flows within the combined sewer system and overflows to the river. This data will increase the City's knowledge of system operation, quantify overflows, and provide additional data for continued computer model development.
- Review future Ohio EPA aquatic life sampling in Newark area streams to verify CSOs are not affecting the aquatic life. Perform additional aquatic life studies as necessary to verify or further investigate CSO impacts.

Implementation of the Nine Minimum Controls:

The City of Newark has already successfully implemented the Nine Minimum Controls (NMCs) as documented in their *Combined Sewer Overflow Operational & Maintenance Plan*. The Long Term Control Plan employs the continued use of the NMCs to protect water quality as well as the following Best Management Practices:

- Expanded public education including presentations at public events and the distribution of brochures.
- Storm drain stenciling during the summer months of storm drains in both the combined and separate sewer systems.

In addition to the Case 1 community requirements listed above, the Newark LTCP includes two additional elements: reclassification of the North Fork Licking River and a Fecal Coliform Study of the Licking River downstream of the City of Newark.

Reclassification of the North Fork Licking River Between the Confluence and Rivermile 1.6

Although no CSO impacts on water quality were found, one area of apparent water quality impairment was identified. The aquatic life study found that the macroinvertebrates in the North Fork Licking River (NFLR) at rivermile 0.1-0.2 did not meet the designated aquatic life standard of Warmwater Habitat, resulting in a designation of Partial Attainment. This is in contrast to all other sites in the Newark area, including the site upstream on the North Fork, which were found in Full Attainment of Warmwater Habitat. These findings matched those of a 1993 sampling of aquatic life at the same sites by the Ohio EPA. The Ohio EPA concluded the impairment was due to upstream CSOs. However, in accordance with the Demonstration Approach, this study conducted additional sampling and reached a different conclusion.

The data collected during the development of the Long Term Control Plan, combined with a review of the stream habitat at the site, resulted in the conclusion that discharges from the City of Newark CSOs are not the cause for the Partial Attainment in the North Fork, rivermile 0.1. Instead, the partial attainment is likely due to a non-favorable habitat and unstable substrate at the site, both of which contribute to the slightly depressed state of the macroinvertebrate population found during the sampling. This conclusion is supported by the following:

- Extensive sampling in 1998 of stream sediment, river water, storm sewer discharges and combined sewer discharges found no direct cause of impairment to macroinvertebrates.

- The reach of the North Fork containing Rivermile 0.1 has been channelized and modified by the Army Corp of Engineers for flood control purposes as part of the Newark Local Protection Project from the confluence to approximately rivermile 1.6. The City of Newark is legally bound to maintain the channelization.

- Other similar streams in the area receiving CSO discharges did not exhibit similar reductions in attainment (South Fork Rivermile 0.1 and Raccoon Creek Rivermile 0.1 are both in Full Attainment despite CSO discharges). Both sites had better habitat scores than the North Fork at Rivermile 0.1-0.2.

- The substrate was found to consist of gravels, sands and other small material mixed with some larger rocks. Field observations during the sampling season indicated that materials tend to shift as peak storm flows are encountered. This shifting of the substrate disrupts sites and may prevent macroinvertebrates from colonizing.

- The reduction in pollution in the NFLR has failed to improve the macroinvertebrate scores, although the fish scores have improved dramatically. This shows something other than pollution is impacting the macroinvertebrates.

As a result of this conclusion, the Newark Long Term Control Plan requests that the Ohio EPA reclassify the North Fork Licking River between its confluence with the South Fork and the Manning Street Bridge (approximately Rivermile 1.6) from Warmwater Habitat to Modified Warmwater Habitat. It is the conclusion of this report that this reach cannot consistently support Warmwater Habitat for macroinvertebrates.

Fecal Coliform Study of the Licking River downstream of the City of Newark

As a result of input during a public meeting, the Long Term Control Plan includes a study of the impact of Newark CSOs on a downstream beach in Dillon State Park. Although it is believed this beach is not impacted by the Newark Combined Sewer system, the Long Term Control Plan includes this study in order to be proactive regarding the potential impact of Newark CSO discharges on the Dillon State Park beach.

ES.5 Compliance with Demonstration Approach - National CSO Policy

In accordance with the Demonstration Approach of the National CSO Policy, the City of Newark Combined Sewer System Long Term Control Plan (LTCP) provides the following:

- The LTCP is sufficient such that CSO discharges do not cause water quality violations nor impair the designated uses of Aquatic Life and Primary Contact Recreation.
- Known water quality impairments are attributed to a poor habitat and unstable substrate in the receiving water thus existing CSO discharges do not preclude attainment of water quality standards in this area. Furthermore, it is recommended that the site of impairment be reclassified from Warmwater Habitat to Modified Warmwater Habitat.
- The LTCP emphasizes Best Management Practices, including those already in the City's Combined Sewer Operational and Maintenance Plan, that will reduce pollutant discharges from the Combined Sewer System. The LTCP also recognizes the pollution reduction benefits already achieved by the City of Newark in projects that directly reduced CSO discharges to the North Fork.
- The continued monitoring included in the LTCP provides early warning of water quality problems or other changes in the system. The continued monitoring will allow the City of Newark to react quickly to preserve watcr quality and to address problems as they develop.

The City of Newark Long Term Control Plan commits the City of Newark to continued monitoring of the water quality in local receiving streams to verify existing water quality is maintained while implementing best management practices and additional studies to prevent future water quality degradation.

\+ + END OF EXECUTIVE SUMMARY + +

CHAPTER 1

1.1 Background

The City of Newark, Ohio Wastewater Treatment Plant (WWTP) is located adjacent to the Licking River, approximately three miles east of the City's downtown area. The City's sewer system consists of approximately 114 miles of sanitary sewer and 56 miles of combined sewer. The combined sewers were constructed near the turn of the century and comprise approximately 33 percent of the wastewater collection system. The combined sewer system consists of two main areas: the North and South Fork drainage areas. The North Fork drainage area consists of the older urban area north and northeast of the confluence of the North and South Forks of the Licking River. The South Fork drainage area colleets flows from the older central business district and the industrial area northwest of the confluence. As the City of Newark grew, separate sanitary and storm sewers were constructed. Separate sewers make up the remaining 66 percent of the wastewater collection system. The entire collection system is shown on Figure 1-1.

The City's combined sewer system transports normal sanitary flow and stormwater collected during rain events to the WWTP. During wet weather, flows in excess of the sewer capacity are discharged to receiving streams through combined sewer overflow (CSO) structures. During rainfall events, 30 separate overflows from the combined sewer system can discharge excess flow to Raccoon Creek, the North and South Forks of the Licking River and the Licking River mainstem at 26 locations. Nine CSOs discharge to the North Fork Licking River; nine CSOs discharge to the South Fork Licking River and 12 CSOs discharge to the Raccoon Creek. The general location for each of these CSOs is shown schematically on Figure 1-2.

1.2 NPDES Permit

In August 1995, the Ohio EPA renewed the City of Newark's National Pollution Discharge Elimination System (NPDES) permit, Permit No. 4PE00001*GD. The NPDES permit included new combined sewer overflow (CSO) requirements in accordance with the Ohio EPA's implementation of the National CSO Policy. A copy of the City's NPDES permit is located in Appendix A.

1.3 Combined Sewer Overflow Requirements

Five significant CSO-related requirements were included in the City of Newark NPDES permit:

- Implementation of the Nine Minimum Controls
- Full Treatment of Flow at the WWTP
- Stream Bacteriological Sampling
- Collection System Characterization
- Long-Term Control Planning

Nine Minimum Controls

The City provided the Ohio EPA with its *Combined Sewer Overflow Operational & Maintenance Plan* in January 1994. The *Operational & Maintenance Plan* outlined the implementation of the Nine Minimum Controls (NMCs) in compliance with the City's NPDES permit. The *Addendum - Combined Sewer Overflow Operational & Maintenance Plan* was submitted to Ohio EPA in May 1996. As requested by the Ohio EPA, the addendum outlined additional operation and maintenance procedures used by the City of Newark.

Full Treatment of Flow at the WWTP

The City of Newark suhmitted documentation to the Ohio EPA that the Newark WWTP was treating all of the flow that entered the plant during wet weather. This documentation is included in the City's "*Addendum - Combined Sewer Overflow Operational & Maintenance Plan*" dated May 1996.

Stream Bacteriological Sampling

During the summer of 1996, the City performed hacteriological sampling upstream and downstream of City CSOs. In August 1996, the City suhmitted the *River Fecal Coliform Characterization Report* to the Ohio EPA that documented the sampling results. The results of this study are discussed in more detail in Chapter 2. A copy of the report is located in Appendix H.

Collection System Characterization

The Ohio EPA generally requires all CSO communities to characterize their comhined sewer collection system. As discussed later in this chapter, Ohio EPA had identified apparent water quality impacts on the North Fork Licking River (NFLR). Since apparent water quality impacts were found on the NFLR and not other streams receiving CSO discharges, Ohio EPA only required that the collection system discharging to the NFLR be characterized. The purpose of this characterization was to quantify the volume of flow and pollutant load discharged to the NFLR hy comhined sewer overflows (CSOs). The characterization report titled, *Sewer System Characterization Report North Fork Licking River,* was submitted to the Ohio EPA in September 1997. The characterization report is discussed in more detail in Chapter 2.

Long Term Control Plan

The City of Newark's NPDES permit required that a Comhined Sewer System Long Term Control Plan (LTCP) he completed hy Octoher 1, 1998. The goal of the LTCP as stated in the permit is as follows:

"The goal of the plan is that discharges from combined sewer overflows shall not cause or significantly contribute to violations of water quality standards or impairment of designated uses."

This report constitutes the City of Newark's Combined Sewer System Long Term Control Plan.

1.4 Combined Sewer System Long Term Control Plan Approach

The Ohio EPA has been periodically sampling the Licking River since 1981. The most recent sampling by Ohio EPA took place in 1993. This sampling documented continuing improvement in aquatic life in the Licking River and its tributaries. The improvements have been especially impressive in the Newark area. Except in one small segment, the Licking River and its tributaries in the Newark area are in Full Attainment of Warmwater Habitat standards. The Ohio EPA identified one segment on the North Fork Licking River (NFLR) as being in Partial Attainment of its standards. The Ohio EPA attributed this apparent lack of attainment to combined sewer overflows (CSOs) located on the NFLR. This conclusion can be found in the *Biological and Water Quality Study of the Licking River and Selected Tributaries*, Ohio EPA Technical Report number MAS-1994-12-12.

With such an excellent record of water quality attainment and a well defined and relatively small area of suspected CSO impacts, the obvious choice for the City of Newark Long Term Control Plan approach was the "**Demonstration Approach**." The demonstration approach allows communities to target their CSO control efforts specifically to the individual nature and location of the water quality problem, if they can demonstrate their plan would attain the desired water quality standard. The Demonstration Approach is also helpful for communities that suspect non-CSO sources are responsible for or contributing to non-attainment of water quality standards.

Specifically, the Newark Combined Sewer System Long Term Control Plan will contain the following elements:

1.	System Characterization	Chapter 2
2.	Public Participation	Chapter 3
3.	Sensitive Area Review	Chapter 3
4.	Alternative Evaluation	Chapter 3
5.	Cost/Performance Considerations	Chapter 3
6.	Operational and Maintenance Plan Review	Chapter 4
7.	Implementation Schedule	Chapter 4
8.	Compliance Monitoring	Chapter 4

Note that maximization of treatment at the Newark WWTP has already been addressed in the *"Addendum - Combined Sewer Overflow Operational & Maintenance Plan"* dated May 1996.

1.5 Scope

The City of Newark entered into an agreement with Malcolm Pirnie Inc. to provide the following professional services:

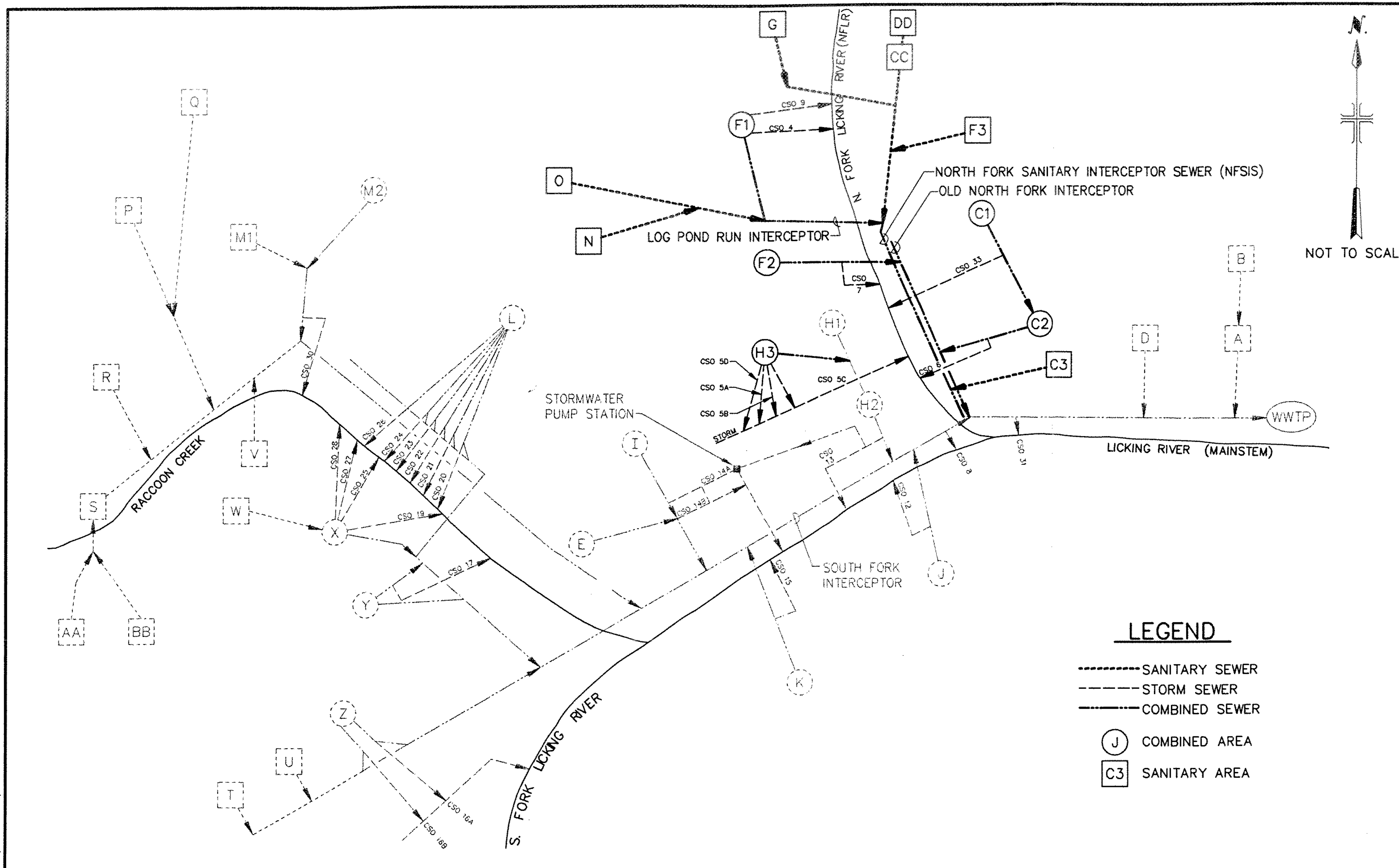
1. Provide a Sewer System Characterization Report acceptable to the Ohio EPA and completed in compliance with dates stated in the City's NPDES permit.
2. Develop a Combined Sewer System Long Term Control Plan acceptable to the Ohio EPA and completed in compliance with dates stated in the City's NPDES permit.

Specific items in the scope of work included:

- Existing Data Collection
- Monitoring and Sample Plan Development
- Monitoring and Sample Data Collection and Analysis
- Sewer System Map and Model Development
- Aquatic Life Use/Recreational Use Attainment Analysis
- Public Participation

This report provides the City of Newark Combined Sewer System Long Term Control Plan. The Sewer System Characterization report has been submitted previously.

+ + END OF CHAPTER 1 + +



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MALCOLM PIRNIE

SKELETON OF NEWARK SEWER SYSTEM

FIGURE 1-2

CHAPTER 2

2.1 Objective

System Characterization, as defined by the National CSO Policy, consists of two parts, a Sewer System Characterization and a Receiving Water Characterization. The purpose of the System Characterization is to build a baseline of data that can be used to implement the Nine Minimum Controls, support the development of the Combined Sewer System Long Term Control Plan and monitor the progress of CSO controls. The purpose of Receiving Water Characterization is to assess the current water quality, investigate areas of impairment and determine sources of impairment.

A Sewer System Characterization was required by Newark's NPDES Permit Compliance Schedule. A combination of flow metering, CSO sampling, computer modeling and mapping were used to characterize the Newark Combined Sewer System. The characterization report, *Sewer System Characterization Report - North Fork Licking River,* was completed and submitted to Ohio EPA in September 1997. The conclusions of this report are summarized later in this chapter.

A variety of sampling efforts were used to characterize the Newark area receiving waters. The most significant sampling was an aquatic life study conducted by EnviroScience Inc. during the summer of 1997. This study examined the fish and macroinvertebrate health of all streams receiving discharges from the Newark Combined Sewer System. The results of this study were included in the report, *"Aquatic Survey of the Licking River, EnviroScience Inc."* Follow-up sampling was also performed on water quality, sediments, toxicity, etc. Due to the good water quality in the Newark area receiving streams, computer modeling of the streams was not necessary. A copy of the aquatic survey report is located in Appendix C.

2.2 Nine Minimum Controls

The City of Newark has completed its *Combined Sewer Overflow Operational & Maintenance Plan* that summarizes the implementation of the National CSO Policy's Nine Minimum Controls (NMCs). The *Operation & Maintenance Plan* outlines the procedures used by the City of Newark to operate and maintain its combined sewer system. The NMCs were essentially in place prior to the System Characterization effort. Coordination of the NMCs with the Long Term Control Plan (LTCP) is discussed in Chapter 4.

The NMCs, as defined by the United States Environmental Protection Agency (USEPA), are simple, low cost, controls intended to reduce CSOs and their impact on receiving streams. The NMCs are technology-based measures that are easily implemented in a short period of time. The USEPA has defined the following NMCs:

1. Proper operation and maintenance of the sewer system and CSO outfalls.
2. Maximize use of the collection system for storage.
3. Review and modification of pretreatment requirements.
4. Maximize flow to the POTW for treatment.
5. Prevent dry weather overflows.
6. Control of solid and floatable materials.
7. Pollution prevention.
8. Public notification.
9. Monitor CSOs to characterize impacts and efficacy of controls.

The implementation of each minimum control by the City of Newark is summarized in the City's *Combined Sewer System Operational and Maintenance Plan* dated January 1994. Additional information can also be found in the *Addendum to the Combined Sewer System Operational and Maintenance Plan* dated May 1996. An outline of each minimum control is provided below for reference only. For specific details of Newark's implementation of the NMCs, see the above referenced documents.

Operation and Maintenance Program

Items described in the City of Newark's operation and maintenance program includes personnel, training, budget, equipment, sewer inspection/cleaning, record keeping, etc.

Maximize Use of Collection System for Storage

Over the past 18 years the City of Newark has performed numerous sewer system studies and implemented their recommendations for reducing infiltration and inflow (I/I) in its sewer system. By removing stormwater from the system, the City has increased available storage in the collection system.

The City has also installed numerous flapgates on the discharge of CSOs prone to reverse flow from receiving streams or storm sewers during high stream levels. By keeping this souree of inflow out, the City has increased the storage available in the system.

Review Pretreatment Requirements

As a percentage of dry weather flow to the plant, the industrial user contribution is approximately 26%. Under the City's Industrial Pretreatment Program (IPP) all Categorical and Significant Industries are self-monitoring or monitored by the City. The City reviews and updates the pretreatment program on a regular basis. The last update occurred in 1996.

Since approval of the IPP in March 1985, the City has experienced a reduction of metal loadings in sludge generated by the Newark Wastewater Treatment Plant. The historical trend of the reduction of metals in the Newark WWTP sludge demonstrates the effectiveness of the IPP. It also supports the conclusion that less pollutants (metals) are being discharged to receiving streams since industrial users are discharging less metals to the combined sewer system.

Maximize Flow to the Treatment Plant

During wet weather, the pump station at the Newark Wastewater Treatment Plant (WWTP) is operated so that the pump station wet well level does not exceed 19 feet. As discussed in the *Addendum-Operational & Maintenance Plan,* at a maximum wet well level of 19 feet, the nearest CSO upstream from the plant (CSO 1031) does not overflow and the plant bypass does not overflow. Thus all flow that can reach the plant is treated.

Prevent Dry Weather Overflows

Combined sewer overflows are inspected periodically as described in the City's *Combined Sewer System Operational and Maintenance Plan.*

Control of Solid and Floatable Materials

The City of Newark performs street sweeping in the downtown area twice a week. Other curbed streets are swept on "as needed" basis. Catch basin cleaning is also performed on an as needed basis. This issue is addressed again in the development of Long Term Control Plan alternatives in Chapter 3.

Pollution Prevention

There exist many City and non-City programs that support pollution prevention and public education efforts. The following list is from the City's *Addendum to the Combined Sewer System Operational and Maintenance Plan* dated May 1996:

1. Review and evaluate the local industrial limits.
2. Review and evaluate the WWTP's ability to handle wet weather flows.
3. Combined sewer overflow evaluation and modification.
4. Litter prevention and recycling programs.
5. Household hazardous wastes program.
6. Solid waste disposal program.

Public Notification

As stated in the City's *Addendum to the Combined Sewer System Operational and Maintenance Plan* dated May 1996, a consensus of local officials including a representative of the Newark Health Department decided that signs should be posted at all Newark CSOs to warn against contact with discharge water. The presence of fecal coliforms in receiving streams was also addressed as part of the development of Long Term Control Plan alternatives in Chapter 3.

Monitor CSOs to Characterize Impacts and Efficacy of Controls

As stated in the *Addendum to the Combined Sewer System Operational and Maintenance Plan,* the City inspects all CSOs as soon as possible after significant storm events (> 0.25 inches in one hour) to observe any problems that may have developed at an overflow structure. Documentation of overflow activation is kept at the WWTP.

As discussed later in this Chapter, the City has also characterized the Sewer System and the Receiving Waters as part of the development of a Long Term Control Plan

2.3 Sewer System Characterization

Characterization of the combined sewer system was performed to establish baseline dry weather sewer flows, CSO discharge volumes, pollutant loads and frequency of overflows. The development of the Sewer System Characterization resulted in the following:

- A characterization of the CSO pollutant load to the North Fork Licking River (NFLR).
- A better understanding of the collection system, including improved CSO structure documentation and system mapping, through field inspections, historical records and data collection.
- Combined sewer system flow metering, rainfall measurement and pollutant sampling data.
- A dynamic computer model of the Combined Sewer System, based on the United States EPA's SWMM model.

Historical sampling by the Ohio EPA in Newark area streams has identified only one area of apparent water quality impairment, rivermile 0.1-0.2 in the North Fork. Thus, only the combined sewer system tributary to the North Fork was characterized. The characterization was completed in October 1997 and is summarized in the report, *"Sewer System Characterization Report, North Fork Licking River."* This report has been submitted to the Ohio EPA. Portions of the Sewer System Characterization that are significant to the development of the Long Term Control Plan are discussed below.

2.3.1 Combined Sewer System Modeling

As part of the North Fork Sewer System Characterization, a computer model of the collection system was developed. The Newark sewer system model was developed to meet system characterization and Long Term Control Plan objectives. Specifically, the model was used to characterize the sewer system, determine the CSO volume during wet weather for a wide range of storm events, and establish the sewer system's hydraulic capacity during dry weather and wet weather.

The Newark model is based on the USEPA's Storm Water Management Model (SWMM) developed in 1969 - 1970. Over the past two decades, modifications and changes have been made to increase model capabilities and user friendliness. CAICE Software Inc. (formally XP-Software Inc.) has developed a graphical version of the original SWMM program that allows for graphical representation of the sewer system as well as graphical output. For this project, the City purchased Version 2.0 of XP-SWMM.

Modeling urban runoff for a sewer system requires various input data. The sewer network was constructed from record drawings showing pipe sizes, sewer lengths, sewer inverts and ground elevations. Pump station, siphon construction, and CSO configurations were also researched and built into the model. Next, residential dry weather flow and industrial flow data were estimated and input into the model. These flows were based on data obtained during the dry weather flow monitoring. In order to produce runoff for combined sewer areas, the drainage area, imperviousness, slope, catchment width, and infiltration were determined and defined. Once the structure of the model was established, the model was calibrated using rainfall data from local rain gauges and flows measured during dry and wet weather by flow meters installed in key sewer manholes. Flow meters were used to collect data in the Newark Combined Sewer System from March through October 1996, witb additional periods in 1997 and 1998.

2.3.2 Sewer System Characterization Conclusions

Tbe annual CSO discharge volumes are based on SWMM simulations of four typical storms that occur during an average year. The typical storms were developed by analyzing eight years of rainfall data to determine the intensity, duration and number of events per year per typical storm. The four typical storms have different rainfall amounts and durations (0.24 inches in 3.67 hours; 0.75 inches in 9 hours; 1.25 inches in 12 hours; 2.4 incbes in 11.5 hours). The model was used to predict the CSO discharge volume for each typical storm. The annual discharge volume was obtained by multiplying the volume for each typical storm by its annual frequency of occurrence. Based on the rainfall analysis, the frequencies of activation of the various North Fork CSOs were also estimated. These are shown in Figure 2-1.

To estimate pollutant loadings, CSO discharge samples were analyzed for pollutant concentrations. It was found that Newark CSOs exhibit typical "first flush" pollution concentrations that tend to decrease with time during the overflow event. Typical pollutant concentrations are shown in Figures 2-2 and 2-3. Using the annual volume of CSO predicted by the model, the annual pollutant loadings for each CSO within the North Fork combined sewer system were calculated. These loadings are shown in Figure 2-4. Calculations of pollutant loading for each CSO are provided in Appendix B for reference.

Note that the North Fork CSOs that discharge the greatest volume and have the highest frequency of overflow are CSOs 1006 and 1007.

Using model output, tbe annual volume of wet weather flow collected by the Nortb Fork combined sewer system is approximately 162 million gallons, of which 34 million gallons discharges to the North Fork. This means that over 83% of the wet weather flow in the portion the combined sewer system tributary to the North Fork is captured and treated. This high percentage of capture is primarily due to past improvements hy the City of Newark.

2.4 Receiving Water Characterization

To characterize the receiving waters of the North Fork, the following sampling was completed:

- Aquatic life sampling: This sampling received the most effort and analysis since the fish and macroinvertebrates provide a long-term measurement of the quality of the receiving water. Random chemical sampling has limited value for determining long-term water quality standard compliance. Aquatic life sampling provides a direct measurement of the attainment of the receiving water of its Aquatic Life designated use (Warmwater Habitat). As discussed later, water and sediment sampling was performed to assist in the analysis of the aquatic life results.
- Fecal coliform sampling: This sampling provided a direct measurement of the attainment of the Primary Contact (Recreational) designated use.

2.4.1 Aquatic Survey of the Licking River

An aquatic life study of the South Fork Licking River, the Raccoon Creek, the North Fork Licking River and the Licking River mainstem was performed in the summer of 1997. The results of this study are summarized in the report, *Aquatic Survey of the Licking River, March 1998*, by EnviroScience Inc. and can be found in Appendix C. The purpose of this study was to characterize the receiving streams in the City of Newark. All streams selected for the study receive discharges from comhined sewer overflows from the Newark comhined sewer system during wet weather. In order to assess the overall stream condition, the stream habitat and the fish and macroinvertebrate communities were evaluated using the following indices established by the Ohio EPA:

- Qualitative Habitat Evaluation Index (QHEI) - This is a physical hahitat index that evaluates the macrohabitat characteristics such as substrate, stream cover, bank erosion and gradient. Sites with scores greater than 60 are indicative of Warmwater Habitat.
- Index of Biotic Integrity (IBI) - This index assesses the fish community.

Characteristics considered by this index are fish diversity, quantity and anomalies. Sites with scores greater than 34 to 37 are indicative of attainment of warmwater habitat aquatic life criteria in this ecoregion.

- Modified Index of Well Being (MIwb) - This index also assesses the fish community. Characteristics considered by this index are numher of individuals, biomass and the Shannon Diversity Index (numbers and weights). Sites with scores greater than 7.4 to 7.8 are indicative of attainment of warmwater habitat aquatic life criteria in this ecoregion.
- Invertebrate Community Index (ICI) - This index assesses the hiological integrity of the macroinvertehrate community. Characteristics considered by this index are the quantity and diversity of the collected macroinvertehrates. Sites with scores greater than 30 to 32 are indicative of attainment of warmwater habitat aquatic life criteria in this ecoregion..

The aquatic study consisted of sampling eight locations for biological integrity. Sites were generally selected to bracket CSO discharge areas, i.e., one site upstream and one site downstream of a CSO area. Sites selected included two on the North Fork, three on the South Fork, two on Raccoon Creek and one on the mainstem of the Licking River. A map of the sample site locations is shown on Figure 2.5.

Electrofishing was performed twice (July 7-8, 1997 and September 2-4, 1997) at all locations to sample the fish community. The macroinvertebrate community was also sampled at all locations with Hester-Dendy samplers installed during July and removed at the end of August. Upon removal of the Hester-Dendy samplers, additional "kick" samples were collected from the river suhstrate to supplement the data collected by the Hester-Dendy sampler as required hy the Ohio EPA sampling protocol. When the samplers were removed, it was noted that a fiher bag was wrapped around the North Fork sampler at RM 0.1 and that hoth the South Fork (upstream and downstream) and Mainstem samplers were washed away. For these reasons, Hester-Dendy samplers were reinstalled at each of these locations.

The results of the 1997 sampling showed little change from sampling performed by the Ohio EPA in 1993. Both studies found the Raccoon Creek, South Fork Licking River and the Mainstem Licking River were in Full Attainment of their designated water quality standards while a portion of the North Fork Licking River was in Partial Attainment.

The results of the 1997 sampling for the South Fork and Raccoon Creek are shown in Figures 2-6 and 2-7. These results demonstrate that these streams were in Full Attainment of their designated aquatic life standard.

The results of the 1997 sampling for the North Fork Licking River and the Licking River Mainstem are shown in Figure 2.8. These results demonstrate that the

Licking River Mainstem and the North Fork Licking River (upstream) were in Full Attainment.

Both the 1997 study and the Ohio EPA's 1993 study found that one reach of the North Fork Licking River (rivermile 0.1) was in Partial Attainment of Warmwater Habitat Standards. As shown on Figure 2-8, the scores pertaining to the stream habitat index (QHEI) meet the warmwater habitat standard at both the upstream (rivermile 2.6) and downstream (rivermile 0.1) sites, however a definite decrease in habitat was recorded between rivermile 2.6 and 0.1. The fish indices (IBI and MIwb) also meet warmwater habitat standards at all sites, including North Fork rivermile 0.1. The Partial Attainment is due to the results of the macroinvertebrate scores. As shown in Figure 2-8, the results of the ICI index at North Fork rivermile 0.1 are only slightly less than full attainment (28 vs. 30). This is the score for the second sampler (NF 0.1-II) placed at the site. The results of the first sampler were not used since a fiber bag had wrapped around the sampler during the sampling period. Although the fish scores were within warmwater habitat standards and the macroinvertebrate scores were just below warmwater habitat standards, the score of 28 for the macroinvertebrates was sufficient to result in a Partial Attainment conclusion.

Due to the finding of a slight depression in the macroinvertebrate scores in the downstream portion of the NFLR, additional water quality sampling and analysis was performed during the summer of 1998. The purpose of the sampling was to identify reasons for the impairment of the macroinvertebrates. Sampling activities included:

- Sediment sampling of CSOs and the North Fork
- Background river water sampling of the North Fork
- Wet weather sampling of CSO discharges, storm sewer discharges and the North Fork river water
- Toxicity sampling of a CSO discharge, storm sewer discharge and the North Fork river water

2.4.2 Sediment Sampling

Sediment samples were collected on April 15, 1998 and subsequently analyzed to determine if chemicals in the sediment could be the cause of the impacts on macroinvertebrates at rivermile 0.1 on the NFLR. A total of six sediment samples were collected from areas where contaminants may be entering the streams. Four sediment samples were collected from the stream bed of the NFLR and one sample each was taken from sediment deposits in CSO structures 1006 and 1007. CSO structures 1006 and 1007 were originally designed as sand catchers and thus accumulate sediment. Sample locations are shown on Figure 2-9. The analytical data can be found in Appendix D and a summary of the sediment sample analysis results is provided in Figure 2-10.

Analysis of the sediment sampling and analysis data indicates the following:

- In general, the pollutant concentrations of the river sediment downstream of CSO 1006 were similar to pollutant concentrations found upstream of CSO 1007.
- The CSO 1006 sediment pollutant concentrations were similar to the river sediment pollutant concentrations while CSO 1007 sediment pollutant concentrations tended to be slightly elevated.
- The river sediment sample metal concentrations are similar to the sediment samples collected by Ohio EPA at river mile 1.6 during their 1993 sampling program. (See the 1995 Ohio EPA report, *Biological and Water Quality Study of the Licking River and selected Tributaries).*

As seen in Figure 2-10, the sediment sampling and analysis results did not show significantly elevated contaminant concentrations when compared with standard sediment guidelines. These results indicate that sediment contamination is not a likely cause for the impairment of macroinvertebrates in the NFLR.

2.4.3 Wet Weather Sampling

As part of the investigation of the impairment of macroinvertebrates on the NFLR, it was decided to sample the CSO discharges from CSOs 1006 and 1007 and the discharges from storm sewers adjacent to each. CSO 1006 and 1007 were selected because they account for more than 90% of the combined sewer overflow to the North Fork.

Wet weather flow sampling was performed on April 16, 1998. Samples of the water discharged from CSOs 1006 and 1007 was collected as were samples of the water discharged from the storm sewers. At the same time samples were being collected from the CSOs and storm sewers, the NFLR was sampled upstream and downstream of the CSO and storm sewer outfall locations to determine the relative impact of the discharges on the NFLR. The sampling locations are shown on Figure 2-9. A summary of the wet weather flow sampling analytical data is provided in Figure 2-11 while the entire set of analytical data can be found in Appendix E.

Analysis of the results of the wet weather sampling results and analytical data indicates the following:

- In general, the water discharged from storm sewers has concentrations of pollutants that are lower than the water being discharged from combined sewer overflows.
- Fecal coliform concentrations from storm sewers were relatively high, approximately the same magnitude as for CSO discharges.

As shown in Figure 2-11, the wet weather flow sampling results do not show any water quality violations in the North Fork Licking River samples (upstream or downstream) when compared with the maximum value from the Ohio Water Quality Standard. The CSO discharge and storm sewer discharge samples do show elevated levels of pollutants. However, since the river samples downstream of the CSO and storm sewer discharges are not in violation, neither CSOs nor the sampled storm sewers appear to cause water quality violations in the North Fork Licking River during wet weather. The results of the wet weather sampling and analysis also supports the premise that the CSOs and the storm sewer discharges are not the cause of the apparent macroinvertebrate impairment.

2.4.4 Background River Sampling

Background river water samples were collected from the NFLR during dry weather to determine the concentration of metals normally in the river water. These samples were collected on May 18, 1998. The analytical data can be found in Appendix F and a summary of this sampling analytical data can be found in Figure 2-12. Each background sample location is shown on Figure 2-9.

As seen in Figure 2-12, the upstream and downstream sample locations have similar concentrations for all analyzed parameters. All concentrations are below the maximum water quality standard and usually below the 30-day average water quality standard. This indicates that normal dry weather flow contaminants in the river are not the source of macroinvertebrate impairment.

2.4.5 Toxicity Sampling

Toxicity screening was also performed to attempt to define factors that might limit macroinvertebrates. It was decided to sample the river water, CSO discharge and a storm sewer diseharge. CSO 1006 was selected to represent CSO discharges. The storm sewer adjacent to CSO 1006 was selected to represent storm sewer discharges. It was decided to test the toxicity of the NFLR upstream and downstream of CSO 1006 and the adjacent storm sewer discharges. This served the dual purpose of providing a test of the NFLR water with and without the CSO and storm sewer discharges. The sample locations are shown on Figure 2-9.

Acute and chronic screening toxicity tests were performed in an attempt to identify short or long term impacts to the macroinvertebrates (as measured by the water flea in the standard toxicity test). Toxicity tests were also run using fathead minnows since this the standard test protocol, although fish toxicity was not a concern. These samples were collected on June 12, 1998. The results from this sampling can be found in Appendix G and a summary of the analytical data is shown in Figure 2-13.

As shown in Figure 2-13, none of the samples showed any toxic effects on the water flea. The two river samples did show some slight chronic impacts on the fathead minnow. However the excellent fish scores from the North Fork aquatic life surveys discussed previously indicates these values are not a concern. These findings support the premise that neither the NFLR water, CSO discharges nor storm sewer discharges are the cause of the macroinvertebrate impairment.

To assist in evaluating any toxic effects that may be detected, standard pollutant and metal analyses were also performed on the collected samples. The pollutants and metals concentrations of the river water, CSO and storm sewer toxicity samples also showed no significant pollution concentrations. The results of these analyses are also summarized in Figure 2-13.

2.4.6 Feeal Coliform Evaluation

In order to characterize the receiving waters and meet NPDES requirements, the City completed a *River Fecal Coliform Characterization Report* and submitted it to the Ohio EPA on August 9, 1996. A copy of the report is included in Appendix H for reference.

As part of the fecal coliform characterization, samples were collected upstream and downstream of all CSO areas during dry and wet weather conditions. Upstream samples were collected from the North Fork, South Fork and Raccoon Creek. The downstream sample was collected from the Licking River Mainstem, upstream of the Newark Wastewater Treatment Plant discharge. The data is included with the *River Fecal Coliform Characterization Report* in Appendix H. The following general conclusions can be made from the collected data.

1. Fecal coliform concentrations increase through the combined sewer area during wet weather. Concentrations return to pre-rain event levels within approximately three days if no additional rain occurs. The sources of the fecal coliforms are most likely the City of Newark CSOs and storm sewers.
2. Fecal coliform concentrations increase upstream of the CSO area during wet weather events, however the increase typically lags the rain event by one day. This indicates there exist significant sources of fecal coliforms upstream of the City of Newark. The source of these fecal coliforms is unknown but is most likely upstream septic systems and agricultural activity.

Water Quality Standards

As part of the receiving water characterization, the data was analyzed to see if the water quality standards were violated. The Ohio EPA has designated the recreational water quality standards for the streams in the Newark area as "Primary Contact." The standard for Primary Contact Recreation contains two parts as described below:

"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."

OAC 3745-1-07 Table 7-2

The application of the fecal coliform water quality standard (WQS) was analyzed in three different ways as shown in Figure 2-14. First, the WQS was applied to dry day values only (i.e., sample values collected on days when there had been no rain for at least three days). Secondly, the WQS was applied to all samples collected regardless of rain events. Lastly, the WQS was applied to a "typical" 30-day period during the recreational season as estimated from the sampling data.

Dry Day Analysis

The analysis of dry day values only is shown in Figure 2-14. Figure 2-14 shows that all sites met both parts of the fecal coliform WQS during dry weather.

Dry and Wet Day Analysis (All Sample Data)

The analysis of all the sample data (both wet and dry days) is shown in Figure 2-14. The sample data consisted of 10 dry days and 12 wet days of data. Since the WQS is a 30-day standard based on at least 5 samples, the data was broken down into the months it was collected, June and July. For comparison purposes, the WQS was also applied to the entire data set (June through July) although this would span a period greater than 30 days.

In this analysis, all sites upstream and downstream of the CSO area violated the "Percent Exceeding 2,000" standard. Only the downstream CSO site (labeled "Upstream WWTP") violated the geometric mean standard of 1,000. Although this was a violation, the value was very close to the standard (1,226 vs. 1,000). Compared with other CSO communities, the Newark wet weather fecal coliform concentrations were relatively low. The reason for the relatively low fecal concentrations during wet weather is unknown. Two possibilities are:

- The Newark CSO system captures a large portion of the first flush
- Stormwater either in the collection system or in the receiving water dilutes the concentrations.

Typical 30-Day Period-Recreational Season

In analyzing the fecal coliform data, it is important to note that the samples were collected in order to determine the impacts of wet weather on fecal coliform concentrations. Thus the resulting data set is skewed toward wet weather values that tend to be higher. The data set used for the above analysis had almost an even number of wet and dry days. However a 30-day period in the Newark area during the recreational season typically has more "dry " days than "wet" days.

In an attempt to address this issue, average dry day values were added to the data set to obtain a more typical 30-day representation. The results of this analysis are shown in Figure 2-14. As expected, adding "typical" dry days resulted in a substantial reduction in the geometric mean to the extent all sites were well below violation of the geometric mean portion of the standard. However, one upstream site (Raccoon Creek) and the downstream site (Upstream WWTP) still violated the "Percent of Sample Values Exceeding 2,000" part of the standard. This demonstrates that the "Percent of Sample Values Exceeding 2,000" is by far the more stringent part of the Recreational Use standard.

Application of the "Percent of Sample Values Exceeding 2,000" standard without consideration of wet weather impacts will generally result in a water quality standard violation at all sites, upstream and downstream of the CSO area. For example, since only 10% of samples in a 30-day period can exceed 2,000 colonies/100ml, than there can be only 3 samples exceeding 2,000 in a 30-day period, assuming one sample is collected per day. The raw data included in Appendix H shows that most rain events result in values in excess of 2,000 at all sites. Since the Newark area receives more than three rain events in 30 days during the recreational season, it is almost impossible for any stream to meet water quality standards, whether upstream or downstream of the CSO area.

Conclusions

From the above analyses, it can be seen that application of the existing water quality standard can be done in several different ways depending on how often and when samples are collected during the 30-day period and if wet weather impacts are considered. This makes drawing conclusions difficult when determining compliance with the standard.

The following conclusions regarding fecal coliform water quality standards can be made from the analysis of the data in Figure 2-14:

1. All stream sites in the Newark area typically meet fecal coliform water quality standards during dry weather, both upstream and downstream of the CSO area.
2. All stream sites in the Newark area, both upstream and downstream of the CSO

area, will generally violate at least one of the two parts of the fecal coliform water quality standard when wet and dry weather data are considered together. Whether a violation occurs will depend primarily on how many samples are taken and their proximity to rain events.

3. Fecal coliform concentrations in Newark streams during wet weather are relatively low compared to other CSO communities.
4. The "percent of sample values exceeding 2,000" is the more stringent of the two parts of the WQS.

2.4.7 Receiving Water Characterization Conclusions

After analyzing all the characterization data, including the 1997 aquatic life study, the Ohio EPA's historical aquatic life data, and all other data collected as part of this project, the NFLR is characterized as follows:

- The warmwater habitat criteria is attained for fish populations both up and downstream of the NFLR CSO discharge area. This appears to be a stable situation since attainment of fish populations meeting warmwater habitat were first recorded in 1993 and again in 1997. Tbe existing level of CSO discharge does not impact fish populations.
- The macroinvertebrate population is attaining warmwater habitat water quality standards upstream of the NFLR CSO area. However at the NFLR rivermile 0.1-0.2, the macroinvertebrate scores are less than warmwater habitat standards.
- The water quality of the NFLR appears to meet chemical water quality standards necessary to maintain warmwater habitat. CSO discharges and storm sewer discharges do not appear to violate chemical water quality standards.
- Sediment in the NFLR does contain trace to elevated concentrations of pollutants, but none sufficient to impact aquatic life. The source of the pollutants is most likely bistorical uses in the area.
- The NFLR water is not toxic to macroinvertebrates as measured by standard acute and long-term toxicity tests. Toxicity was also not detected in storm sewer and CSO discharges.
- The NFLR is in attainment of recreational use water quality standards for primary contact recreation during dry weather. Rain events may cause short term violations of the water quality standard both upstream and downstream of the CSO area.

From the above characterization, two water quality issues were identified: attainment of aquatic life standards at NFLR rivermile 0.1-0.2 and compliance with the Recreational Use Primary Contact standard throughout Newark.

NFLR Rivermile 0.1-0.2

The lack of attainment of Warmwater Habitat water quality at the NFLR site is due to low macroinvertebrate scores. This conclusion of the 1997 aquatic sampling was in agreement with the Ohio EPA's conclusion from their 1993 sampling. The Ohio EPA concluded that the cause of this macroinvertebrate impairment was upstream CSOs. However, after much additional investigation and sampling, it is concluded that the partial attainment is not due to CSO discharges but is due to a non-favorable habitat and unstable substrate at the site. The support for these conclusions is provided below:

- The QHEI score given to the North Fork at river mile 0.2 indicates substantial loss of habitat when compared with the upstream sample location at river mile 2.6. As seen in Figure 2-15, speeific ehanges in habitat include instream cover, channel morphology and riparian zone. The channelization of the lower North Fork and lack of habitat structure can be seen in Figures 2-16A, 2-16B and 2-16C. In their 1995 report, "*Biological and Water Quality Study of the Licking River and Selected Tributaries*, the Ohio EPA noted that, "the condition of the physical habitats encountered at RM 0.2 were diminished in comparison to the upstream station." However, the Ohio EPA also stated that "minimum habitat integrity was maintained."
- The channelization evident in the North Fork from the confluence to approximately rivermile 1.6 was constructed by the U.S. Army Corp of Engineers (COE) as part of the Newark Local Protection Project (LPP). This project was first constructed in 1941 with significant modifications in 1963 and 1988. The City is legally bound to maintain and operate the LPP. The COE defines the City's primary channel maintenance activity as monitoring and removal of sediment deposition. Tbe area of concern (rivermile 0.1-0.2) lies within the LPP thus the City will always have to dredge and shape this section of the NFLR to maintain its carrying capacity.
- Other streams in the Newark area receiving CSO discharges did not exhibit similar reduction in attainment (South Fork river mile 0.1 and Raccoon Creek river mile 0.1). Both of these sites had better habitat scores.
- Since QHEl scores are primarily based on fish habitat, additional field investigation was made of the substrate at the site. The substrate was found to consist of gravels, sands and other small material mixed with some larger rocks. Field observations during the sampling season indicated that materials tend to shift as peak storm flows are encountered. This shifting of the substrate may disrupt sites and prevent macroinvertebrates from colonizing. Fish are less affected by instability of tbe substrate on this scale since they do not colonize substrate surfaces

in the same manner as macroinvertebrates.

- The reduction in pollution in the NFLR has failed to impact the macroinvertebrate scores, although the fish scores have improved dramatically. This indicates something other than pollution is impacting the macroinvertebrates. In 1981, the Ohio EPA found the macroinvertebrates at the site to be in full attainment of water quality standards. Since 1981 there have been many improvements in the Newark collection system, Industrial Pretreatment Program and industrial stormwater that have greatly reduced pollution in the NFLR. However the macroinvertebrate scores have consistently remained depressed, in fact they bave never reached the levels recorded in 1981. The fish on the other hand have responded very favorably. The Ohio EPA's analysis attributed the good score in 1981 to higher than average flow at the USGS Licking River monitoring station. Since flows were elevated in the Licking River they were assumed elevated in the NFLR. However, the 1997 sampling provided an opportunity to review that conclusion. It was found that the 1997 flows in the Licking River were even higher than 1981, yet the scores still remain depressed.

The additional data collected in 1997, which was of course not available to the Ohio EPA in 1993, points to habitat as being the cause of impairment in the NFLR and not CSO or non-CSO discharges.

Primary Contact Recreation

The data collected shows that Newark CSOs do not violate the Primary Contact standard during dry weather. During wet weather, the Primary Contact standard may be exceeded upstream and downstream of the CSO area. When elevated levels do occur, they typically decrease to pre-event levels within three days. These short term increases in fecal coliform concentrations are concluded not to be a pervasive threat to the primary contact designated uses and tbus not a significant water quality violation.

2.5 System Characterization Conclusions

The results of the Sewer System Characterization and the Receiving Water Characterization are intended to guide the application of the Nine Minimum Controls and the development of the Long Term Control Plan.

2.5.1 Nine Minimum Controls

The City had implemented the Nine Minimum Controls prior to the system characterization. The good results of the System Characterization and the finding of no significant CSO impacts on water quality confirm the successful use of the NMCs by the

City of Newark. Modifications to the NMCs that may be proposed as part of the LTCP are discussed in Chapter 4.

2.5.2 Long Term Control Plan

One purpose of the System Characterization is to identify CSO water quality impacts so appropriate CSO controls can be included in the Long Term Control Plan (LTCP). Although no significant water quality impacts were identified, the System Characterization did identify several potential areas where problems could develop. In keeping with the City of Newark's desire to be proactive regarding water quality, the CSO Control Alternatives to be evaluated will have the following goals:

- Monitor the Combined Sewer System to detect changes in flow or maintenance problems that could result in water quality impacts.
- Monitor the receiving water to detect any water quality degradation as measured by the aquatic life standards.

++ END OF CHAPTER 2 ++

Figure 2-1
Combined Sewer Overflow Frequency Summary

Overflow Number & Location	Typical Storm Category (Total Inches)				Total Annual Activation
	0.24	0.75	1.25	2.4	
Annual Frequency	73	13	6	2	94
1004-Manning St. & NFLR		13	6	2	21
1005a-Buckingham St. & SR16			6	2	8
1005b-N. 5th St. & SR16			6	2	8
1005c-N. 4th St. & SR16			6	2	8
1005d-Central Ave. & SR 16	73	13	6	2	94
1006-Fleek Ave. & NFLR	73	13	6	2	94
1007-Everett Ave. & NFLR	73	13	6	2	94
1009-North St. & NFLR		13	6	2	21
1033-Everett Ave. & N. Buena Vista	73	13	6	2	94

Note: Table 5-7, Sewer System Characterizataion - North Fork Licking River

Figure 2-2
Newark CSO Long Term Control Plan
Average CSO Concentrations
Average of all CSO Samples Collected - March thru May 1996

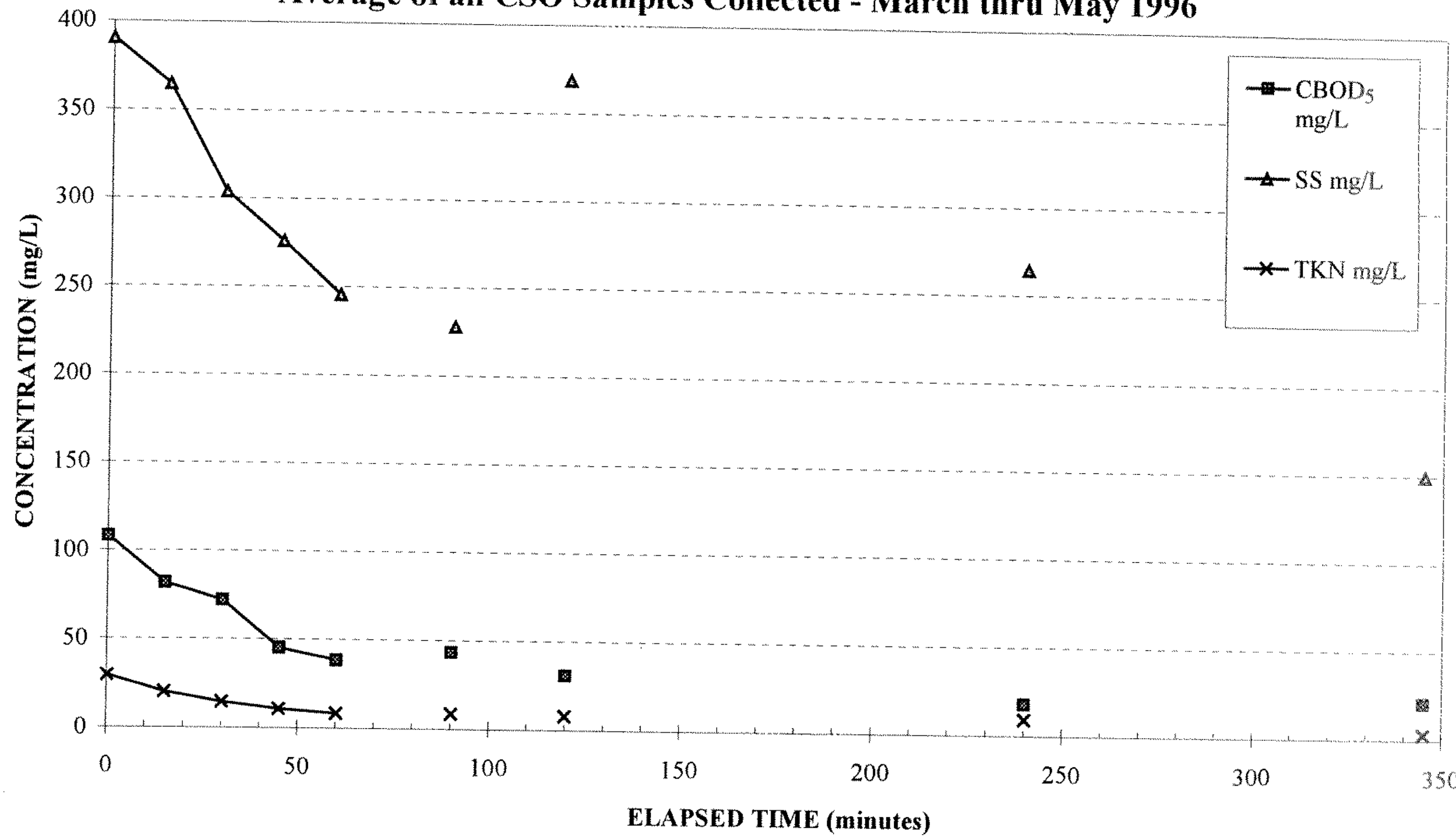

FIG2-2&3.XLS sumry mgl

9/21/98 2:24 PM

Figure 2-3
Newark CSO Long Term Control Plan
Average CSO Concentrations
Average of all CSO Samples Collected - March thru May 1996

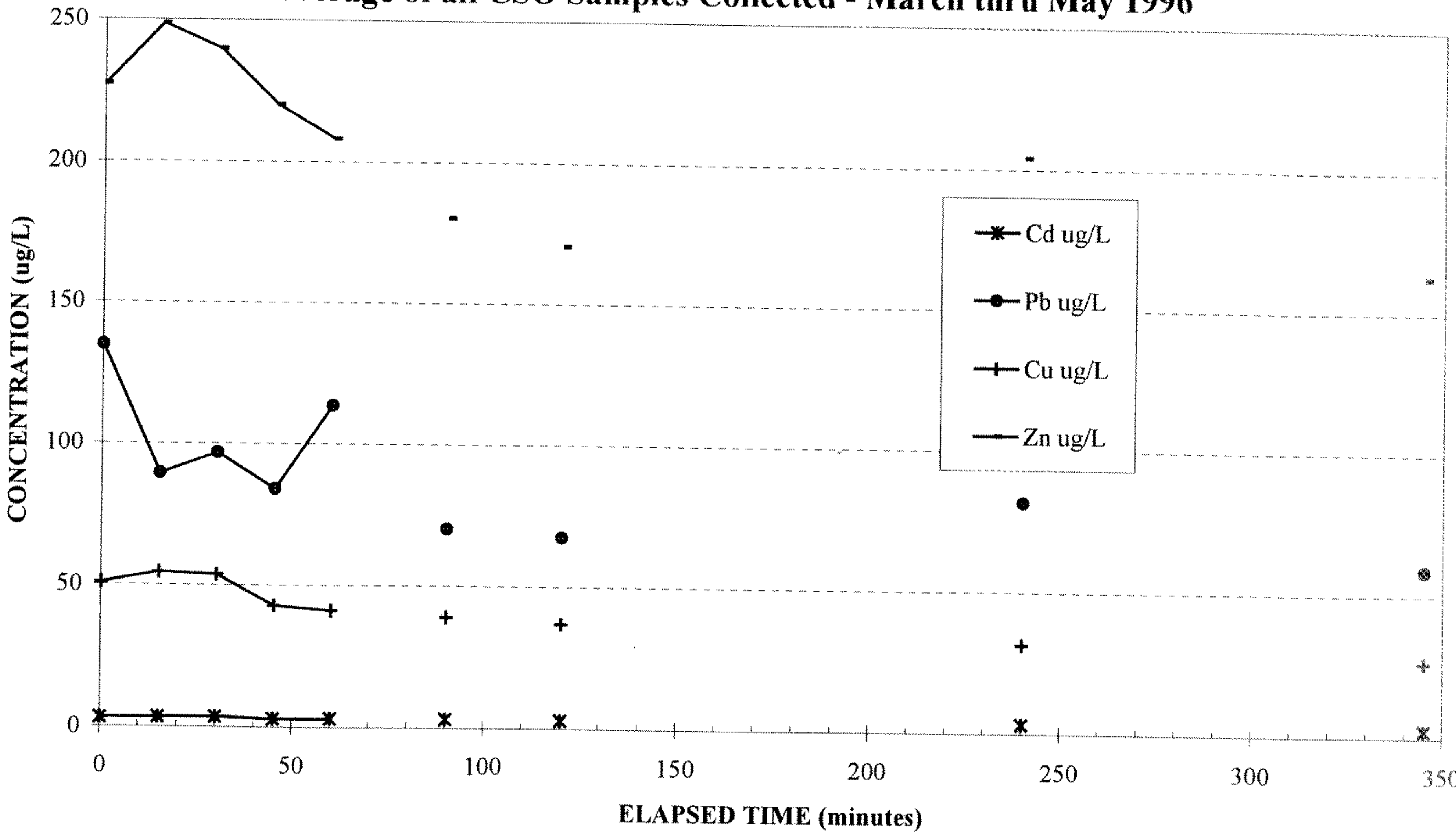

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Figure 2-4
Newark CSO Long Term Control Plan
Typical Annual CSO Discharge

CSO No.	Location	Volume (Gal)	CBOD (lbs)	SS (lbs)	TKN (lbs)	Cu (lbs)	Cd (lbs)	Pb (lbs)	Zn (lbs)
1004	Manning St. & NFLR	358,000	112	875	27	0.11	0.0077	0.23	0.56
1005a	Buckingham St. & SR 16	145,631	59	349	13	0.05	0.0042	0.10	0.25
1005b	N. 5th St. & SR 16	47,223	17	111	4	0.02	0.0012	0.03	0.08
1005c	N. 4th St. & SR 16	236,726	75	557	19	0.07	0.0052	0.16	0.38
1005d	Central Ave. & SR 16	265,713	76	601	19	0.08	0.0052	0.17	0.42
1006	Fleek Ave. & NFLR	21,077,235	7,296	49,456	1,787	6.78	0.5005	14.35	34.62
1007	Everett Ave. & NFLR	10,195,281	3,198	22,886	761	3.18	0.2186	6.78	16.46
1009	North St. & NFLR	1,173,556	311	2,805	84	0.35	0.0210	0.76	1.85
1033	Everett Ave. & N. Buena Vista	562,421	191	1,366	47	0.18	0.0133	0.38	0.92
Annual Total		34,061,787	11,335	79,005	2,761	10.84	0.7768	22.96	55.53

Note:
Rainfall events developed from actual data collected during the period of January 1990 thru October 1997.
0.24 inch storm in 3.67 hours - 73.45 events per year
0.75 inch storm in 9 hours - 13.46 events per year
1.25 inch storm in 12 hours - 5.98 events per year
2.4 inch storm in 11.5 hours - 2.35 events per year
Same as TABLE 5-6 in Sewer System Characterization -North Fork Licking River

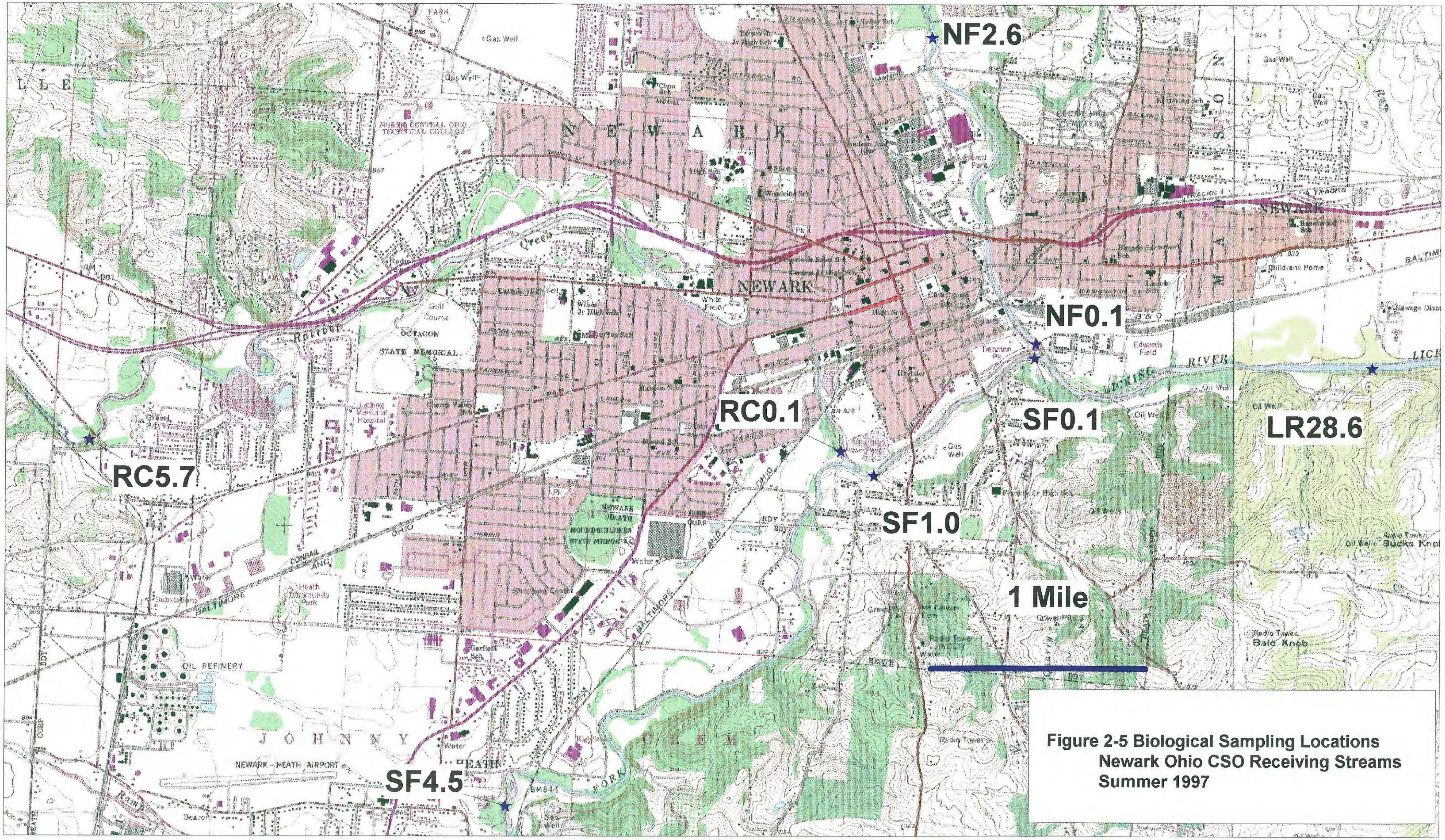


Figure 2-5 Biological Sampling Locations
Newark Ohio CSO Receiving Streams
Summer 1997

Figure 2-6
Biological Data for South Fork of Licking River

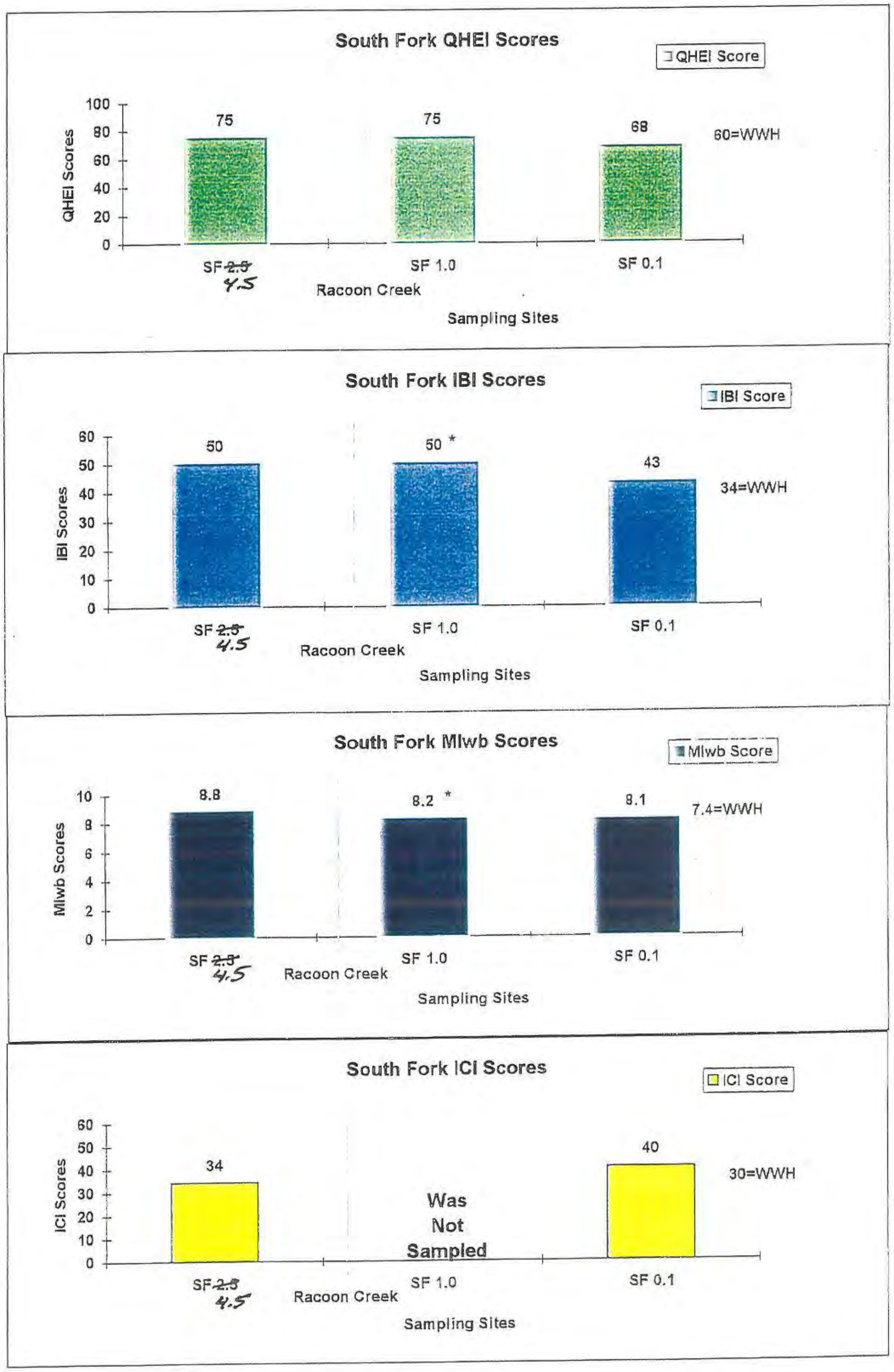


Figure 2-6 is the same as Figure 4.1 in the Enviroscience Aquatic Survey of the Licking River.

Figure 2-7
Biological Data for Raccoon Creek

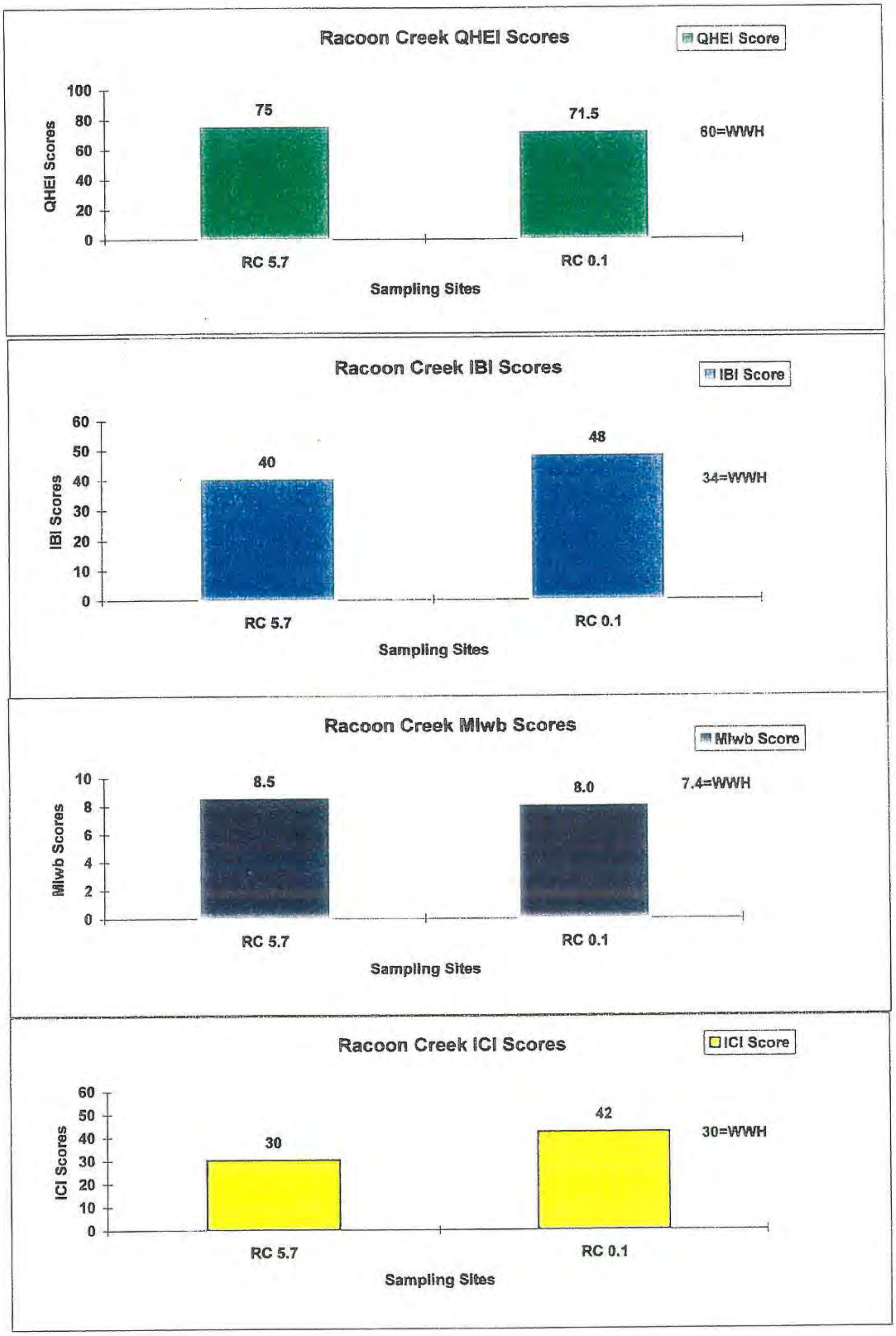


Figure 2-7 is the same as Figure 4.2 in the Enviroscience Aquatic Survey of the Licking River.

Figure 2-8
Biological Data for North Fork and the Licking River Mainstem

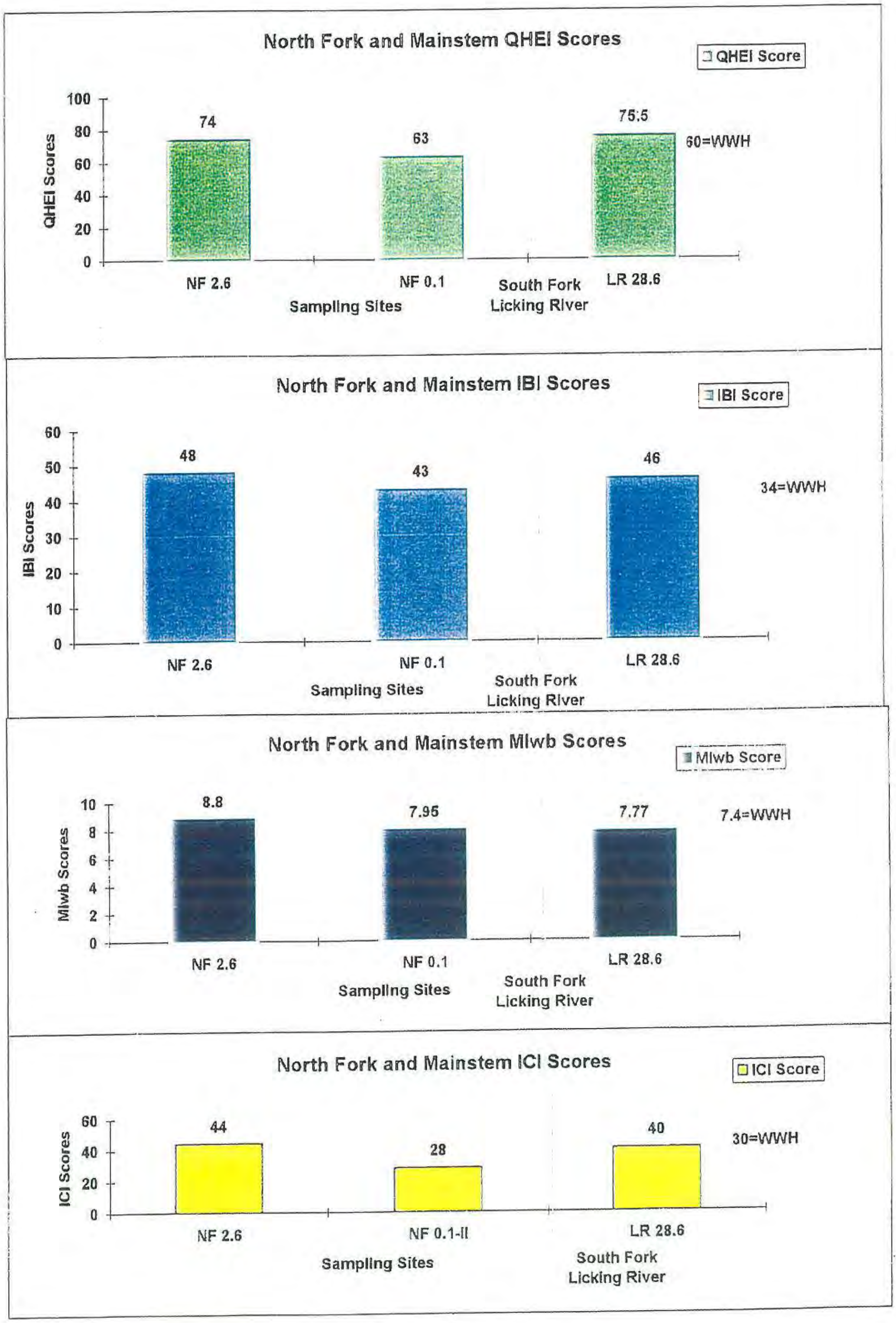


Figure 2-8 is the same as Figure 4.3 in the Enviroscience Aquatic Survey of the Licking River.

Figure 2- 9
North Fork Sampling Locations

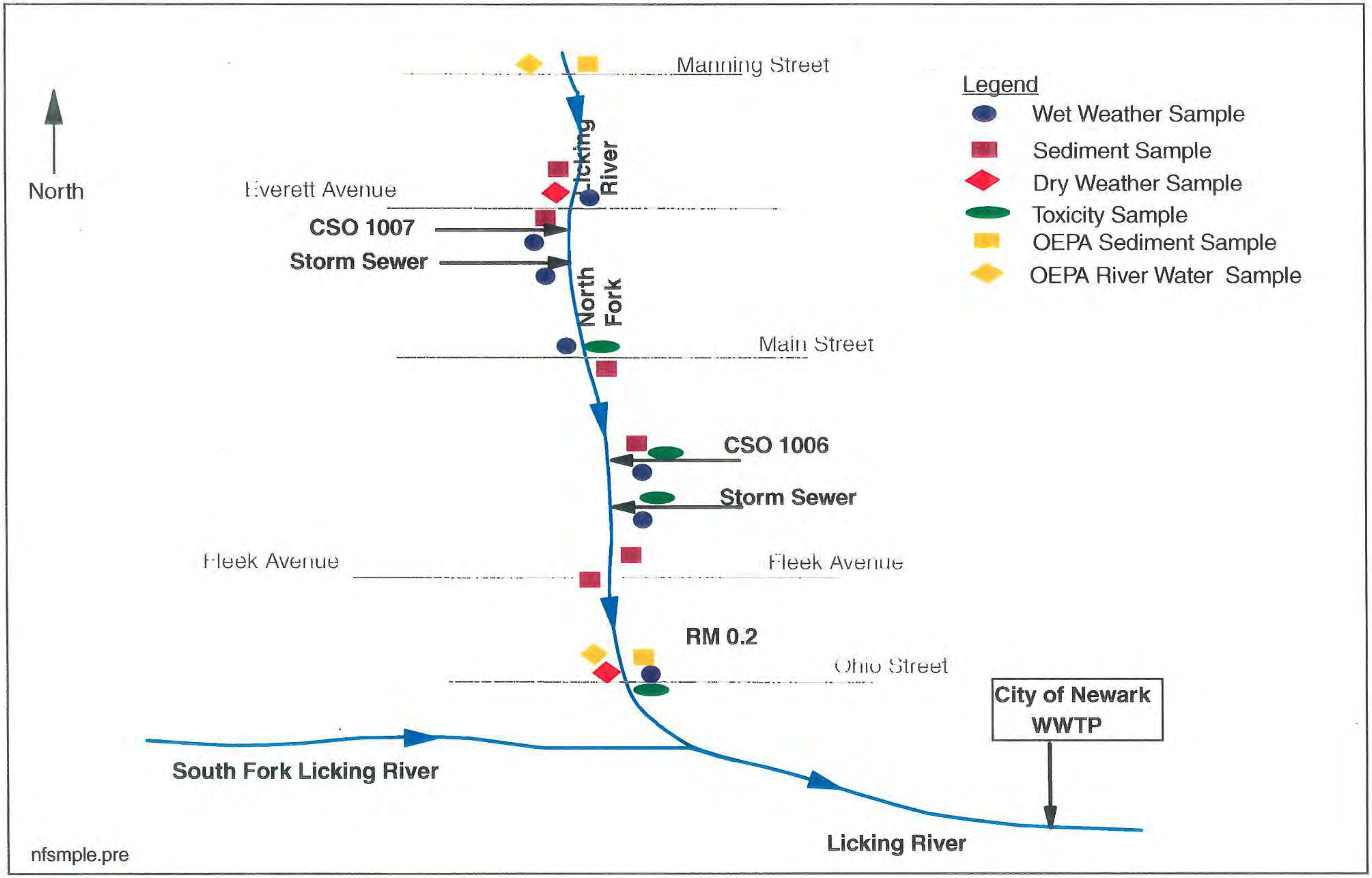


Figure 2-10
Newark CSO Long Term Control Plan
Additional NFLR Sampling 4/15/98
Sediment Samling

Parameter	Sediment Quality Standard					OEPA	Sample Location (3)					
	Kelly-Hite (6)			Canadian (5)		1993	NF US 7	CSO 7	NF US 6	CSO 6	NF DS 6	NF DS 6
	Normal	Slight	High	Low	High	RM 1.6					Fleek&Ohio	RR&Fleek
Acenaphthacene									<1.0			<1.0
Acenaphthene									<1.0			<1.0
Anthracene				0.22	37	<0.5			<1.0			<1.0
Benzo(a)anthracene				0.32	148	<0.5			<0.15			<0.15
Benzo(a)pyrene				0.37	144	<0.5			<0.3			<0.3
Benzo(b)pyrene									<0.3			<0.3
Benzo(k)fluoroanthene				0.24	134	<0.5			<0.3			<0.3
Benzo(g,h,i)perylene				0.17	32	<0.5			<1.0			<1.0
Chrysene				0.34	46	<0.5			<5.0			<5.0
Dibenzo(a,h)anthracene									<0.3			<0.3
Fluoranthene				0.75	102	<0.5			1.163			1.216
Fluorene									<1.0			<1.0
Ideno(1,2,3-c,d)pyrene				0.2	32	<0.5			<0.3			<0.3
Naphthalene									<1.0			<1.0
Phenathrene				0.56	95	<0.5			<1.0			<1.0
Pyrene				0.49	85	<0.5			1.046			1.001
PCB-1242									<0.002		<0.002	
PCB-1254									<0.002		<0.002	
PCB-1221									<0.002		<0.002	
PCB-1232									<0.002		<0.002	
PCB-1248									<0.002		<0.002	
PCB-1260				0.005	2.4				<0.002		<0.002	
PCB-1016									<0.002		<0.002	
4,4-DDT									0.496			<0.04
Aluminum							3,400	5,050	2,860	1,320	4,180	1,840
Magnesium							12,000	18,800	10,000	12,100	13,700	10,700
Mercury	<0.25	0.25-0.4	>0.4	0.2	2.4		0.06	2.7	0.04	0.07	0.11	0.02
Cadmium	<1.8	1.8-2.6	>2.6			0.5	0.9	8.0	0.7	0.7	1.0	0.5
Chromium	14-30	30-38	>38			11.2	5.0	31.9	3.9	5.6	6.4	3.3
Copper	<100	100-150	>150	16	110	16.3	18.8	139.0	13.1	59.8	36.4	12.6
Nickel						13.4	18.9	34.8	15.7	12.9	19.3	12.2
Lead	16-100	100-150	>150			16.2	25.0	313.0	19.1	32.8	38.8	15.2
Zinc	50-175	175-250	>250			82.5	76.2	640.0	62.4	92.5	179.0	42.6
Arsenic	<27	24-41	>41			15.4	8.0	9.3	6.1	2.3	8.0	3.5
Selenium							0.2	1.5	0.1	0.1	AA	0.1
Molybdenum							4.0	15.6	3.0	4.4	4.4	2.3
Thallium							0.3	0.8	0.2	0.1	AA	0.1

Notes
1. All values in mg/kg
2. Blank space indicates sample was not collected and analyzed.
3. Main St. sample collected from East bank NFLR; Fleek and Ohio sample collected from the West bank of the NFLR; Fleek and RR - East bank of the NFLR.
4. AA - Below Detection
5. Canadian Sediment Quality Guidelines: Low = lowest effect level; high = severe effect level based on 10% total organic carbon.
6. Sediment classification system by Kelly and Hite (1984): Slight = slightly elevated, high = highly elevated.

Location Definition
NF US 7 = North Fork Upstream CSO 1007
CSO 7 = Sediment in CSO 1007 Structure
NF US 6 = North Fork Upstream CSO 1006
CSO 6 = Sediment in CSO 1006 Structure
NF DS 6 = North Fork Downstream CSO 1006

Figure 2-11
Newark CSO Long Term Control Plan
Additional NFLR Sampling
Wet Weather River Sampling, 1.3 inches on 4/16/98

	Units	Water Quality Std.		Location						
		Max.	30-day	NF US 7	CSO 7	STM 7	NF US 6	CSO 6	STM 6	NF DS 6
CBOD	mg/l			5.4	29.8	3.0	8.0	108.3	26.3	5.3
SS	mg/l			136	559	5	141	415	178	120
TKN	mg/l			1.6	4.3	0.2	1.6	19.2	2.6	1.3
Fecal	col/100ml	2,000	1,000	NS	**13,650**	**10,650**	NS	TNTC	**19,900**	NS
Aluminium	ug/l			1,952	4,198	AA	2,208	2,604	1,545	2,133
Magnesium	ug/l			14,225	16,400	27,800	14,575	6,675	3,360	15,075
Mercury	ug/l	1.1	0.2	AA	0.4	0.1	0.2	0.6	0.2	AA
Cadmium	ug/l	12	2.4	1.9	3.0	1.4	1.9	1.5	2.4	2.1
Chromium	ug/l	3,200	370	AA	1.3	1.4	1.3	3.2	0.1	AA
Copper	ug/l	36	22	10.2	**47.0**	4.2	11.9	**77.5**	25.8	11.6
Nickel	ug/l	2,900	320	6.8	26.5	9.5	8.0	18.6	8.8	5.1
Lead	ug/l	320	17	6.2	96.8	19.0	15.2	74.5	61.5	3.3
Zinc	ug/l	210	190	51	**288**	8	51	**285**	161	48
Arsenic	ug/l	360	190	2.8	9.3	0.6	3.8	2.7	2.7	3.0
Selenium	ug/l	20	5	AA	1.6	1.2	1.0	0.4	1.1	2.8
Molybdenum	ug/l			AA	10.7	15.8	13.6	20.1	6.0	11.0
Thalium	ug/l	71	16	AA	0.8	2.5	1.1	AA	1.6	1.5

Aquatic standards based on hardness of 200 mg/l CaCO3
Values are an average of the first 5 samples collected.
AA - Below dection limit
NS - No Sample collected
Corresponds to sample collected in North Fork Licking River.
NF US 7 = North Fork river sample Upstream CSO 1007 (ref. Figure 2-9)
CSO 7 = CSO 1007 Discharge Sample (ref. Figure 2-9)
STM 7 = Storm sewer discharge sample near CSO 1007 (ref. Figure 2-9)
NF US 6 = North Fork river sample Upstream CSO 1006 (ref. Figure 2-9)
CSO 6 = Sediment in CSO 1006 Structure (ref. Figure 2-9)
STM 6 = Storm sewer discharge sample near CSO 1006 (ref. Figure 2-9)
NF DS 6 = North Fork river sample Downstream CSO 1006 (ref. Figure 2-9)

Figure 2-12
Newark CSO Long Term Control Plan
Additional NFLR Sampling 5/18/98
Background River Water Samples

	Units	Aquatic Standard		Location	
		Max.	30-day	NF US 7	NF DS 6
CBOD	mg/l			4.2	3.7
SS	mg/l			2.4	2.4
TKN	mg/l			0.4	0.5
Aluminium	ug/l			43	26
Magnesium	ug/l			25,820	26,180
Mercury	ug/l	1.1	0.2	0.8	0.4
Cadmium	ug/l	12	2.4	1.1	1.1
Chromium	ug/l	3,200	370	1.2	0.6
Copper	ug/l	36	22	4.0	4.8
Nickel	ug/l	2,900	320	6.2	5.0
Lead	ug/l	320	17	12.2	14.1
Zinc	ug/l	210	190	6.6	13.9
Arsenic	ug/l	360	190	0.9	2.5
Selenium	ug/l	20	5	0.1	0.0
Molybdenum	ug/l			9.6	5.1
Silver	ug/l	5.3	1.3	1.0	1.1
Thalium	ug/l	71	16	3.3	0.5

Aquatic Standard based on hardness of 200 mg/l CaCO3
Values represent an average of all five collected samples.
NF US 7 = North Fork river sample Upstream CSO 1007 (ref. Figure 2-9)
NF DS 6 = North Fork river sample Downstream CSO 1006 (ref. Figure 2-9)

Figure 2-13
Newark CSO Long Term Control Plan
Toxicity Sampling
Wet Weather Event 6/12/98, 0.54 inches of Rain

Parameter	Aquatic Standard		Sample Location			
	Max.	30-day	NF US 6 Main St.	CSO 6	CSO 6 Storm	NF DS 6 Ohio St.
Organics (mg/l)						
Suspended Solids			116	124	26	120
5day CBOD			4.3	11.6	3.5	4.6
TKN			0.2	2.4	0.7	0.6
Fecal Coliform (col./ml)				22,000		
Metals (ug/l)						
Aluminum			1,190	827	360	904
Magnesium			21,600	2,790	860	18,100
Mercury	1.1	0.2	AA	AA	AA	AA
Cadmium	12	2.4	1.3	0.5	0.7	1.3
Chromium	3200	370	3.2	2.4	2.1	3.2
Copper	36	22	7.6	22	6.5	9.0
Nickel	2900	320	11.5	8.9	6.3	11.5
Lead	320	17	20	28	16	20
Zinc	200	190	41	81	37	44
Silver	5.3	1.3				
Arsenic	360	190	1.7	2.3	0.6	1.8
Selenium	20	5	3.3	2.0	3.1	8.9
Molybdenum			10.6	29	16	1.0
Thallium	71	16	AA	AA	AA	AA
Acute Toxicity (% Surviving 96 Hours)						
Water Flea			100	100	100	80
Fathead Minnow			94	96	90	94
Chronic Toxicity (% Surviving 7 Days)						
Water Flea			100	100	100	100
Fathead Minnow			74	94	82	63

Notes
1. All units as noted.
2. Blank space indicates sample was not collected and analyzed.
3. Aquatic Standard based on hardness of 200 mg/l $CaCO_3$

Figure 2 - 14
Fecal Coliform Stream Sample Data

Dry Day Analysis

Location/Sample Site	June Data Geometric Mean	June Data Samples >2000	June Data Percent >2000	July Data Geometric Mean	July Data Samples >2000	July Data Percent >2000	All Data Geometric Mean	All Data Samples >2000	All Data Percent >2000
Upstream CSOs									
North Fork Licking	116	0	0	123	1	5	117	0	0
South Fork Licking	84	0	0	245	1	5	106	0	0
Raccoon Creek	298	0	0	165	1	5	262	0	0
Downstream CSOs									
Upstream WWTP	243	0	0	278	3	14	251	0	0
Water Quality Std.	1,000		10%	1,000		10%	1,000		10%

Dry days do not include day of rainfall or two days after rainfall.

Dry and Wet Day Analysis (All Sample Data)

Location/Sample Site	June Data Geometric Mean	June Data Samples >2000	June Data Percent >2000	July Data Geometric Mean	July Data Samples >2000	July Data Percent >2000	All Data Geometric Mean	All Data Samples >2000	All Data Percent >2000
Upstream CSOs									
North Fork Licking	377	2	14	365	1	14	374	3	14
South Fork Licking	312	2	15	430	1	14	344	3	15
Raccoon Creek	530	3	21	468	1	14	512	4	19
Downstream CSOs									
Upstream WWTP	806	4	29	1,226	3	43	909	7	33
Water Quality Std.	1,000		10%	1,000		10%	1,000		10%

Typical 30-Day Period - Recreational Season

Location/Sample Site	June Data Geometric Mean	June Data Samples >2000	June Data Percent >2000	July Data Geometric Mean	July Data Samples >2000	July Data Percent >2000	All Data Geometric Mean	All Data Samples >2000	All Data Percent >2000
Upstream CSOs									
North Fork Licking	235	2	7	166	1	5	201	3	6
South Fork Licking	210	2	7	287	1	5	242	3	6
Raccoon Creek	442	3	11	224	1	5	326	4	8
Downstream CSOs									
Upstream WWTP	490	4	15	437	3	14	465	7	14
Water Quality Std.	1,000		10%	1,000		10%	1,000		10%

(shaded) Sample value exceeds Water Quality Standard

Dry days do not include day of rainfall or two days after rainfall.

Figure 2-15
North Fork and Mainstem QHEI Scores

Metric	NF-2.6	NF-0.1	LR-28.6	Maximum
1. Substrate	15	15	15	20
2. Instream Cover	13	7	13	20
3. Channel Morphology	14	11.5	15.5	20
4. Riparian Zone	8.5	6.5	9	10
5a. Pool Quality	10	9	8	12
5b. Riffle Quality	5.5	4	5	8
6. Gradient	8	10	10	10
Total	74	63	75.5	100

Notes:
1. QHEI scores > 60 are expected to sustain fish and macroinvertebrate populations representative of WWH.
2. Figure 2-15 is the same as Table 3.9 in the Enviroscience Aquatic Survey of the Licking River.

Figure 2-16A • Photos of North Fork Licking River

NFLR at Fleek Avenue, Looking North, Railroad Bridge in Background

Above and at Right: NFLR at Fleek Avenue, Looking South, Ohio Street Bridge in Background

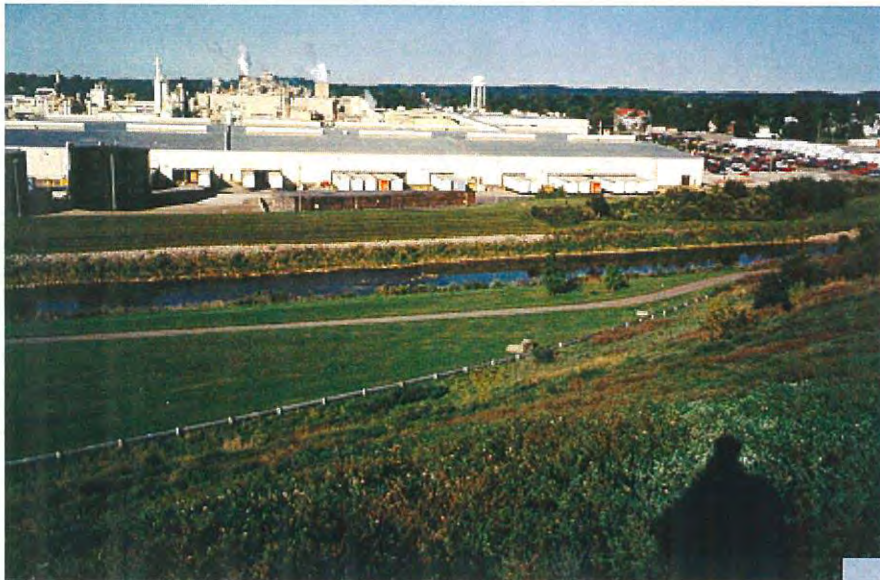
Figure 2-16B • Photos of North Fork Licking River

NFLR at Everett Avenue, Looking South, Everett Avenue Bridge in Background

NFLR at Everett Avenue, Looking North from Everett Avenue Bridge

Below: NFLR at Main Street, Looking South, Main Street Bridge Shown

Figure 2-16C • Photos of North Fork Licking River



NFLR between Everett Avenue and Manning Street. Looking Southeast with Owens Corning Fiberglass in background.

CHAPTER 3

3.1 Long-term Control Plan Approach

The development of Long Term Control Plan (LTCP) alternatives requires a complete understanding of the receiving stream's aquatic life designation, current water quality and operation of the sewer system. An understanding of the aquatic life designation and water quality in the North Fork Licking River (NFLR) as well as how the combined sewer system operates is provided in Chapter 2.

As concluded in Chapter 2, the Newark combined sewer system does not cause or significantly contribute to water quality violations. This conclusion means that the City of Newark is a "Case 1" community as defined in the Ohio EPA's March 1995, Ohio CSO Strategy. As stated in the strategy, characterization and monitoring of the collection system and overflows and implementation of the nine minimum controls may be an adequate long-term control plan.

The City of Newark's effort to characterize its combined sewer system is summarized in Chapter 2. Since Chapter 2 has shown that discharges from the City of Newark's Combined Sewer system are not causing water quality impacts, the City's Combined Sewer System Long Term Control Plan is already in compliance with the **"Demonstration Approach"** of the National CSO Policy. This chapter will therefore develop the methods the City will use to monitor and maintain water quality in Newark area receiving streams.

3.1.1 Long Term Control Plan Goals

The City's NPDES permit states "the goal of the plan is that discharges from combined sewer overflows shall not cause or significantly contribute to violations of water quality standards or impairment of designated uses."

Since water quality standards are being met in the Newark area, the goal of the City of Newark's Long Term Control Plan is to "protect" existing water quality. Therefore, the CSO Control Alternatives to be evaluated will have the following objectives:

- Monitor the Combined Sewer System to detect changes that may be due to new users, developments or maintenance problems that could result in water quality impacts.
- Monitor the receiving water to detect any water quality degradation as measured by the aquatic life standards.

Although the focus of concern had originally been the North Fork of the Licking River, the monitoring and maintenance alternatives will focus on protecting water quality of all streams receiving CSO discharges.

3.2 General Considerations

3.2.1 Nine Minimum Controls

The implementation of each of the Nine Minimum Controls (NMCs) is summarized in Chapter 2. A complete description of the NMCs can be found in the City of Newark's *Combined Sewer System Operation & Maintenance Plan* dated May 1996.

The City of Newark's Nine Minimum Controls will be the primary tool for protecting water quality and thus are at the center of the City of Newark's Long Term Control Plan. This chapter will review additional Pollution Prevention activities (Minimum Control No. 7) and Best Management Practices (BMPs) that can reduce pollution and help protect water quality.

3.2.2 Public Participation

In order to include public opinions and concerns in the Long Term Control Plan (LTCP) process, two phases of public participation were completed. Each phase consisted of a public meeting with a question and answer period to allow for public comment and input. The first phase occurred early in the development of the LTCP. The purpose of the meeting was to present a summary of the receiving stream water quality and the sewer system characterization data. This information was used to inform the public of the condition of the receiving waters and the impact of CSOs on the receiving waters. The characterization data along with public response was used to guide the development of LTCP alternative(s). At the second phase meeting, the alternatives developed, their costs and the recommended alternatives were presented.

Public Meeting No. 1

The first public meeting was held on May 11, 1998 in the council chambers of the Newark City Hall in downtown Newark. At this meeting, a presentation was made to the Service Committee and the general public of the status of the receiving waters in the City of Newark and the characteristics of the Newark combined sewer system.

In order to increase public attendance at the meeting, letters of invitation were sent to individuals and/or groups that had expressed interest in the water quality of the Licking River in the past. In addition, the meeting subject matter was discussed by the City on WCLT during a weekly radio interview. A copy of the memorandum to the Mayor, memorandum to the Service Committee, letter of invitation, meeting minutes and a follow-up newspaper article are included in Appendix I. The meeting minutes include the meeting agenda, attendance list, presentation materials and questions and answers discussed at the meeting.

During the question and answer period after the presentation, public discussion involved basement flooding after rain events, fecal coliform concentrations downstream of the City near Dillon Reservoir and public notification of CSO events. The questions were addressed in the following manner.

- **Basement flooding:** During the meeting, a question was raised regarding the impact of the Long Term Control Plan on flooded basement problems in a specific part of the City. Since this question could not be completely answered at the meeting, additional investigation was done later. The area of basement flooding was investigated and found to be served by a separate sewer system. Thus the flooded basements were not caused by wet weather flow in the combined sewer system and were therefore not included in any LTCP alternative.

- **Fecal coliform downstream of Newark at Dillon Reservoir:** During the meeting, representatives of the Dillon Advisory Council asked about the impact of the Long Term Control Plan on fecal coliform concentrations at Dillon State Park beach. The recent Fecal Coliform Sampling Program performed by the City did not collect data from downstream of the WWTP. However, samples were collected upstream and downstream of all CSOs. The results from the sampling showed that, during dry weather, water quality standards were met at all locations. During wet weather, all sampled locations experienced elevated levels for short periods and did not adversely impact water quality. It was also noted that other sources of bacteria likely exist. Bacteria in Dillon Reservoir could be due to runoff associated agricultural areas downstream of Newark and with failing septic systems. This issue was investigated further as discussed later in this Chapter.

- **Public notification of CSOs:** A question was raised at the meeting regarding public notification of combined sewer overflow discharges. It was explained that public notification is one of the required Nine Minimum Controls and had been included in the City's Combined Sewer System Operational Plan. After discussion with local health officials, the City had installed signs at each combined sewer outfall advising people to avoid contact with discharges from the CSO.

The response from the Public Meeting No.1 covered three basic areas, flooded basements, fecal coliforms and public notification. The flooded basement issue turned out to be a separate sewer system issue and thus did not impact alternative development. The fecal coliform concern was raised regarding a bathing beach 15 miles downstream. Although it is not believed that Newark CSOs have a significant impact at that location, this concern was considered during the development of LTCP alternatives. Public notification is currently addressed in the City's *Combined Sewer System Operational & Maintenance Plan*.

Public Meeting Number 2

A second public meeting was held on August 10, 1998 in the council chambers of the Newark City Hall in downtown Newark. At this meeting, a presentation was also made to the Service Committee and the general public. The purpose of this meeting was to present additional sampling and analysis data collected since the first public meeting, to present the LTCP alternatives, to discuss the selection process and to present the recommended LTCP.

As with the first meeting, letters of invitation were sent to individuals and/or groups that have expressed interest in the preservation of the Licking River in the past. In addition, the meeting subject matter was broadcast on local radio stations (WCLT and WHTH) and an article was included in a local newspaper. A eopy of a typical letter of invitation, the newspaper article, and the meeting minutes are included in Appendix J. The meeting minutes include the meeting agenda, the meeting attendance list, the presentation materials and questions and answers discussed at the meeting.

During the question and answer period of the presentation, public comments centered around the overlap in City funding of the Long Term Control Plan while the City considers developing a possible stormwater utility or other stormwater management program. The questions were addressed in the following manner.

- **Funding - WWTP vs. Stormwater Utility:** It is likely that the EPA will require some very specific information in a Stormwater permit and the information collected for the Long Term Control Plan may not satisfy EPA needs since the permits are completely separate. The continued monitoring of the rivers for the Combined Sewer Overflow Long Term Control Plan will, to some extent, be useful for the Stormwater Utility since both CSOs and stormwater discharges contribute to the Water Quality in Newark. However, the CSO program is only concerned with stormwater from the CSO area while the Stormwater Utility will deal with stormwater from the separate areas and the entire City as well. The Stormwater Utility can probably use the same type of Best Management Practices used in the Long Term Control Plan.

The results of Public Meeting No. 2 did not result in any concern with the recommended LTCP alternatives nor their scope. There was no disagreement on the alternatives recommended for implementation. There was concern raised regarding costs related to the development of a stormwater management program. However, it was concluded that whatever shape the future stormwater management program may take, the LTCP would still have to be in place as currently proposed.

3.2.3 Ohio EPA Coordination

The regulatory agency for the Newark Combined Sewer System Long Term Control Plan is the Ohio Environmental Protection Agency, Central District Office (CDO). During the development of the Long Term Control Plan, the CDO was kept informed of project milestones and their input was received at several key stages of the project.

Background Conditions and NPDES Permit

The Ohio EPA provided initial guidance for this project in two ways. First, they provided significant water quality data in their 1995 study, *Biological and Water Quality Study of the Licking River and Selected Tributaries.* This study concluded that all of the streams in the Newark area were in attainment of their water quality standards, except the lower reaches of the North Fork Licking River. This section was only in Partial Attainment of its standards due to low macroinvertebrate scores, although the fish in the section were excellent.

Secondly, the agency used the data from their 1995 study and implementation of their March 1995 Ohio CSO Strategy to develop the CSO requirements included in the City of Newark NPDES permit. One of these requirements was the development of a Combined Sewer System Long Term Control Plan. The agency also noted that the specific area of concern regarding CSO discharges was the North Fork of the Licking River.

Sampling Plan and Public Participation

The agency's input was also requested on several key LTCP issues. During the planning of the "System Characterization," sampling plans were prepared for both the sewer characterization (CSO flow monitoring and sampling) and the receiving water characterization (aquatic life sampling). The CSO flow monitoring and sampling plan was submitted in February 1996 and the aquatic life sampling plan was submitted in January 1997. These plans were submitted for the Ohio EPA's review and comment. A meeting was held at the Ohio EPA Central District Office to discuss the aquatic life sampling plan prior to its start. A summary of this meeting is provided in Appendix K.

The Ohio EPA was also contacted prior to the Public Participation phase of the project. The agency provided guidance and suggestions regarding the meeting's advertisement and location. The selection of the Service Committee as the vehicle of getting public participation was due to input from the Ohio EPA.

3.2.4 Sensitive Areas

In the Ohio EPA's March 1995 CSO Control Strategy, three types of receiving waters were identified as governing the content of a LTCP. These waters were:

- State Resource Waters
- Bathing Waters
- Surface Waters withing 500 yards of a Public Water Supply

The concern with these types of waters is consistent with the definition of "sensitive areas" found in the August 1995 United States Environmental Protection Agency publication, *Combined Sewer Overflows - Guidance for Long Term Control Plan,* repeated below for reference.

"...Outstanding National Resource Waters, National Marine Sanctuaries, waters with threatened or endangered species and their habitat, waters supporting primary contact recreation (e.g., bathing beaches), public drinking water intakes or their designated protection areas, and shellfish beds."

In the USEPA document, the concern with "primary contact" was identified as "bathing beaches," similar to the Ohio EPA's area of concern. Since Newark CSOs do not discharge to these sensitive areas, it is classified as a Case 1 CSO community as defined by the Ohio EPA CSO Control Strategy.

However, as discussed previously, during the Public Participation phase, concerns were raised about the impact of Newark CSOs on the Dillon State Park bathing beach, 15 miles downstream. Although it is believed that Newark CSOs discharges do not significantly impact the bathing beach, the concern was investigated as part of the Long Term Control Plan. The recreational uses of the streams in the Newark area are discussed in more detail later in this chapter.

Several sources of data regarding fecal coliform concentrations in the Dillon Reservoir and upstream areas were found. These sources are listed below and a summary of the conclusions gained from each source follows:

- The City of Newark's 1996 Fecal Monitoring Study (Appendix H)
- Ohio EPA sampling in 1993 (included in their 1995 *Biological and Water Quality Study of the Licking River and Selected Tributaries*)
- May 1994 report on the Dillon Lake Watershed Protection Project, Muskingum County, Ohio (Appendix L)
- Ohio Department of Natural Resources (ODNR) data including beach posting and closure records for the Dillon State Park Beach (1993 - 1997)

As part of the City's 1996 Fecal Coliform Study, fecal coliform samples were collected from the Raccoon Creek, the North Fork, the South Fork and the Licking River Mainstem upstream of the City of Newark WWTP discharge. The conclusions from this sampling are discussed in Chapter 2 and pertain to streams in the City of Newark subject to CSO discharges. Although the City's study did not address fecal coliform concentrations downstream of the City, the observation that wet weather fecal coliform concentrations through the City were relatively low is significant when considering downstream impacts.

The Ohio EPA sampled the Licking River from Newark to Dillon Reservoir in 1993. However the sampling was not directly correlated to rainfall nor was the sampling sufficient to apply the Ohio water quality standard for fecal coliforms. A review of the data shows the potential for high concentrations of fecal coliforms (> 2,000 per 100ml) during wet weather between Newark and the Dillon Reservoir.

Although the Ohio EPA did not identify sources of fecal coliforms downstream of Newark, the 1994 report prepared by the Muskingum County Soil and Water Conservation District identified several feedlots that had no waste management facilities in the watershed. At least one of these feedlots has been contacted by the Ohio EPA for potential violations. It is likely that these feedlots are a significant source of fecal coliforms detected at the Dillon State Park beach.

A review of the Ohio Department of Natural Resources data was inconclusive since the samples are only collected once a month unless elevated levels are found and, more importantly, because the sampling is not timed to correspond to rain events. In every year reviewed (1993-1997), elevated fecal coliform levels were found. However, in only one year (1994) was the beach posted with a warning of elevated bacteria levels. The Dillon State Park manager stated that the beach has never been closed due to bacteriological readings. The manager stated that the most common reason to close the beach is flood debris, primarily washed down trees and branches.

The results of this research confirmed that Dillon State Park beach does experience elevated levels of bacteria during rain events. It also confirmed the existence of fecal coliform sources downstream of the City of Newark capable of causing fecal coliform water quality violations. This analysis was unable to determine whether Newark CSOs contribute to bacteria levels at the beach, although it is considered unlikely due to the distance between Newark and Dillon. Thus a fecal monitoring plan will be proposed in the LTCP to measure bacteria levels between the City of Newark and the Dillon State Park beach.

Existing Recreational Uses of Newark Area Streams

From observations during the aquatic life stream survey, as well as the knowledge of local officials, the existing recreational use of the receiving waters in the Newark area are primarily fishing and wading. This is due primarily to the shallow nature of the streams, which typically average less than 15-inches. However, there are a few naturally occurring pools where swimming and full-body contact does occur. Below is a summary of the use of each receiving stream in thc CSO area:

South Fork

- South Fork from Orchard St. to the confluence with Raccoon Creek: No public parks exist, but access can be gained from private property. Some pools exist where occasional swimming is known to occur near Raccoon Creek. Fishing is the primary use of the stream.
- South Fork Betwcen Raccoon Creek and the confluence with the North Fork: This section is channelized from flood control work performed in the 1940s. No public parks exist, but access can be gained from private property. Fishing is the primary use of the stream.
- South Fork at Denman Park: Access to the river is possible from this park. Use of the stream is primarily fishing and wading.

North Fork (This section is channelized due to flood control work completed in 1941 and expanded in 1988; See Figures 2-16A, B, and C).

- North Fork from Manning St. to Everett Park: Fishing and wading are primary uses of the stream, especially at the park.
- North Fork from Everett Park to the confluence with South Fork: This section is heavily urbanized and has only one small park (Town Commons). The stream receives little or no recreational use here.

Raccoon Creek

- Raccoon Creek from 30th Street to the confluence with South Fork: No public parks exist, but access can be gained from White Field, YMCA property and State Route 79 bridge. Use of the stream is primarily fishing.

Licking River Mainstem

- Licking River from Confluence to WWTP: Edwards Park/Babe Ruth Field is used primarily for baseball, with little focus on the use of the river. A future park is planned in for this area, although no details are available.

The recreational uses of the streams in the Newark area include no bathing beaches or other sensitive uses. However, the streams are accessible and are used for fishing and wading, with some isolated locations where swimming can occur. As discussed in Chapter 2, Newark CSOs are not a pervasive threat to these recreational uses and no Long Term Control Plan alternatives were developed to address them.

3.3 Development of Alternatives

Based on the understanding of the Newark combined sewer system and receiving water quality outlined in Chapter 2 and the additional considerations discussed above, alternatives were developed that focused on two identified areas of concern:

1. Protection of existing water quality attainment (Aquatic Life)
2. Downstream fecal coliform concentrations

To address these concerns, the following alternatives were evaluated:

1. Best Management Practices
2. Continued Monitoring

In addition to these alternatives, CSO reduction and elimination alternatives (Collection System Controls) were reviewed. Since no water quality impacts were found, these Collection System Control alternatives were not recommended. However they are useful for comparison purposes since they define the extent of investment required to reduce or eliminate overflows to the North Fork from CSOs 1006 and 1007.

Details of each alternative considered are discussed below.

3.3.1 Best Management Practices

Best Management Practices (BMPs) were considered for the City of Newark as a Long Term Control Plan alternative due to their ability to reduce pollution at a relatively low cost. Although the City has no need to reduce CSO pollution now, it is recognized that there will be changes by the citizens of Newark in where they live, how they make their living, and how they use the land in the watershed. Any changes in people's habits, lifestyles, etc. will have an impact on Newark's streams. BMPs can inform and educate the public about CSOs, storm sewers and their impact on water quality. BMPs are an inexpensive way to be proactive in protecting water quality.

Two BMPs considered for the City of Newark were public education and storm drain stenciling. Several other BMPs were considered but were screened out due to their difficulty in implementation, their high/unknown costs or their inapplicability to combined sewer overflows. BMPs that fell into these categories included community group development, homeowner hazardous waste surveys, industrial pretreatment practices review (already part of the Nine Minimum Controls), and stream corridor/riparian area restoration.

Public Education

As part of this BMP, activities will be sponsored and/or supported by the City to educate and inform the public about environmental issues, combined sewer systems, stormwater and water quality issues. To further implement this BMP, the City will also distribute brochures and pamphlets to the public at fairs, schools and community activities. These brochures will pertain to environmental issues, especially water quality. This BMP will be an expansion of activities currently being implemented by the City as part of the Nine Minimum Controls.

Storm Drain Stenciling

This BMP is targeted at the general public also. It involves installing warning signs on storm drain catch basins in both combined and separately sewered areas. The purpose of the signs is to remind the public that materials disposed of in the storm drain catch basins are directly discharged to the river. An example of a typical storm drain stencil is provided in Figure 3-1.

3.3.2 Continued Monitoring

Continued monitoring activities will evaluate water quality and increase the knowledge and understanding of how the collection system operates. Continued monitoring activities include collection system flow monitoring, receiving stream aquatic life sampling and receiving stream fecal coliform bacteria sampling.

Flow Monitoring

This activity will use existing flow monitoring equipment to monitor flows within the combined sewer collection system, continuing the extensive characterization work started to develop this plan. All CSOs will be monitored on a biannual basis (once every two years). Each year, fifteen CSOs will be monitored in groups of five. Each group will be monitored for four months each year.

Periodic Aquatic Surveys

Historically, the Ohio EPA has performed aquatic surveys of the Licking River and its tributaries in the Newark area approximately every five years. These surveys have been extremely important in documenting water quality problems as well as improvements and successes. When necessary, as during the development of the Combined Sewer System Long Term Control Plan, the City will supplement the Ohio EPA's sampling with its own. This alternative proposes continuing this practice of using the Ohio EPA stream sampling program, supplemented where necessary to perform aquatic surveys of the Licking River every five years.

Bacteria Sampling

In response to concerns raised during the Public Participation portion of the Long Term Control Plan process, an alternative to study downstream bacteria concentrations is proposed. The primary purpose of the study is to determine if bacteria from Newark CSOs are a significant portion of the bacteria currently found in the downstream Dillon Reservoir. Since there are several known sources of bacteria in the Licking River watershed between the City of Newark and Dillon Reservoir, this sampling will be helpful in defining the impacts of these various sources. The proposed sampling will determine the travel time between the City and Dillon Reservoir, potential bacteria sources by tributary area and land use analysis, and estimate bacteria decay.

3.3.3 Collection System Controls

In typical Long Term Control Plans, alternatives for eliminating or reducing CSOs are viable alternatives. However, as discussed previously, Newark is a Case 1 CSO Community as defined by the Ohio EPA and thus these alternatives are not required. Although not required, these alternatives are useful in that they place the cost of the alternatives considered into perspective, i.e., how do the recommended costs compare to the cost of eliminating or reducing the CSO.

The collection system control alternatives discussed are capital-cost intensive projects that reduce or eliminate CSO frequency, volume, and pollution loading to the river. Collection system control alternatives were classified as those that either reduce or eliminate CSO discharges.

3.3.3.1 Reduced CSO Discharge to the NFLR

The goal of these alternatives was to reduce CSO discharges to the North Fork Licking River (NFLR) by providing storage in the system. Two methods were analyzed, one assumed existing trunk system capacity (In-Line) could be used for storage and the other assumed new storage tanks (Off-Line) would be constructed. The In-Line alternative was limited in the amount it could store by the hydraulics and size of the existing trunk sewers. The storage tank alternative would provide primary treatment (30 minutes detention timc) to all CSO discharge volume.

In-Line Storage for Reduced CSO Discharge

This alternative assumed flow restriction devices or regulators would be installed in the combined sewer system upstream of CSOs 1006 and 1007 to increase system storage. A computer model simulation was used to estimate the storage available in the existing trunks sewers without creating street or basement flooding conditions.

The controls would be operated such that dry weather flow (DWF) would pass through the control structure and onto the treatment plant. During wet weather, as flow increased, the wet weather flow (WWF) would be restricted by a regulating device (e.g., a sluice gate or vortex regulator). This would artificially raise the hydraulic gradeline and store flow in the trunk. These controls would be monitored to ensure that the water elevation in the sewers remained below predetermined elevations (typically basement elevations). As shown in Figure 3-2, this alternative would result in an annual volume reduction of 7,288,000 gallons or 23% of the existing overflow volume to the NFLR. The frequency of CSO activation would also be reduced from 94 events per year to 21 per year.

Off-Line Storage for Primary Treatment

This alternative proposed constructing off-line storage basins near CSOs 1006 and 1007 to provide primary treatment for all WWF prior to discharge to the NFLR. It was assumed that covered basins could be constructed near CSOs 1006 and 1007 and that the combined sewer flow entering the basins would be provided with 30 minutes of detention prior to discharge to the river. In addition to providing primary treatment, this alternative would also reduce the volume of overflow due to the storage provided in tanks. As shown in Figure 3-2, this alternative would provide a reduction in an annual CSO discharge volume of 14,889,000 gallons or 48% of the existing overflow volume to the NFLR. The frequency of CSO activation would also be reduced from 94 events per year to 21 per year.

3.3.3.2 Total CSO Discharge Elimination to the NFLR

The goal of these alternatives was to estimate the cost of eliminating CSO discharges to the North Fork Licking River (NFLR). This alternative included eliminating only CSOs 1006 and 1007 since these overflows account for over 90% of CSO discharge to the NFLR.

Two alternatives were analyzed to eliminate CSOs 1006 and 1007. One alternative assumed new off-line storage tanks could be constructed to hold WWFs until the treatment plant could handle them. The second assumed sewer separation projects would separate storm flow from sanitary flow. The sewer separation alternative was further broken down into use of new storm sewers or new sanitary sewers for separation. Note that the sewer separation option does not necessarily reduce flows to the NFLR. Instead, CSO discharge volumes become stormwater discharge volumes. As discussed in Chapter 2, storm sewer discharges do have pollutant loads.

Off-Line Storage for Elimination of CSOs 1006 & 1007

This alternative proposed construction of off-line basins near CSOs 1006 and 1007 to store all wet weather flows until the sewer system could transport the flows to the WWTP. This alternative assumed that covered basins could be constructed near CSOs 1006 and 1007 and that flows would be discharged back into the system within 24 hours. As shown in Figure 3-2, this alternative would result in the total elimination of discharges to the NFLR from CSOs 1006 and 1007.

Sewer Separation - New Sanitary Sewer for Elimination of CSOs 1006 & 1007

In this alternative, construction of a new sanitary sewer system upstream of CSOs 1006 and 1007 was proposed. In this alternative, it was assumed that the sanitary sewer would consist of 8, 10, 12, 15, 18 and 24 inch pipe installed next to the existing combined sewer. It was also assumed that the existing combined sewer would be converted to a storm sewer to convey all storm water presently collected in the combined sewer (storm drains, downspout, etc.) to the river. Sanitary flows would be removed from the existing combined sewer and discharged to the new sanitary sewer.

Although this alternative would eliminate all CSO discharge volume and associated pollutants to the NFLR from CSOs 1006 and 1007, it would also increase the storm sewer discharge volume. The existing combined sewer collection system currently transports approximately 83% of the wet weather infiltration and inflow (I/I) collected in the NFLR area to the WWTP for treatment (reference October 1997 *Sewer System Characterization Report North Fork Licking River*). As a result of sewer separation in this alternative, all of the currently captured wet weather I/I will be discharged to the receiving waters without treatment. The volumes shown in Figure 3-2 represent the reduction in CSO volume but they do not show the net increase in storm sewer volumes and associated pollutants.

Sewer Separation - New Storm Sewer for Elimination of CSOs 1006 & 1007

In this alternative, a new storm sewer would be installed upstream of CSOs 1006 and 1007. The existing combined sewer system would be used as the sanitary sewer. In this alternative, it was assumed that the new storm sewer would be the same size as the existing combined sewer and installed adjacent to it with a minimum depth of cover. Existing "clear water" sources, such as area drains and street curb inlets, would be connected to the new storm sewer.

As discussed above for New Sanitary Sewers, this alternative would eliminate all CSO discharge volume and associated pollutants to the NFLR from CSOs 1006 and 1007 but would also increase the storm sewer discharge volume.

3.4 Evaluation of Alternatives for CSO Control

3.4.1 Best Management Practices Costs

Best Management Practice labor costs were developed assuming a combination of City personnel and outside contractors provided the required services. Costs were also assumed for reproduction of education materials. The annual costs associated with each alternative are summarized in Table 3-1.

Table 3-1
Newark CSO
LTCP BMP Alternative Costs

Alternative	Project Cost ($/year)
Public Education	9,000
Storm Drain Stenciling	11,000
All Alternatives	20,000

3.4.2 Continued Monitoring Costs

Continuing monitoring costs were developed for each alternative. The costs are based on current sampling costs and are summarized in Table 3-2.

Table 3-2
Newark CSO
LTCP Continued Monitoring Alternative Costs

Alternative	Project Cost ($/year)
Annual Combined Sewer System Flow Monitoring	19,000
Aquatic Survey (Once Every 5 years)	12,000
Bacteria Sampling Downstream CSO Area (Total Cost $85,000)	17,000
All Alternatives	48,000

As seen in Table 3-2, the costs range from $12,000/year to $19,000/year with the total estimated cost of $48,000/year for the implementation of all continued monitoring alternatives. The annual cost for the Aquatic Survey shown in Table 3-2 is based on the cost of a single survey event spread over five years. The Bacteria Sampling cost is a single event spread over five years. Although only it is anticipated that the Bacteria Sampling event will only be done once, it is shown as an annual cost since it is likely that other studies of the CSO system will be necessary for continued monitoring.

3.4.3 Collection System Controls Costs

Using supplier material costs and Means Construction Cost Data, project costs were developed for each alternative for the areas tributary to CSO 1006 and CSO 1007. For each alternative, the capital cost includes construction, engineering, administration and contingency costs. The operation and maintenance (O&M) costs were also estimated for each collection system alternative. Operation and maintenance costs associated with the storm and sanitary sewers include catch basin and sewer cleaning.

The present worth and annualized costs for each area are shown in Tables 3-3 and 3-4. Present worth and annualized costs were calculated using an interest rate of 6% and a project life of 20 years.

Table 3-3
Newark CSO
LTCP Alternative Collection System Costs - CSO 1006

Alternative	Total Capital Cost ($)	Annual O&M Cost ($)	Total Present Worth ($)	Total Annualized Cost ($)
Reduced CSO Discharge to NFLR				
In-System Storage	2,717,000	19,000	2,935,000	256,000
Off-line Basins for Primary Treatment	5,551,000	82,000	6,495,000	566,000
Total CSO Discharge Elimination to NFLR				
Off-line Basins	16,113,000	133,000	17,638,000	1,538,000
Install Storm Sewer	9,962,000	100,000	11,105,000	968,000
Install Sanitary Sewer	18,448,000	184,000	20,564,000	1,793,000

Table 3-4
Newark CSO
LTCP Alternative Collection System Costs - CSO 1007

Alternative	Total Capital Cost ($)	Annual O&M Cost ($)	Total Present Worth ($)	Total Annualized Cost ($)
Reduced CSO Discharge to NFLR				
In-System Storage	1,744,000	19,000	1,963,000	171,000
Off-line Basins for Primary Treatment	3,227,000	64,000	3,967,000	346,000
Total CSO Discharge Elimination to NFLR				
Off-line Basins	9,043,000	103,000	10,219,000	891,000
Install Storm Sewer	1,626,000	16,000	1,812,000	158,000
Install Sanitary Sewer	1,723,000	17,000	1,921,000	168,000

As seen in Tables 3-3 and 3-4, the costs for the five different alternatives vary significantly. The off-line basins have large capital costs due to land requirements, equipment requirements and construction costs. The two alternatives for sewer installation vary mainly due to the depth of construction. Since the storm sewer is assumed to be installed at a shallower depth, its cost is much less although the pipe sizes are much larger.

3.4.4 Performance

The performance associated with BMP activities are generally difficult to estimate. However, over time, BMPs can reduce the amount of pollutants discharged into the collection system and treated at the WWTP. Continued monitoring activities associated with the collection system document the operation and performance of the collection system but do not have specific performance criteria associated with them. However, the aquatic survey monitoring will be used to document continued attainment of water quality standards or to identify a problem should it occur.

Only the performance of the Collection System Controls was analyzed since the Best Management Practices and Continued Monitoring activities are not designed to produce measurable results.

The performance of each of the Collection System Control alternatives was evaluated based on its ability to reduce CSO volume, reduce the pounds of suspended solids being discharged to the river and/or reduce the frequency of CSO activation. (Suspended solids were used as a measure of the pollutant load being discharged to the river). The CSO volume reduction is expressed as gallons per year. The annual volume from CSOs 1006 and 1007 was calculated using output from XP-SWMM. The total suspended solids (TSS) is expressed as pounds of TSS per year. The pollutant loading is estimated using the model output and an average combined sewer overflow TSS concentration of 290 mg/l. For storm water, an average TSS value of 145 mg/l is used. Both TSS concentrations are based on analysis of samples taken during the System Characterization work discussed in Chapter 2. The CSO frequency reduction is based on model output volumes and alternative volume reductions. The reduction in CSO volume, loading and frequency for the area tributary to CSOs 1006 and 1007 is summarized in Figure 3-2.

As seen in Figure 3-2, sewer separation (New Storm Sewer and New Sanitary Sewer) is shown as providing complete elimination of CSO discharge volume and loading from CSO 1006 and 1007. However, this is a reduction of combined sewer overflow only. With sewer separation, there will be an increase in "storm" sewer discharge. This increase in “storm” sewer discharge volume and loading is due to the fact that the volume of wet weather I/I currently captured by the combined sewer system and treated at the WWTP will, under sewer separation, be discharged to the receiving waters without treatment. Thus, the New Storm Sewer and New Sanitary Sewer alternatives achieve total CSO elimination, but they do not result in total pollution reduction.

++ END OF CHAPTER 3 ++

Figure 3-1
Combined Sewer System Long Term Control Plan
Storm Drain Stenciling

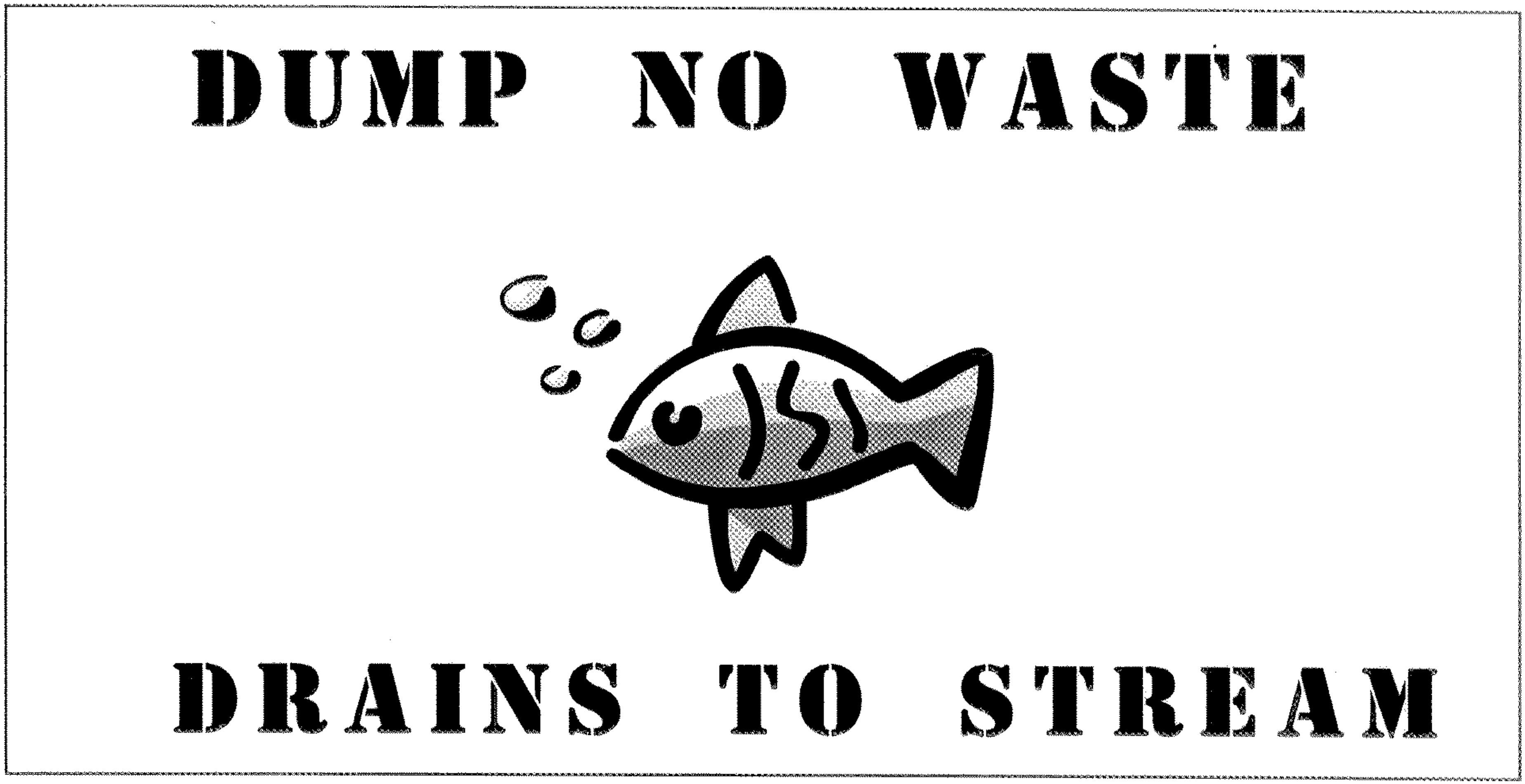


Figure 3-2
Newark CSO
LTCP Collection System Alternative Performance Evaluation

Alternative	Volume Reduction		Total Suspended Solids Reduction		CSO Frequency	
	CSO 1006 (gal/yr)	CSO 1007 (gal/yr)	CSO 1006 (lbs/yr)	CSO 1007 (lbs/yr)	CSO 1006 (events/yr)	CSO 1007 (events/yr)
CURRENT CONDITIONS	21,053,000	10,195,000	51,000	25,000	94	94
Reduced CSO Discharge to NFLR						
In-System Storage	5,580,000	1,708,000	14,000 (1)	4,000 (1)	21	21
Off-line Basins for Primary Treatment	8,868,000	6,021,000	36,000 (2)	20,000 (2)	21	21
Total CSO Discharge Elimination to NFLR						
Off-linc Basins	21,053,000	10,195,000	51,000 (1)	25,000 (1)	0	0
New Storm Sewer	21,053,000	10,195,000	(84,000)(3)	(84,000)(3)	0	0
New Sanitary Sewer	21,053,000	10,195,000	(84,000)(3)	(84,000)(3)	0	0

Notes:

1. Total Suspended Solids Reduction assumes 100% removal for flow going to WWTP.
2. Total Suspended Solids Reduction assumes 100% removal for flow going to WWTP and 50% removal for flow going to river.
3. Total Suspcnded Solids Reduction assumes 83% of the stormwater reachcs WWTP with current combined system, 10% of stormwater reaches WWTP with new separate sewer system, stormwater TSS concentration is 50% of CSO TSS concentration.

CHAPTER 4

Chapter 4 - Selection and Implementation of the Long Term Control Plan

4.1 Selection of Recommended Plan

Based on the System Characterization discussed in Chapter 2 and the public participation and agency input discussed in Chapter 3, the following areas of concern were identified:

1. Protection of existing water quality attainment (Aquatic Life)
2. Downstream fecal coliform concentrations

The following alternatives were developed in Chapter 3:

- Best Management Practices
- Continued Monitoring
- Collection System Controls

The recommended City of Newark Combined Sewer System Long Term Control Plan consists of implementing Best Management Practices and Continued Monitoring activities. These alternatives will protect the existing water quality and identify potential problems should they occur. As discussed in Chapter 3, the Collection System Controls are not recommended since they are very costly relative to the other alternatives and will not result in the improvement of water quality. In contrast, BMPs and continued monitoring activities are relatively low cost and readily implemented alternatives. These alternatives educate the public about the collection system and the impacts of pollution on receiving streams while at the same time promote the reduction of pollutants discharged to the collection system.

The proposed Long Term Control Plan recommendation consists of six items.

1. Implement Best Management Practices appropriate for the City of Newark's combined sewer system such as Public Education and Storm Drain Stenciling.

2. Continue periodic flow monitoring to measure flows within the combined sewer collection system and overflows to the river. This data will increase their knowledge of system operation, quantify overflows, and provide additional data for continued model development. All CSOs will be monitored on a biannual basis (once every two years). Each year, fifteen CSOs will be monitored in groups of five. Each group will be monitored for four months each year.

3. Review future Ohio EPA aquatic life sampling in Newark area streams to verify CSOs are not impacting the aquatic life. Perform additional aquatic life studies to verify these conclusions as the City of Newark believes necessary based on Ohio EPA sampling frequency.

4. Develop a Licking River bacteria sample plan to:
   a. Determine the time of travel between the City of Newark, Ohio and the Dillon State Park Beach.
   b. Determine the sources of fecal coliform bacteria (by tributary area, not individual sources) in the Licking River between the City of Newark, Ohio and the Dillon State Park Beach.
   c. Identify potential sources of fecal coliform by land use analysis.

5. Reclassify the North Fork Licking River between the confluence and the Manning Street Bridge (approximately rivermile 1.6) from Warmwater Habitat to Modified Warmwater Habitat.

   This change is necessary to recognize the channelization that has occurred for flood control purposes and the unstable substrate that exists in this section of the North Fork. As discussed in Chapter 2, the North Fork was first channelized in 1941 and again in 1988. This channelization extends from the confluence to approximately rivermile 1.6. The City of Newark is legally required to maintain the channelization through dredging and other streambed modification techniques. It also appears that the natural loose gravel and sand depositions on the streambed continually shift within the channelized seetion of the stream. These factors combine to produce a non-favorable and unstable habitat for macroinvertebrates. Existing levels of pollution do not appear to be limiting the macroinvertebrate populations in the stream as evidenced by sixteen years of wastewater system improvements and reduced pollution in this section of the North Fork with no corresponding improvement in macroinvertebrate health.

6. Continue the O&M practices (the Nine Minimum Controls) included in the approved City of Newark *Combined Sewer Overflow Operational & Maintenance Plan*.

4.2 Financial Implications

Financing of City projects typically involves Bonds, State Revolving Loan Funds, Grants and user charges. In some instances, when the implementation cost is less than $2 million, the City can pay for the project directly through user charges. Based on the total estimated costs, it is anticipated that the City of Newark will implement the Long Term Control Plan using existing funds collected from user charges.

Based on current City records, the Newark wastewater treatment system has 15,425 customers. The total revenue for the City of Newark Sewer Department for the 1997 calender year was approximately $4.8 million. This total includes WWTP operation, sewer maintenance, sewer administration and debt retirement.

Using the yearly costs presented in Table 3-1 for Best Management Practice Alternatives, the additional cost per user for each alternative is shown in Table 4-1.

Table 4-1
Newark CSO
LTCP BMP Alternative Costs

Alternative	Project Cost ($/user/month)	Project Cost ($/user/year)
Public Education	0.05	0.60
Storm Drain Stenciling	0.06	0.72
All Alternatives	0.11	1.32

Using the annual costs presented in Table 3-2 for Continued Monitoring Alternatives, the cost per user is shown in Table 4-2. In order to show all expenses in dollars/year, the aquatic sampling and bacterial sampling costs were divided by the five year sampling interval.

Table 4-2
Newark CSO
LTCP Continued Monitoring Alternative Costs

Alternative	Project Cost ($/user/month)	Project Cost ($/user/year)
Annual Flow Monitoring	0.10	1.20
Periodic Aquatic Survey (5 year)	0.06	0.72
Bacteria Sampling Downstream CSO Area	0.09	1.08
All Alternatives	0.25	3.00

In order to fund the continued monitoring and best management practice alternatives stated above, the City will use monies collected from the monthly utility bill. Since these are low cost alternatives, it is not anticipated that the City will need to procure low interest loans or seek other funding alternatives such as grants or bonds.

The recommended plan represents approximately 1.42% of the total 1997 revenue generated by the Sewer Department. Since some of these costs are already in the budget or can be accomplished using existing personnel and equipment, the recommended plan will result in an actual increase in the annual budget of less tban 1.42%. The exact amount of increase will depend on the how the different alternatives are implemented by the City.

4.3 Implementation Schedule

An implementation schedule has been prepared for the recommended LTCP alternatives. The schedule outlines milestones and completion dates. It is assumed that implementation of the LTCP will begin upon approval by OEPA. Thus the schedule assumes that the LTCP will be approved by Ohio EPA on or before January 1, 1999.

A five-year repeating schedule for recommended LTCP is shown in Figure 4-1. A five-year repeating schedule was chosen since some Continued Monitoring activities are performed every five years. Key items are listed below:

- Monitoring of all CSOs is performed every two years,
- Review Obio EPA aquatic sampling by the year 2002. If a study has not been performed by Ohio EPA prior to the year 2002 (five years after the 1997 survey) the City of Newark may perform an aquatic life study.
- BMPs are performed annually
- The fecal coliform study begins in 1999

The City plans to continue these LTCP alternatives in combination with the Nine Minimum Controls contained in its *Combined Sewer Overflow Operation & Maintenance Plan* to document continued water quality attainment and prevent future degradation.

4.4 Operational Plan

The current *Combined Sewer Overflow Operational and Maintenance Plan* was submitted to the Ohio EPA and approved in 1994. The plan was amended in 1996 to include the City's procedures for inspection and monitoring of CSOs, pollution prevention programs and public notification of CSOs. The proposed Long Term Control Plan includes continued support of the Nine Minimum Controls contained in the City of Newark Operational Plan as an integral part of protecting existing water quality.

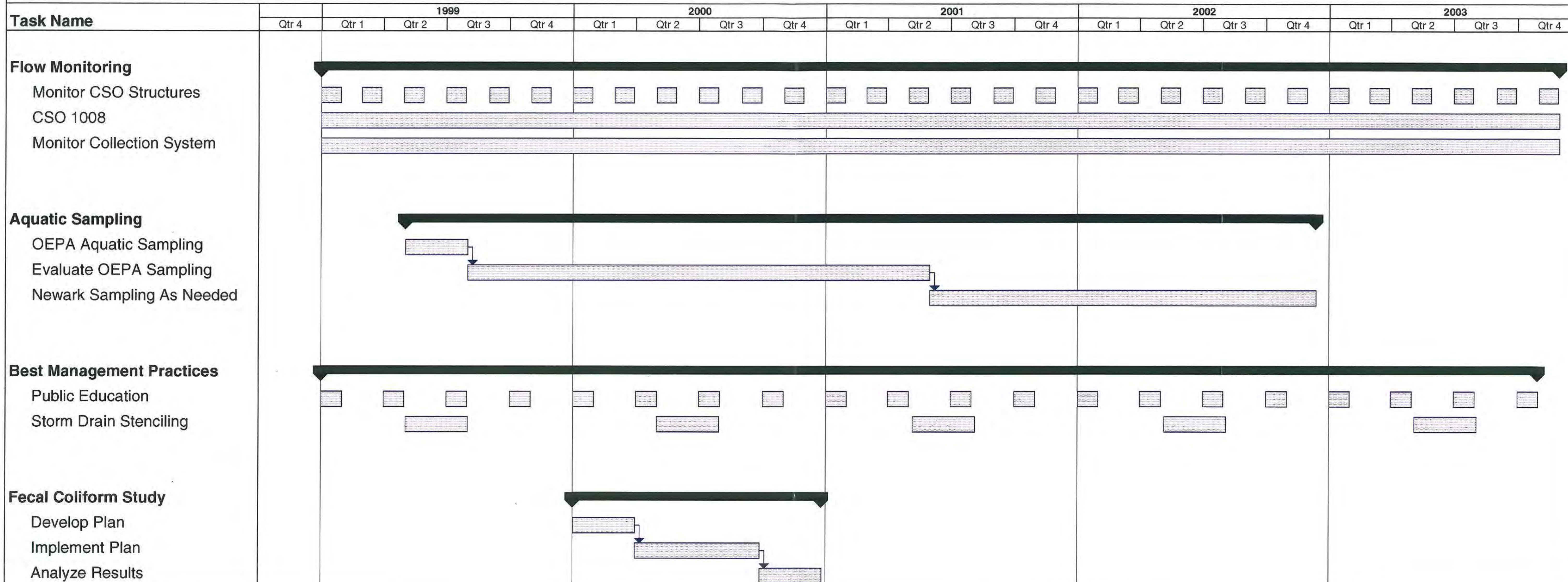
The recommended Long Term Control Plan includes expanded and new BMPs and continued monitoring activities in order to maintain and document water quality attainment. These activities do not require any changes be made to the *Combined Sewer Overflow Operational and Maintenance Plan*.

4.5 Post Construction Compliance Monitoring

Post construction compliance monitoring is typically required to evaluate the effectiveness of the construction activities associated with the Long Term Control Plan. The City of Newark's Long Term Control Plan includes continued monitoring of the water quality in local receiving streams to verify that existing water quality is maintained while implementing best management practices to protect water quality.

+ + END OF CHAPTER 4 + +

NEWARK, OHIO
COMBINED SEWER SYSTEM LONG TERM CONTROL PLAN
IMPLEMENTATION SCHEDULE



Project:
Date: 9/17/98

Task | Summary