Detroit Water and Sewerage Department

Wastewater Master Plan

DWSD Project No. CS-1314

Prior DWSD Studies- Macomb, Oakland, and Wayne Counties

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Prior DWSD Studies-Macomb, Oakland, and Wayne Counties

1. Overview Plan with Environmental Assessment Detroit Water and Sewerage Department Existing Waste Collection and Treatment Facilities Detroit Collection Systems – Alternatives Interim Report, May 1977

Consultant- Giffels/Black & Veatch Joint Venture, Detroit, Michigan

Report Background
This report was written at the same time as the Segmented Facilities Plan was being prepared and by the same consultant team. It is stated in the disclaimer notice that it is an interim report that will be "revised, augmented and refined" at a later date. The report presents alternatives to make improvements to the City of Detroit Wastewater Collection System. The dry weather flow rates for the City of Detroit and the suburban areas are computed by decade. Several alternatives were considered to ensure that the existing collection system has enough capacity to handle the flow associated with a 10-year storm (no duration is specified for this return period). The recommended alternatives included a combination of relief sewers, pump station improvements, and the reduction of CSOs. Estimated project costs for the recommended improvement alternatives are included in the report as well.

Project Detail Summary
The report first considers in some detail the wastewater flows in 1975-76 and future flows up to the year 2020 from the City of Detroit and the suburban communities into the DWSD collection system. The report also presents the collection system alternatives to ensure that the system has sufficient capacity to take the flow generated by a 10-year (the duration is not stated) storm away from inhabited areas of the drainage system. Improvements alternatives considered in this report are a combination of relief sewers, pump station improvements and stormwater management and treatment (for example in-system storage, detention basins and other methods). The report also presents alternatives in the areas served by the three major interceptor sewers in the City of Detroit. In this report, the western interceptor (Oakwood-Northwest Interceptor) was investigated in more detail since the Segmented Facilities Plan was expected to deal with the eastern interceptors (North Interceptor-East Arm, Detroit River Interceptor) in more detail. Three other improvement alternatives considered in this report included lateral sewer replacement and relief, repairs to the main interceptors and combined sewers, and system operation and maintenance.

Project Status
The report recommends a series of capital improvements at a total estimated cost of $328.2 million 1977 dollars.

Later and more detailed studies and reports, in particular the Segmented Facilities Plan and the Long Term CSO Control Plan, have superceded many of the problems analyzed and works recommended by this report.

Wastewater Master Plan Pertinence
This report is valuable for the historic information it provides about the sewer districts and the proposed relief sewers and for a concise summary of calculations, which were later developed in more detail in the Segmented Facilities Plan.

2. Report on Combined Sewer Overflow Facilities Planning for the Detroit Water and Sewerage Department, Detroit, Michigan. EPA Region V, June 1982

Consultant- USEPA Region V, Water Division, Chicago, Illinois and EcolSciences Inc, New Jersey

Report Background
The report is an EPA commentary and reply to the methodology and some of the draft proposals of the Alternative Facilities Interim Report (AFIR). This report presents a summary of various aspects of CSO planning for the DWSD system for the 20 years prior to the publication date with particular emphasis on the period immediately before the date of the report. In particular, it presents some details of the disagreement between DWSD and EPA regarding the proposals in the AFIR, especially the proposed West Arm-North Interceptor intended to provide relief to the River Rouge, Hubbell and Southfield sewer districts.

Project Detail Summary
The report has 11 sections. They are: 1-Introduction, 2-Historical Perspective, 3-Wastewater Transport and Treatment Facilities, 4-CSO Quantity and Quality, 5-Receiving Stream Water Quality, 6-Development of Alternatives, 7-Water Quality Improvements, 8-Evaluation of Alternatives, 9-Revisions to the Alternatives, June 1981, 10-Evaluation Criteria, 11-Recommendations.

The report indicates in its introduction that its purpose is to preserve the progress made by the AFIR on CSO planning to enable it to be picked up in the future. The report looks in particular detail at the proposal to extend service in Macomb County. The report then outlines the CSO situation in Detroit, including detailing the overflow locations and the results of monitoring. The quality of the receiving waters is discussed including the water quality objectives.
The various computer models including inputs and outputs required and generated are discussed in the CSO context.

Finally, the alternatives developed in the AFIR are discussed in terms of methodology, analysis and impact on water quality and costs.

The report is concluded with recommendations about the direction of CSO planning when it is resumed in Detroit.

Project Status
There are no recommendations with associated estimated costs in this report. The disagreement between EPA and DWSD regarding the best way to control CSOs in Detroit appears to have put a stop to CSO planning until the 1990s when the CS-1158 project produced the Long-Term CSO Control Plan for Detroit. The North Interceptor-West Arm was not recommended in CS-1158.

Wastewater Master Plan Pertinence
This report provides an alternative perspective on CSO planning in the DWSD system in the 1970's, the time when the Segmented Facilities Plan was developed. Its point of view is a dissenting viewpoint from the mainstream view in DWSD and its consultants at the time (1982). The data of most relevance concerns the service area in Macomb County.

3. Basic Requirements Report Evergreen-Farmington Relief Outlet Draft, July 1984

Consultant- Detroit Water and Sewerage Department, Engineering Division, Detroit, Michigan

Report Background
This report was written to address the issue of servicing the Evergreen-Farmington Sewer District in Oakland County. At the time of the report, the district was served by the Southfield sewer, which did not have sufficient capacity to provide adequate service. The report presents the proposed facilities required to provide up to 170-cfs outlet capacity for the Evergreen-Farmington Sewage Disposal District in Oakland County.

Project Detail Summary
The report calculates the maximum volume of flow generated by the district based on unofficial SEMCOG population projections for year 2025. The current (1984) situation is described and several alternatives are reviewed.

The recommended solution is to divert the flow through a new 8-foot diameter sewer from the Evergreen-Farmington interceptors to the First-Hamilton Relief Sewer and to reconfigure the regulators between the First-Hamilton Relief Sewer and the North Interceptor-East Arm and the Detroit River Interceptor.
The report also describes in some detail the criteria for interrupting service to the Evergreen-Farmington Sewage Disposal District and the expected impact on its flow in that eventuality.

Project Status
The report does not provide any estimated costs for the recommended alternatives.

This report was superceded by a subsequent report *North Huron Valley/Rouge Valley Program, Engineering Report – Volume II, Evergreen – Farmington Relief Outlet, C262391 – 10, May 1985* which is reviewed elsewhere in this section. The latter was produced in response to a review of the original report by USEPA.

Wastewater Master Plan Pertinence
The report provides a lot of basic information on the Evergreen–Farmington Sewage Disposal District especially regarding the volume of flow from the district under several different conditions. The report provides detailed calculations about the flow and the operation of the regulator structures to divert flow to the First-Hamilton Relief Sewer and the Detroit River Interceptor.

4. Quantity and Quality of Combined Sewer Overflows CS-806 Final Facilities Plan Interim Report September 1980

Consultant- Giffels/Black & Veatch Joint Venture, Detroit, Michigan

Report Background
This report is an interim part of the Final Facilities Plan which followed the Segmented Facilities Plan and which was halted in 1981 due to disagreements between the EPA and DWSD and a resulting court decision. The report was undertaken to determine the scale of the CSOs from the Detroit sewer system, which was a requirement of the court decision. The report is in three volumes; Volume-1: Summary, Volume-2: Report and Volume-3: Appendices. The report presents the results of calculated volumes and loadings for CSOs from the City of Detroit sewer system for 1979. The data is then used in conjunction with a computer model to calculate the expected CSOs for a year with a statistically averaged rainfall. The model was calibrated using the 1979 data.

Project Detail Summary
The report is described in its introduction as an extension beyond the level of the Segmented Facilities Plan issued in January 1978. In particular it is intended to address a specific requirement of the Consent Judgement of September 1977, as amended in March 1980. The methodology used to establish the volume and frequency of CSOs involved setting up a field data-gathering program. The data collected included rainfall, CSO flows and quality, receiving water flows and quality during and after CSO events, measurement of runoff from selected land areas chosen to be typical representatives of the catchment area of the sewer system.
The resultant data was used to calculate the volume of CSOs, the impact on the WWTP, the quality impact on the receiving waters and the relationship to the rainfall characteristics of each event.

The reduced data was used to calibrate several computer models developed to simulate the behavior of the sewer system and its impact on the receiving waters.

The calibrated models were then applied to a statistically averaged precipitation year to give an estimate of the average level of CSO volumes and quality from the DWSD system. Volume-1 summarizes the study, Volume-2 gives details of the data collected, and the calculations and modifications made to the computer models for calibration purposes and Volume-3 provides the detailed breakdown of the data and computations.

Project Status
There are no recommendations made in this report and therefore no estimated costs. The Final Facilities Plan was suspended in 1981 and this report was not finalized. This study has been updated and superceded by subsequent studies in particular CS-1158 Long-Term CSO Control Plan for the Detroit and Rouge Rivers.

Wastewater Master Plan Pertinence
This study provides a baseline for CSOs from the DWSD system.

5. Overview Plan of Wastewater Collection and Treatment for the Detroit Metro System Draft Report, July 1975

Consultant-Hubbell, Roth and Clark, Detroit, Michigan

Report Background
This report appears to be a follow-up to earlier reports that dealt with the metropolitan Detroit sewer service area as a single entity and tried to harmonize planning between the City and its suburban partners. The report presents a concise review of the Detroit Metro Water Department (DMWD, as DWSD was then named) sewage collection system and service area. It studies the physical characteristics of the service area and its population projections from 1970 to 2020 with the 30-year period up to 2000 investigated in more detail. It contains several recommendations for the construction of interceptors including the North Interceptor – West Arm. It also presents recommendations for improvements to be made at the Wastewater Treatment Plant (WWTP).

Project Detail Summary
The report begins with a quick review of the physical characteristics of the service area. There follows a discussion of the population predictions for the various municipalities within the service area.
(It is interesting to note that the population prediction for the City of Detroit in 2000 is 1.5 million, substantially more than the approximately 1.0 million provisionally recorded in the 2000 census.) The next section goes into water quality issues in some depth.

The report also provides a review of standards, quality requirements of the major waterways in the area (Rouge River, Detroit River and Clinton River) under federal

and state regulations, and lists of the major sources of point pollution discharges on each waterway.

The final two parts of the report describe the overall collection system, the system in each sewer district, the processes at the WWTP, and how infiltration/inflow is estimated for each sewer district. The final section discusses the alternatives required to serve the projected population in the year 2000. The major recommendation is the construction of the North Interceptor – West Arm to relieve the Detroit western sewer districts and the Evergreen-Farmington district in Oakland County.

Project Status
The report gives an estimated cost for the preferred alternative of $382.7 million 1975 dollars for works in the collection system and $195 million 1975 dollars for improvements at the Wastewater Treatment Plant. This report was superceded and expanded by the Segmented Facilities Plan. The North Interceptor – West Arm has never been constructed and is not likely to be, because subsequent construction has addressed some of the problems that this interceptor was intended to relieve. Other items on the recommendation list have been implemented or have been the subject of further studies.

Wastewater Master Plan Pertinence
Gives historic background on the sewer districts in the City and suburbs, including the interceptors and pumping stations. The maps of the sewers in the Detroit sewer districts are somewhat more detailed than those in the Segmented Facilities Plan.

6. North Huron Valley/Rouge Valley Program Engineering Report – Volume II Evergreen – Farmington Relief Outlet C262391 – 10, May 1985

Consultant- Detroit Water and Sewerage Department, Engineering Division, Detroit, Michigan (Internal Report)

Report Background
This report presents the response to a USEPA request for further information on providing flow relief for the Evergreen-Farmington Sewer District in Oakland County. This is provided in the context of an overall plan for flows from the western and northwestern suburbs in the DWSD collection system. In particular, the report addresses the diversion of flows, which then entered the Southfield sewer district system to the First-Hamilton Relief Sewer on Detroit's east side.

The report also discusses the impact on the Rouge River south of 8 Mile Road and on the Detroit River pending construction of Pump Station No. 2 and the overall impact

on the interceptors and the WWTP. Finally, it discusses the possibility of using the existing system for storage and first flush capture.

Project Detail Summary
This report was prepared after the cancellation of the Final Facilities Plan in 1978 and after the Alternative Facilities Interim Plan concluded that the North Interceptor-West Arm was not "cost efficient". This meant that the previously considered plan to relieve the Evergreen-Farmington district to the eastern interceptors (North Interceptor-East Arm and the Detroit River Interceptor) was to be reconsidered as the way of achieving this objective and of freeing up capacity for the western suburbs in the Rouge Valley Sewer District.

The option of diverting flow to the First-Hamilton Sewer had been visualized from the time that sewage was first accepted into the DWSD system from the Evergreen-Farmington district in 1958. The report details the requirements for the relief sewer and its impact on the hydraulic grade lines in various parts of the Detroit system. The conditions under which service can be interrupted are analyzed and the impact on the Evergreen-Farmington Sewer District under "before and after" conditions are shown, demonstrating the better service of the proposed relief sewer. Other improvements are also reviewed including Pumping Station No. 2. In particular, the report presents the possibility that a West Side relief interceptor may still be constructed. Finally the impact of the proposal on water quality in the Detroit River and Rouge River is analyzed at some length.

The conclusion is that diversion of the Districts' flows will increase overflows to the Detroit River in the short term but that this will have minimal impact because of the small volume of overflow relative to the river flows. The Rouge River will be improved by the reduction in the overflows from Evergreen-Farmington District to the river via the Eight-Mile Drain. In particular, the report addresses the issue of in-system storage and the conditions for interrupting service to the Evergreen-Farmington District.

The conditions considered are when flow must be restricted below the ultimate design of 170 cfs because of the surcharging conditions in Detroit. It also provides estimates of surcharging in the Evergreen-Farmington system at the connection to DWSD's sewer under various conditions.

The surcharging conditions are based on the hydraulic gradeline in the DWSD system at Seven-Mile Road and San Juan. When this gradeline reaches 159.00 ft (Detroit Datum), the flow from Evergreen-Farmington is reduced by diverting some flow to the Rouge River. The report concludes that for a 10-year storm, up to 110 cfs can be accepted into the DWSD system without surcharging the Detroit sewers. Surcharging of the Evergreen-Farmington sewers at Southfield and Eight-Mile would occur at a 6-year storm frequency. Upstream surcharging of the Evergreen-Farmington system is not considered.

Project Status
The report does not give any cost estimates for the proposed works. The Evergreen-Farmington Relief Sewer was constructed in the 1980's. It connects to the First-Hamilton Sewer at Seven Mile Road and diverts the Evergreen-Farmington District at Southfield and Eight-Mile Roads.

Wastewater Master Plan Pertinence
This report gives a lot of valuable information on the flows from the Evergreen-Farmington Sewer District. In addition, it provides an overview of the major interceptor sewers west of the First-Hamilton Relief Sewer, including profiles and hydraulic grade lines under various designs and operating conditions. In particular, the report addresses the issue of in-system storage and the conditions for interrupting service to the Evergreen-Farmington District.

7. River Rouge Combined Sewer Overflow Control Tunnel DWSD Contract CS-1283 Geotechnical Evaluation and Feasibility Report September 1998

Consultant - NTH Consultants Limited, Detroit, Michigan

Report Background
This report presents the results of the Geotechnical Evaluation and Feasibility Study for the proposed Rouge River Combined Sewer Overflow Control Plan, CS-1283. The report is a supporting document for the proposed tunnel alternative for CSO control.

Project Detail Summary
The report is a review and interpretation of the data collected and presented in the Geotechnical Data Report (see below). An introductory overview is supported with a series of detailed appendices documenting the conclusions from the data and detailing the implications for the construction of a tunnel.

These appendices are Appendix-A: Plates, Appendix-B: Hydrogeologic Evaluations Report, Appendix-C: Main Tunnel Evaluations Report, Appendix-D: Shaft Evaluations Report, Appendix-E: Connecting Sewer Evaluations Report, Appendix-F: Pump Station Evaluations Report, Appendix-G: Surface Structures Evaluations Report, Appendix-H: Permit Requirements Report, Appendix-I: Conceptual Schedule, Appendix-J: Cost Estimate, Appendix-K: Site Conditions Report. The report concluded that the tunnel could be constructed in the bedrock with conventional methods of tunnel construction. The major exception is the construction through an area of fissured rock (Breccia) which will probably be difficult due to the presence of groundwater, methane gas and fractured rock. North of this formation is a hard shale and south of it is a hard limestone. The report gives estimated requirements for dewatering rates to enable construction of the tunnel and the ancillary structures such as drop shafts and pumping stations. Seepage rates in the tunnel excavation are given.

Minor odor problems from hydrogen sulfide are anticipated. The report contains a wealth of interpreted geotechnical data on the area adjacent to the Rouge River from Eight-Mile Road to Warren Avenue.

Project Status
The report provides "probable costs" estimates for the construction of four alternative alignments of the proposed tunnel. These range from $446 million to $476 million 1998 dollars. The estimates are supported by detailed breakdowns for each component of the tunnel alternatives. The report was used to assist in the selection of the preferred alternative for the Upper Rouge CSO Control. The conventional CSO capture tunnel being the preferred alternative, this report is used in the basis of design for this tunnel.

Wastewater Master Plan Pertinence
This report may be of assistance in evaluating alternatives arising out of the Wastewater Master Plan in the River Rouge sewer district. It provides a basis for estimating the difficulty and costs of construction.

8. River Rouge Combined Sewer Overflow Control Tunnel DWSD Contract CS-1283 Geotechnical Data Report September 1998

Consultant - NTH Consultants Limited, Detroit, Michigan

Report Background
This report describes the investigation activities and the resultant data developed for the proposed Rouge River Combined Sewer Overflow Control Plan CS-1283. The interpretation of this data is presented in the Geotechnical Evaluation and Feasibility Report (see above) for the proposed Rouge River Combined Sewer Overflow Control Plan.

Project Detail Summary
The report presents the data collected in a brief summary and a series of six detailed appendices. The appendices are Appendix-A: Plan and Profile Drawings, Appendix-B: Data Logs, Appendix-C: Soil Test Data, Appendix-D: Groundwater and Gas Data, Appendix-E: Rock Test Data, Appendix-F: Hydrogeologic Test Data. The report is a compilation of a large amount of raw geotechnical and other data with no interpretation. The appendix headings summarize the data contained in the report.

Project Status
The data was interpreted in another report, as described above, and no further actions are expected to arise from it.

Wastewater Master Plan Pertinence
The data may be of assistance in determining the feasibility and cost of proposed improvements to the sewer collection system in the Rouge, Hubbell and Southfield sewer districts arising out of the Wastewater Master Plan.

9. Procedure for Receiving Hauled-In Liquid Waste at the Detroit Wastewater Plant December 1985 Detroit Water and Sewerage Department, Industrial Waste Control Division Hauled-In Liquid Waste Program January, 1986

Consultant - Internal Documents of Detroit Water and Sewerage Department, Detroit, Michigan

Report Background
This report consists of two documents. These documents arose out of a need for DWSD to formulate a uniform set of procedures and regulations to govern the acceptance of hauled-in liquid waste into the DWSD sewer system.

Project Detail Summary
The first document describes the procedures for accepting hauled-in liquid waste at the DWSD Wastewater Treatment Plant and other information relevant to the issue. The document also lists the charges levied on each applicant at the discretion of DWSD for the acceptance of the liquid waste. The locations of three (3) other unloading sites in Oakland County are given including charges at those locations. No site in Macomb County is listed. The procedures provide for the licensing of sites where waste can be accepted into the DWSD system.
Such a Wastewater Unloading Site can be operated by a private entity under the DWSD rules. The rules require that waste haulers must be pre-approved by and provide bonds to DWSD to be permitted to discharge liquid waste. The rules cover septage from septic tanks, waste from RV toilets, sludge from municipal treatment works, waste oils and fats from food establishments and industrial waste (including cleanups from fires, accidents and spills). There are detailed rules for providing samples of the proposed waste to be discharged so that DWSD can determine its acceptability into the treatment works. The second document lists the rules and procedures related to waste hauling, and provides application forms for septage and waste haulers to apply for authorization.

Project Status
The report documents do not provide any cost estimates for the operation of the hauled-in waste program, neither in terms of manpower nor of the cost of treating the waste. Therefore, the basis for the establishment of the charges listed in the rules is not shown in the documents. The rules came into effect on January 1, 1986 and are currently being operated by the Industrial Waste Control Division of DWSD.

Wastewater Master Plan Pertinence
The documents show the current practice with regard to hauled-in liquid waste, which can be reviewed to determine whether any changes in policy should be recommended in the Master Plan.

10. Wastewater Collection System Improvements CS-1158, Task 1 - In System Storage Design

Consultant - Wade-Trim / Associates, Detroit, MI

Project Background
The title Collection System Improvements was given to describe collectively a series of tasks under the DWSD contract CS-1158. These tasks were envisioned as a means to comply with the 1989 Discharge Permit issued by the Michigan Department of Natural Resources (MDNR), which added requirements to eliminate or adequately treat CSO's at approximately forty overflow points along the Rouge and Detroit Rivers.

Project Detail Summary
As a requirement of the then NPDES permit, DWSD was required to install seven (7) in-system storage devices in the Detroit Collection System to reduce combined sewer overflow (CSO) into the Rouge River. Initially this task of CS-1158 had planned to construct inflatable dams, but after the cost effectiveness analysis, a system of slide-gates was chosen to be installed at the following outfall structures along the Rouge River:

1. McNichols Sewer and Relief (2 Outfalls);
2. Puritan;
3. Lyndon;
4. Dolson;
5. West Chicago; and
6. Tireman.

Project Status
The construction of the slide-gate facilities was completed under DWSD contract PC-698. The facilities are presumed to be operable and in use.

Wastewater Master Plan Assistance
This report provides the following information about these installations:

1. Conceptual layouts of the In-System Storage Facilities;
2. Design criteria for the functional support elements of the design;
3. Cost estimates; and
4. The program schedule for the design and construction of these facilities.

11. Wastewater Collection System Improvements, CS-1158, Task 2 & 3 - Regulator Rehabilitation, Remote Flow Control, Meter Rehabilitation

Consultant - Wade-Trim / Associates, Detroit, MI

Project Background
The title Collection System Improvements was given to describe collectively a series of tasks under the DWSD contract CS-1158. These tasks were envisioned as a means to comply with the 1989 Discharge Permit issued by the Michigan Department of Natural Resources (MDNR) which added requirements to eliminate or adequately treat CSO's at approximately forty overflow points along the Rouge and Detroit Rivers.

Project Detail Summary
These tasks of CS-1158 served to provide proposed restoration or rehabilitation of existing structural and associated access components, and flow control mechanical equipment of regulating facilities controlling flows into the Detroit and Rouge Rivers. This report, issued in August 1993, provides assessed conditions and offers recommended improvements to the regulating facilities.
The findings of this report were based on the review of as-built or contract drawings, field inspection reports, and existing drawings that have been updated.

Project Status
These collection system improvements were constructed under PC-695.

Wastewater Master Plan Assistance
This report provides thorough descriptions of common sewer conditions that are inherent to the Detroit system that may assist future maintenance planning.

12. Wastewater Collection System Improvements, CS-1158, Task 4 - Detention Basins

Consultant - Wade-Trim / Associates, Detroit, MI

Project Background
The title Collection System Improvements was given to describe collectively a series of tasks under the DWSD contract CS-1158. These tasks were envisioned as a means to comply with the 1989 Discharge Permit issued by the Michigan Department of Natural Resources (MDNR) which added requirements to eliminate or adequately treat CSO's at approximately forty overflow points along the Rouge and Detroit Rivers.

Project Detail Summary

Task 4 - Detention Basins. In October, 1989, the Michigan Department of Natural Resources re-issued the discharge permit to the Detroit Water and Sewerage Department adding requirements for the City to eliminate or adequately treat Combined Sewer Overflows (CSO) at approximately 40 overflow points along the Rouge and Detroit Rivers. In response to this mandate, three storm water detention facilities were designed under contract CS-1158 for treatment of specific overflows into the Rouge River.

- Hubbell-Southfield Combined Sewer Overflow Facility. The facility is located in Dearborn, MI south of Michigan Avenue, east of the Southfield Expressway and north of Rotunda Drive (outfall 058). The detention basin was designed as a flow through basin with 22 MG of storage capacity that would provide solids removal, detention and disinfection of combined sewer overflows for the Hubbell-Southfield drainage district. The basin was designed so that a "complete capture" would be achieved for 75% of the storms within a typical year.
- Puritan-Fenkell Combined Sewer Overflow Facility.

  The Puritan-Fenkell Detention Facility was designed to prevent 2.8 MG of untreated combined sewer overflow from entering the Main Branch of the Rouge River at the Puritan and Fenkell outfalls (B-75 and B-76). The 2.8 MG detention facility is located in the City of Detroit Eliza Howell Park, south of Fenkell, east of Telegraph. Additionally, this facility provides pumpage of dry-weather wastewater flows.
- Seven Mile Combined Sewer Overflow Facility. The Seven Mile CSO facility was designed to eliminate the untreated combined sewer overflows from Outfall Nos. 076 and 078.
- The report details the design criteria for this 2.2 MG basin that provides 30 minutes of detention, settling, skimming, disinfection for the maximum hour discharge flow from a storm of 1-inch (one year-one hour).
- This basin is located in the city of Detroit north of Seven Mile Road and east of Shiawassee Road.

Project Status Task 4 - Detention Basins:

- Hubbell-Southfield Combined Sewer Overflow Facility. Construction of this facility commenced under Contract PC-694 and was completed on March 17, 1999.
- Puritan-Fenkell Combined Sewer Overflow Facility. Construction of this facility commenced under Contract PC-697 and was completed on January 15, 1999.
- Seven Mile Combined Sewer Overflow Facility. Construction of this facility commenced under Contract PC-696 and was completed on January 28, 1999.

Wastewater Master Plan Assistance
These basis of design reports provide design assumptions that have been considered for each of the unit processes involved for these facilities as well as physical data regarding each facility's sub-drainage basin (rainfall, runoff, etc.).

13. Segmented Facilities Plan, January 31,1978

Consultant - Giffels / Black & Veatch (JV)

Project Background
The Segmented Facilities Plan Report served as a final update to the draft Overview Plan with Environmental Assessment (June 1977). This document was prepared for compliance with the provisions of Public Law 92-500, the Water Pollution Control Act (Amendments of 1972).

Project Detail Summary
Of keen interest in the Segmented Facilities Report is the extensive listing of recommendations for improvements to the wastewater treatment plant and the wastewater collection system. The recommendations are categorized in the following three categories:

1. Optimization of Existing Facilities (1977-1981)
2. New Major Construction Programs (1977-1981)
3. Construction (1981-2000)

Wastewater Master Plan Assistance
The report contains a wealth of historical information regarding capital improvement programs, treatment technology recommendations, environmental impact, economics, legal and institutional considerations, etc.

14. Rate Settlement Agreement, May 1978

Consultant - Camp, Dresser, & McKee, Detroit, MI

Project Background
The impetus behind this study was the Consent Judgement, which became effective on September 9, 1977. DWSD had imposed on it, among many other requirements, a stipulation that "On or before January 1, 1980, the User Charge System,

Industrial Cost Recovery System, and Local Capital Cost Funding system shall become effective on all bills rendered in accordance therewith, except that the Industrial Cost Recovery System shall be retroactive to the time that a construction grant project became operable." This report summarized a vigorous study that established the means by which the preceding was achieved.

Project Detail Summary
The effort in the production of this report was organized as follows:

1. Obtaining a detailed understanding of the systems used by the DWSD and the City agencies, which support it, in the conduct of the Department's affairs.
2. Developing a basic methodology for rate determination.
3. Preparing a number of studies on such areas as system geometry, allocation of debt costs to system components, storm drainage costs, sewage flow projection methodology, operation and maintenance cost projection methodology, and industrial cost recovery and waste surcharge methodologies and procedures.
4. Detailed analysis of the preceding.

Wastewater Master Plan Assistance
This document could serve as a guide or an outline for future Sewerage System Rates and Charges forecasts. Specifically, this report is valuable when considering the Capital Improvement Plan that is recommended through CS-1314 and the associated effect on sewerage rates.

15. Detroit Facilities Plan Interim Report, Alternative Facilities, CS-806 June 1981

Consultant - Giffels/Black & Veatch (JV), Detroit, Michigan

Report Background
The Detroit Facilities Plan is a direct result of the Consent Judgement against the City of Detroit. Its purpose as stated in the report was as follows:

The Detroit Facilities Plan was to investigate all aspects relating to transport, storage, and treatment of combined sewer overflows (CSO), plus treatment of dry weather flows in excess of plant capacity. This Alternative Facilities Interim Report (AFIR) responds to Item IV.A.7 of the amended Consent Judgement, which stipulates that the following elements be included:

- A description of the benefits and costs resulting from improved water quality at each of the alternative levels of control.
- An environmental information document.
- Proposed outfall requirements and effluent limitations for each facility.
- Implementable site plans.

Project Detail Summary
The Alternative Facilities Interim Report had a succinctly defined group of objectives outlined by Section IV, Paragraph B of the original Consent Judgment. These objectives were as stated in the report:

- Establish the quantity and quality of combined sewer overflows within the service area.
- Calibrate the precise capability and capacity of the then existing plant.
- Establish the total quantity and characteristics of the influent flow from both combined and sanitary sewers.
- Identify and describe the facilities required at the existing treatment plant or any other identified site to treat combined sewer overflows as well as dry weather flows.
- Develop a time schedule and cost opinion for the work to be performed within the planning period.
- Proved an implementable site plan for all facilities required during the planning period
- Describe all outfall requirements and limitations for each treatment facility.
- Resolve air quality standard attainment issues associated with ultimate sludge disposal.
- Prepare an environmental assessment for all facilities and sites.

Wastewater Master Plan Assistance
The report's focus was to establish CSO control alternatives in a technically and economically feasible manner through the year 2000.

16. Final Design Report for Raw Wastewater Pumping Station No. 2A, CS-967 January 1987

Consultant - Metcalf & Eddy, Detroit, MI

Report Background
The Final Design Report for the Raw Wastewater Pumping Station No. 2A is a follow-up to the Preliminary Design Report on Raw Wastewater Pumping Station No. 2A (October 1986). The report was a multi-consultant effort that provided the basic concepts for the design of the proposed facility.

This package was presented in two parts, a document summarizing the design criteria of all the design disciplines as well as a cost estimate and a bound set of 63 preliminary contract drawings.

Project Detail Summary
Upon recommendation of the Detroit Water and Sewerage Department, Metcalf & Eddy, through this report, have summarized their design efforts establishing the criteria for the construction of Raw Wastewater Pumping Station No. 2A. The facility was described and elaborated on as being comprised of four mechanical process areas: Pumping Station, Screenings Facility, Chemical Facility, and Grit Chambers. Detailed design criteria were established within the text for the aforementioned process areas.

Project Status
Construction for Pumping Station No. 2A was completed in summer 1994.

Wastewater Master Plan Assistance
The report provides excellent data regarding design flow capacities for the unit mechanical processes of Pump Station 2A, which allow the assessment of increased flow capacity from the collection system to the pump station. Also, the report neatly summarizes flow characteristics (design capacities, maximum daily, etc.) and distribution for the interceptors entering the wastewater treatment plant.

17. Sewerage System Flow Management Report, August 1987

Consultant - DWSD Internal Report Office of Program Management

Project Background
As stated in the report, "The primary purpose of this Flow Management Report is to present the operational objectives of the Detroit Water and Sewerage Department (DWSD) towards the transport, treatment and discharge of wastewater generated within its service area. In the process, the report presents information regarding the capabilities and limitations of the existing collection system and treatment plant, and outlines the DWSD program for operation, phased upgrade and optimization of its facilities."

Project Detail Summary
The report presented, at the time, DWSD's current and future philosophy of flow management.

DWSD's Flow Management Report achieved this by an analysis of the existing sewerage system, existing and projected wastewater flows, near-term facilities improvement program - collection system, and near-term facilities improvement program - treatment plant.

Wastewater Master Plan Assistance
The contents of this report, particularly the (then) near-term planned improvements to facilities, can assist in an evaluation of proposed or intended capital improvement projects.

18. Detroit River Plume Monitoring and Modeling Program, CS 929 May 1987

Consultant - Environmental Science and Engineering, Inc., Gainesville, Florida, Limno-tech, Inc., Ann Arbor, Michigan

Report Background
The Detroit River Plume Monitoring and Modeling Program commenced in October 1984 to respond to the imposed effluent goals on certain chemical constituents of the Detroit Wastewater Treatment Plant (DWWTP) into the Detroit River.

Project Detail Summary
The effluent goals prescribed by the National Pollutant Discharge Elimination System (NPDES) Permit No. MI0022802 were administered by the Michigan Department of Natural Resources (MDNR) on June 8, 1984 by judicial notice.
The permit established concerns about the residual effects of the discharge of chlorinated wastewater and toxic substances on the aquatic ecology of the Detroit River. A study commenced that included study of the WWTP effluent, investigation of the toxicity and extent of the discharge plume in the Detroit River, and evaluation of the effects of the effluent on human health and the aquatic environment. Included in this effort was a program identified in the May 1987 report as:

> The study design of the entire program included four intense seasonal field studies for toxicant sampling, dye studies, and aquatic ecology surveys. Biweekly toxicant monitoring of the effluent and the river was also completed for the summer of 1985. Acute toxicity bioassay screening of the effluent and chronic bioassays to determine potential long-term effects of the effluent were conducted in July and August 1985. An extensive numerical modeling effort to investigate the fate and effects of the DWSD effluent under "worst-case" conditions was also completed. The model was calibrated and verified with the collected field data and was used to predict impacts under various operational scenarios.

The May 1987 report summarizes the results of the preceding investigations. Also, the report includes a presentation of historical operating data for the DWWTP, Detroit River data, and a review of the MDNR Rule 57.
An analysis of the DWWTP effluent plume's effect respective to environmental and human health risks is discussed in this report.

Project Status
The study has concluded and the final report was issued in May 1987. Currently there have not been subsequent studies on this matter.

Wastewater Master Plan Assistance
The report provides an excellent summary of chemical, biological, and physical data for the flows of the DWWTP and the Detroit River. Also, presented within the report is information that could serve as a procedural outline for studies regarding:

- Bathymetry and Currents
- Dye Studies
- Toxicant Sampling
- Ecological Studies
- Aquatic Toxicity Studies

- Hydrodynamic Modeling
- Risk Assessment for Aquatic Toxicity and Human Health Effects.

This collection of data and summarized procedures will be useful for planning when the study or design of wastewater discharges or treatment plant effluents into a dynamic watershed system are being considered.

19. PCB / Mercury Minimization Program (Subsequent Program Updates) May 31, 1991 - October 2000

Consultant - In-House DWSD Report

Project Background
In October 1989, the State of Michigan, through the Department of Natural Resources (MDNR), proposed in a draft permit that the City institute a PCB and Mercury Control Program for wastewater flows within the collection system. In response DWSD filed for a petition for a contested case challenging the permit. As a result of this action, DWSD was granted a stay in this matter until the case was resolved. Under it own will, DWSD instituted a PCB and mercury minimization in early 1990. These reports are currently satisfying a requirement of the October 1997 NPDES Permit that an annual Program Update be provided every October 1, for a PCB/Mercury Minimization Program.

Project Detail Summary
The predominant strategy of the program was the identification of sources of detectable quantities of the contaminants, PCB and Mercury.
Furthermore, DWSD then made efforts to quantify the contributions of known sources such as contaminated sites, storage facilities, and Significant Industrial Users (SIU's).

The program now has its focus on targeting the resources of known contributors who have the largest propensity for reduction in their discharges of PCB and Mercury.

Project Status
The current report summarizes DWSD's efforts thusly; "DWSD continues to aggressively pursue PCB and Mercury controls throughout the collection system with an emphasis on achieving reductions from known or suspected sources."

Wastewater Master Plan Assistance
This collection of reports contains DWSD's strategies, past and present, for the minimization of PCB and mercury discharges into the wastewater collection system and ultimately the Detroit River. Schemes for reduction and abatement of PCB/Mercury discharges can borrow from the data and discourse of these prior reports.

20. Wastewater System Operational Plan, October 1994, Subsequent Operational Plan Updates

Consultant - DWSD In-House Report

Project Background
October 1994 Wastewater Operation Plan. This report was drafted to fulfill a requirement of the DWSD's National Pollutant Discharge Elimination System (NPDES) Permit, Section A.8.c. For compliance with the permit, DWSD prepared this operational plan which details the management of the wastewater collection system. Furthermore, according to the NPDES Permit, the report was to be updated annually to detail DWSD's approach to collecting and transporting wastewater from its service area (City and Suburban Service Districts) to the treatment plant.

Wastewater Master Plan Assistance
DWSD's Wastewater System Operational Plan is a comprehensive and thorough description of the collection system facilities, operational strategies, and the organization that maintains and operates the collection system. The Wastewater System Operational Plan Updates are reports providing instituted operational changes, planned or constructed system rehabilitation/capital improvements, and other annual information as required by the NPDES permit.

21. DWSD Greater Detroit, Regional System Report, June 30, 1994

Consultant - Camp Dresser & McKee, Detroit, Michigan

Project Background
The Greater Detroit Regional System (GDRS) modeling project is a result of a broadened collection system model prepared by Camp Dresser & McKee in 1987. A court ordered technical committee recommended the expansion of the mathematical model depicting the City of Detroit collection system to include the suburban districts tributary to the DWSD collection system.

Project Detail Summary
The focus of the project was stated thusly in the Project Goals and Objectives Section:

> The primary goal of this current phase of the project was to establish, for several alternatives and baseline conditions and planned improvement conditions, the ability of the collection system to control CSO's and sanitary sewage bypasses, during wet weather. Planning level costs were developed for each alternative in order to perform a basic comparative cost analysis.

Wastewater Master Plan Assistance
This report and model provide a valuable tool when evaluating the effects and benefits of some of the planned improvements for the Long Term CSO Control Plan for the Detroit and Rouge Rivers. Also, this model will provide assistance in planning the expansion of the existing wastewater collection system.

22. Long Term CSO Control Plan For the Detroit and Rouge Rivers, CS-1281

Consultant - Wade-Trim / Associates, Detroit, MI

Project Background
The report for the Long Term Combined Sewer Overflow (CSO) Control Plan, DWSD Project No. CS-1281, was prepared to respond to the mandates of the National Pollution Discharge Elimination System (NPDES) Permit issued to DWSD by the Michigan Department of Environmental Quality (MDEQ) in 1989 and the succeeding update in 1992.

Project Detail Summary
The report details the strategies for total compliance with the MDEQ issued NPDES Permit, i.e. elimination or adequate treatment of Detroit's 78 combined sewer outfalls. These outfalls contribute approximately 20 billion gallons of combined sewer overflow yearly to the Detroit and Rouge Rivers. Presented within the report are methods for control, implementation, financing, public involvement, WWTP capacity, collection system capacity, and rehabilitation that will insure strict adherence to the guidelines established in the NPDES Permit.

The document exhaustively reviews alternatives in a series of control plans. Strategies for the optimum alternative control plan are summarized in a "Preferred Plan". The Preferred Plan outlines a $1.071 billion program of four components:

- CSO Program Base Elements - $322 Million
- Upper Rouge Tunnel - $524 Million
- 4 Screening/Disinfection Facilities on Detroit River - $157 Million
- Baby Creek Facilities - $14 Million
- Land Acquisition - $54 Million

Project Status
The elements of the Preferred Plan are in various states of completion regarding both design and construction.

Wastewater Master Plan Pertinence
The design period of the improvements detailed in the Preferred Plan overlap the outlook period of this current Wastewater Mater Plan. Therefore, previously gathered data, design assumptions, forecasts, etc., of the Long Term CSO Control Plan are effective for similar analyses of the endeavors of the current Wastewater Master Plan.

23. Industrial Waste Control Program Re-Evaluation of Local Limitation for Incompatible and Compatible Substances, September 1995

Consultant - McNamee, Porter & Seely, Ann Arbor, Michigan.

Report Background
The re-evaluation of local limitations for incompatible and compatible substances, specifically metals/cyanide and organics (incompatible) and surchargeable substances, Chemical Oxygen Demand, and Total Kjehldahl Nitrogen (compatible), began in 1993.

The study was commissioned as a tool for DWSD's Industrial Waste Control Program (IWC) to control the composition of non-domestic discharges from Significant Industrial Users (SIU's). In this study, specific emphasis had been given to substances prescribed by the Michigan Department of Natural Resources' enforcement of the City's NPDES Permit No.

MI0022802 or to substances thought by the City to be potential water quality or air quality concerns. This re-evaluation study completed its task in two report volumes the first presents results for the determination of the Maximum Allowable Headworks Loadings (MAHL's), the second volume established the allotment of MAHL's to the collection system users.

Wastewater Master Plan Assistance
In addition to quantitative data for compatible and incompatible substances characteristic to the composition of the Detroit area wastewater, this report presents a step-wise methodology for determining Maximum Allowable Headworks Loadings.

24. Atmospheric Deposition Study of PCB's, Mercury and Cadmium, Phase I Final Report, CS-1226, December 1998

Consultant - McNamee, Porter & Seely, Detroit, Michigan

Report Background
The study was initiated as a proactive measure to support the mercury (Hg), polychlorinated biphenyl (PCB), and cadmium (Cd) minimization programs for the DWSD's, NPDES Permit. As a focus, this report attempted to assess the impact of the atmospheric deposition of HG, PCB, and Cd on surface water runoff and sewer collection system loading on the Detroit Wastewater Treatment Plant (DWWTP).

Project Detail Summary
The objective of Phase I, the results of which are summarized in this report, was to determine the magnitude of atmospheric deposition rates and/or fluxes and the

relation to stormwater runoff loadings. This goal was attempted by answering the following questions:

1. What are the concentrations of the studied pollutants in the air, in rainfall, and in runoff?
2. What is the concentration of the studied pollutants in the WWTP flows?
3. What is the contribution of atmospheric deposition to runoff?
4. What is the contribution of atmospheric deposition to the headworks loading at the DWWTP?
5. What is the contribution of atmospheric deposition to the DWWTP during wet weather events?

The following detailed conclusions are paraphrased from the study's report:

- Spatial differences in pollutant concentrations were evident among the three sites. Pollutant concentrations were typically greatest at the industrial site and lowest at the residential site.
- Pollutant mass as measured at the DWWTP was greater than expected based on the individual components of sanitary sewage and runoff.
- Concentrations of pollutants were greatest in the DWWTP headworks during wet weather.
- The mass of pollutants in runoff from the monitoring sites was comparable to the atmospheric deposition mass; however, there was less mass in the runoff than generated as atmospheric deposition.
- First-flush effects were noted during the intensive sampling that was performed at the DWWTP influent and at impacted runoff sampling sites.
- Atmospheric deposition and runoff does not appear to be a major contributor of Cd, Hg, or PCB mass to DWWTP head works.
- PCBs' homologue group analysis results show that the DWWTP influent characteristic is different between dry and wet weather conditions as well as the interceptor source.
- Hg concentrations reported by this study are comparable to studies in other areas of the country.
- All aqueous media sampled during this study (precipitation, runoff, sanitary wastewater, combined wastewater, and DWWTP influent) had higher concentrations of Hg and PCBs than WQBEL's of 1.8 ng/L and 0.02ng/L, respectively, while none of the aqueous media samples exceeded the WQBEL for Cd (5 ug/L). Therefore, it would not be possible to meet the WQBEL with the present background levels of pollutants (such as sanitary sewerage), including the background levels that exist in atmospheric deposition and runoff.
- Presently, DWSD is in compliance with its NPDES permit requirements for the three pollutants on an MDL basis. In contrast, in support of the Hg and PCBs minimization program stipulated in the DWSD NPDES permit, future study (Phase II) should focus on assessing the source(s) of Hg and PCBs reaching the DWWTP headworks.

Wastewater Master Plan Pertinence
This report identifies likely sources that are contributors of Hg, PCB, and Cd. Therefore, if it becomes an objective of CS-1314 to develop strategies for controlling DWWTP effluent concentrations of the above mentioned pollutants, this report can be a valuable reference.

25. Wastewater CS-1158 Task 2 & 3 - Regulator Rehabilitation, Remote Flow Control

Consultant- Wade-Trim / Associates, Detroit, MI

Project Background
The title *Collection System Improvements* was given to describe collectively a series of tasks under the DWSD contract CS-1158.
These tasks were envisioned as a means to comply with the 1989 Discharge Permit issued by the Michigan Department of Natural Resources (MDNR) which added requirements to eliminate or adequately treat CSO's at approximately forty overflow points along the Rouge and Detroit Rivers.

Project Detail Summary
Tasks 2 & 3 - Regulator Rehabilitation, Remote Flow Control. These tasks of CS-1158 served to provide proposed restoration or rehabilitation of existing structural and associated access components, and flow control mechanical equipment of regulating facilities controlling flows into the Detroit and Rouge Rivers. This report, issued in August 1993, provides assessed conditions and offers recommended improvements to the regulating facilities. The findings of this report were based on the review of as-built or contract drawings, field inspection reports, and existing drawings that have been updated.

Project Status
Tasks 2 & 3 - Regulator Rehabilitation, Remote Flow Control. These collection system improvements constructed under PC-695.

Wastewater Master Plan Assistance
This report provides thorough descriptions of common sewer conditions that are inherent to the Detroit system that may assist future maintenance planning.

26. Wastewater Collection System Improvements CS-1158 Task 4 - Detention Basins

Consultant- Wade-Trim / Associates, Detroit, MI

Project Background
The title *Collection System Improvements* was given to describe collectively a series of tasks under the DWSD contract CS-1158. These tasks were envisioned as a means to comply with the 1989 Discharge Permit issued by the Michigan Department of Natural Resources (MDNR) which added requirements to eliminate or adequately treat CSO's at approximately forty overflow points along the Rouge and Detroit Rivers.

Project Detail Summary
Task 4 - Detention Basins. In October 1989, the Michigan Department of Natural Resources re-issued the discharge permit to the Detroit Water and Sewerage Department adding requirements for the City to eliminate or adequately treat Combined Sewer Overflows (CSO) at approximately 40 overflow points along the Rouge and Detroit Rivers. In response to this mandate, DWSD, under contract CS-1158, three storm water detention facilities were designed for treatment of specific overflows into the Rouge River.

- **Hubbell-Southfield Combined Sewer Overflow Facility**. The facility is located in Dearborn, MI south of Michigan Avenue, east of the Southfield Expressway and north of Rotunda Drive (outfall 058). The detention basin was designed as a flow through basin with 22 MG of storage capacity that would provide solids removal, detention and disinfection of combined sewer overflows for the Hubbell-Southfield drainage district. The basin was designed so that a "complete capture" would be achieved for 75% of the storms within a typical year.

- **Puritan-Fenkell Combined Sewer Overflow Facility**. The Puritan-Fenkell Detention Facility was designed to prevent 2.8 MG of untreated combined sewer overflow from entering the Main Branch of the Rouge River at the Puritan and Fenkell outfalls (B-75 and B-76). (Location + design criteria statement). Additionally, this facility will provide pumpage of dry-weather wastewater flows.

- **Seven Mile Combined Sewer Overflow Facility**. The Seven Mile CSO facility was designed to eliminate the untreated combined sewer overflows from Outfall No.s 076 and 078. The report details the design criteria for this 2.2 MG basin that will provide 30 minutes of detention, settling, skimming, disinfection for the maximum hour discharge flow from a storm of 1-inch (one

year-one hour). This basin is located in the city of Detroit north of Seven Mile Road and east of Shiawassee Road.

Project Status
Task 4 - Detention Basins.

- Hubbell-Southfield Combined Sewer Overflow Facility. Construction on this facility commenced under Contract PC-694 and was completed on March 17, 1999.

- Puritan-Fenkell Combined Sewer Overflow Facility. Construction on this facility commenced under Contract PC-697 and was completed on January 15, 1999.

- Seven Mile Combined Sewer Overflow Facility. Construction on this facility commenced under Contract PC-696 and was completed on January 28, 1999.

Wastewater Master Plan Assistance
These basis of design reports provide design assumptions that have been considered for each of the unit processes involved for these facilities as well as physical data regarding each facility's sub-drainage basin (rainfall, runoff, etc.).

27. Segmented Facilities Plan January 31,1978

Consultant- Giffels / Black & Veatch (JV)

Project Background
The Segmented Facilities Plan Report served as a final update to the draft Overview Plan with Environmental assessment (June 1977). This document was prepared for compliance with the provisions of Public Law 92-500, the Water Pollution Control Act (Amendments of 1972).

Project Detail Summary
Of keen interest in the Segmented Facilities Report is the extensive listing of recommendations for improvements to the wastewater treatment plant and the wastewater collection system. The recommendations are categorized in the following three categories:

1. Optimization of Existing Facilities (1977-1981)

2. New Major Construction Programs (1977-1981)

3. Construction (1981-2000)

These recommendations as they are in the report are attached in Appendix E.

Wastewater Master Plan Assistance
The report contains a wealth of historical information regarding capital improvement programs, treatment technology recommendations, environmental impact, economics, legal and institutional considerations, etc.

28. Detroit Facilities Plan Interim Report Alternative Facilities CS-806 June 1981

Consultant- Giffels/Black & Veatch (JV), Detroit, Michigan
Report Background
The Detroit Facilities Plan is a direct result Consent Judgement against the City of Detroit. Its purpose as stated in the report was as follows:

> The Detroit Facilities Plan was to investigate all aspects relating to transport, storage, and treatment of combined sewer overflows (CSO), plus treatment of dry weather flows in excess of plant capacity. This Alternative Facilities Interim Report (AFIR) responds to Item IV.A.7 of the amended Consent Judgement, which stipulates that the following elements be included:

- A description of the benefits and costs resulting from improved water quality at each of the alternative levels of control.
- An environmental information document.
- Proposed outfall requirements and effluent limitations for each facility.
- Implementable site plans.

Project Detail Summary
The Alternative Facilities Interim Report had a succinctly defined group of objectives outlined by Section IV, Paragraph B of the original Consent Judgment. These objectives were as stated in the report:

- Establish the quantity and quality of combined sewer overflows within the service area.
- Calibrate the precise capability and capacity of the then existing plant.
- Establish the total quantity and characteristics of the influent flow from both combined and sanitary sewers.
- Identify and describe the facilities required at the existing treatment plant or any other identified site to treat combined sewer overflows as well as dry weather flows.
- Develop a time schedule and cost opinions for the work to be performed within the planning period.
- Proved an implementable site plan for all facilities required during the planning period
- Describe all outfall requirements and limitations for each treatment facility.

- Resolve air quality standard attainment issues associated with ultimate sludge disposal.
- Prepare an environmental assessment for all facilities and sites.

Wastewater Master Plan Assistance
The report's focus was to establish CSO control alternatives in a technically and economically feasible manner through the year 2000. An extensive list of this report's conclusions and recommendations along with the Table of Contents has been entered into the project files.

29. Final Design Report for Raw Wastewater Pumping Station No. 2A CS-967 January 1987

Consultant- Metcalf & Eddy, Detroit, MI

Report Background
The Final Design Report for the Raw Wastewater Pumping Station No. 2A is a follow-up to the Preliminary Design Report on Raw Wastewater Pumping Station No. 2A (October 1986). The report was a multi-consultant effort that provided the basic concepts for the design of the proposed facility. This package was presented in two parts, a document summarizing the design criteria of all the design disciplines as well as a cost estimate and a bound set of 63 preliminary contract drawings.

Project Detail Summary
Upon recommendation of the Detroit Water and Sewerage Department, Metcalf & Eddy, through this report, have summarized their design efforts establishing the criteria for the construction of Raw Wastewater Pumping Station No. 2A (see attached table of contents in Appendix H). The facility was described and elaborated on as being comprised of four mechanical process areas: Pumping Station, Screenings Facility, Chemical Facility, and Grit Chambers. Detailed design criteria were established within the text for the aforementioned process areas.

Project Status
Construction for Pumping Station No. 2A was completed in Summer 1994.

Wastewater Master Plan Assistance
The report provides excellent data regarding design flow capacities for the unit mechanical processes of Pump Station 2A which will allow the assessment of increased flow capacity from the collection system to the pump station. Also, the report neatly summarizes flow characteristics (design capacities, maximum

daily, etc.) and distribution for the interceptors entering the wastewater treatment plant which has been entered into the project files.

30. Detroit River Plume Monitoring and Modeling Program CS-929 May 1987

Consultant- Environmental Science and Engineering, Inc., Gainesville, Florida Limno-tech, Inc., Ann Arbor, Michigan

Report Background
The Detroit River Plume Monitoring and Modeling Program commenced in October 1984 to respond to the imposed effluent goals on certain chemical constituents of the Detroit Wastewater Treatment Plant (DWWTP) into the Detroit River.

Project Detail Summary
The effluent goals prescribed by the National Pollution Discharge Elimination System (NPDES) Permit No. MI0022802 was administered by the Michigan Department of Natural Resources (MDNR) on June 8, 1984 by judicial notice. The permit established concerns about the residual effects of the discharge of chlorinated wastewater and toxic substances on the aquatic ecology of the Detroit River. A study commenced that involved a program to study the WWTP effluent, investigate the toxicity and extent of the discharge plume in the Detroit River, and evaluate the effects of the effluent on human health and the aquatic environment. Included in this effort was a program identified in the May 1987 report as:

> The study design of the entire program included four intense seasonal field studies for toxicant sampling, dye studies, and aquatic ecology surveys. Biweekly toxicant monitoring of the effluent and the river was also completed for the summer of 1985. Acute toxicity bioassay screening of the effluent and chronic bioassays to determine potential long-term effects of the effluent were conducted in July and August 1985. An extensive numerical modeling effort to investigate the fate and effects of the DWSD effluent under "worst-case" conditions was also completed. The model was calibrated and verified with the collected field data and was used to predict impacts under various operational scenarios.

The May 1987 report summarizes the results of the preceding investigations. Also, the report includes a presentation of historical operating data for the DWWTP, Detroit River data, and a review of the MDNR Rule 57. An analysis

of the DWWTP effluent plume's effect respective to environmental and human health risks is discussed in this report.

Project Status
The study has concluded and the final report was issued in May 1987. Currently there have not been subsequent studies on this matter.

Wastewater Master Plan Assistance
The report provides an excellent summary of chemical, biological, and physical data for the flows of the DWWTP and the Detroit River.

Also, presented within the report is information that could serve as a procedural outline for studies regarding:

- Bathymetry and Currents
- Dye Studies
- Toxicant Sampling
- Ecological Studies
- Aquatic Toxicity Studies
- Hydrodynamic Modeling
- Risk Assessment for Aquatic Toxicity and Human Health Effects.

This collection of data and summarized procedures will be useful for planning when the study or design of wastewater discharges or treatment plant effluents into a dynamic watershed system are being considered.

31. Wastewater System Operation Plan And Subsequent Operational Plan Updates October 1994

Consultant- DWSD In-House Report

Report Background
October 1994 Wastewater Operation Plan. This report was drafted to fulfill a requirement of the DWSD's National Pollutant Discharge Elimination System (NPDES) Permit, Section A.8.c. For compliance with the permit, DWSD prepared this operational plan which details the management of the wastewater collection system. Furthermore, according to the NPDES Permit, the report was to be updated annually to detail DWSD's approach to collecting and transporting wastewater from its service area (City and Suburban Service Districts) to the treatment plant.

Wastewater Master Plan Assistance
DWSD's Wastewater System Operational Plan is a comprehensive and thorough description of the collection system facilities, operational strategies, and the organization that maintains and operates the collection system.

The Wastewater System Operational Plan Updates are reports providing instituted operational changes, planned or constructed system rehabilitation/capital improvements, and other annual information as required by the NPDES permit.

32. Atmospheric Deposition Study of PCB's, Mercury and Cadmium Phase I Final Report CS-1226 December 1998

Consultant- McNamee, Porter & Seely, Detroit, Michigan

Report Background
The study was initiated as a proactive measure to support the mercury (Hg), polychlorinated biphenyl (PCB), and cadmium (Cd) minimization programs for the DWSD's, NPDES Permit. As a focus, this report attempted to assess the impact of the atmospheric deposition of HG, PCB, and Cd on surface water runoff and sewer collection system loading on the Detroit Wastewater Treatment Plant (DWWTP).

Project Detail Summary
The objective of Phase I, the results of which are summarized in this report, was to determine the magnitude of atmospheric deposition rates and/or fluxes and the relation to stormwater runoff loadings. This goal was attempted by answering the following questions:

1. What is the concentration of the studied pollutants in the air, in rainfall, and in runoff?
2. What is the concentration of the studied pollutants in the WWTP flows?
3. What is the contribution of atmospheric deposition to runoff?
4. What is the contribution of atmospheric deposition to the headworks loading at the DWWTP
5. What is the contribution of atmospheric deposition to the DWWTP during wet weather events?

The following detailed conclusions are paraphrased from the study's report:

- Spatial differences in pollutant concentrations were evident among the three sites. Pollutant concentrations were typically greatest at the industrial site and lowest at the residential site.
- Pollutant mass as measured at the DWWTP was greater than expected based on the individual components of sanitary sewage and runoff.
- Concentration of pollutants were greatest in the DWWTP headworks during wet weather.
- The mass of pollutants in runoff from the monitoring sites was comparable to the atmospheric deposition mass; however, there was less mass in the runoff than generated as atmospheric deposition.
- First-flush effects were noted during the intensive sampling that was performed at the DWWTP influent and at impacted runoff sampling sites.
- Atmospheric deposition and runoff does not appear to be a major contributor of Cd, Hg, or PCB mass to DWWTP head works.
- PCBs' homologue group analysis results show that the DWWTP influent characteristic is different between dry and wet weather conditions as well as the interceptor source.
- Hg concentrations reported by this study are comparable to studies in other areas of the country.
- All aqueous media sampled during this study (precipitation, runoff, sanitary wastewater, combined wastewater, and DWWTP influent) had higher concentrations of Hg and PCBs than WQBELs of 1.8 ng/L and 0.02ng/L, respectively, while none of the aqueous media samples exceeded the WQBEL for Cd (5 ug/L). Therefore, it would not be possible to meet the WQBEL with the present background levels of pollutants (such as sanitary sewerage), including the background levels that exist in atmospheric deposition and runoff.
- Presently, DWSD is in compliance with its NPDES permit requirements for the three pollutants on an MDL basis. In contrast, in support of the Hg and PCBs minimization program stipulated in the DWSD NPDES permit, future study (Phase II) should focus on assessing the source(s) of Hg and PCBs reaching the DWWTP headworks.

Wastewater Master Plan Pertinence

This report identifies likely sources that are contributors of Hg, PCB, and Cd. Therefore, if it becomes an objective of CS-1314 to develop strategies for controlling DWWTP effluent concentrations of the above mentioned pollutants, this report will be a valuable reference.