UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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CLEAN WATER ACT COMPLIANCE INVESTIGATION

City of Detroit
Combined Sewer System
Detroit, Michigan
Project No.: VP0671

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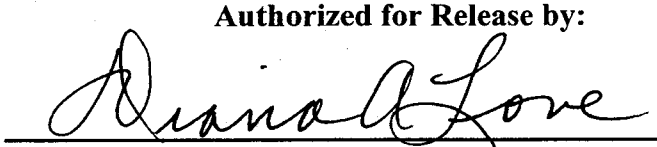

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EXECUTIVE SUMMARY

INTRODUCTION

At the request of U.S. EPA Region 5, the National Enforcement Investigations Center (NEIC) conducted a Clean Water Act (CWA) compliance investigation of the combined sewer overflow (CSO) control implementation requirements for the City of Detroit, Michigan (Detroit) combined sewer system. The objective of the investigation was to determine compliance with applicable National Pollutant Discharge Elimination System (NPDES) permit requirements related to CSO control implementation. This report discusses the Detroit combined sewer system and Clean Water Act compliance issues related to CSO control implementation.

Detroit is located in Wayne County near the Detroit River in southeastern Michigan. The Detroit combined sewer system serves 77 communities (approximately 2.9 million people) and consists of about 3,400 miles of sewer over 840 square miles. Pollution control and wastewater generation and management operations for Detroit are regulated by environmental permits and regulations administered by the U.S. EPA and the Michigan Department of Environmental Quality (MDEQ).

ON-SITE INSPECTION SUMMARY

On-site inspections of Detroit were conducted by NEIC on April 26 through April 28, 2005 and June 14 through June 21, 2005. Credentials were presented to Gary Fujita, Deputy Director, Detroit Water and Sewerage Department (DWSD). A general overview of the Detroit combined sewer system was presented, followed by a detailed discussion of the implementation of CSO controls. Later, inspections were conducted of the combined sewer system, including CSO treatment facilities, in-system storage devices, CSO outfalls, the systems control center (SCC), and wastewater treatment plant (WWTP). Records/documents associated with regulatory activities were also reviewed. An exit conference between regulatory and city personnel was conducted to discuss preliminary inspection findings. NEIC investigators stressed that final determinations will be made in conjunction with regional and state personnel. Phil Argiroff and Jodi Peace from MDEQ, Rose Ellison from EPA Region 5, Grosse Ile Office, and Allan Batka from EPA Region 5, Chicago Office, participated in portions of the on-site inspections.

SUMMARY OF FINDINGS

The following is a brief summary of CWA compliance issues found during the NEIC investigation of Detroit. The background for these findings is described in the Technical Report and a fully detailed description of the findings is included at the end of the report.

Areas of Noncompliance

1. Annual updates to Detroit's Collection System and CSO Treatment Facilities Operational Plan have not fully reflected changes to the collection system.

2. Regularly-scheduled calibrations were not performed on the on-site compliance-related testing equipment at the Puritan-Fenkell and Seven Mile facilities. In addition, records which documented general maintenance and calibration activities for these instruments used for dissolved oxygen, pH, and total residual chlorine testing were not maintained.

Areas of Concern

A. Because of the size of the sewer system and number of overflow locations, Detroit's practice of identifying dry weather overflows through visual inspections may not be adequate.

B. While Detroit has a program for notifying the public once a CSO discharge occurs, there is no mechanism in place to inform the public of the location of CSO outfalls.

C. The Puritan-Fenkell and Seven Mile facilities take on wet weather-related flow in volumes which typically do not approach their respective design storage/treatment capacities.

D. Prolonged storage has resulted in the decay of sodium hypochlorite disinfectant at the Puritan-Fenkell and Seven Mile RTBs, and the Leib screening and disinfection facility. Detroit has disposed of the off-specification sodium hypochlorite in the respective interceptors draining these facilities.

E. NEIC's compliance review of the Collection System and CSO Treatment Facilities Operational Plan highlighted the limitations of the format specified in the NPDES permit.

F. There is no on-site designation of CSO outfalls locations (sign, plaque, marker, etc.), causing some initial confusion between NEIC and DWSD personnel regarding outfall designations.

G. Certain operating parameters for the Puritan-Fenkell and Seven Mile RTBs are not specified in the operating procedures for these two facilities.

H. A sample of electrical and instrumentation preventive maintenance records maintained by Wade-Trim was not readily available during the NEIC inspection.

REGULATORY SUMMARY

Detroit, designated as DWSD hereinafter, is regulated by an NPDES permit because they directly discharge wastewater to the Detroit River, Rouge River, Conner Creek, Fox Creek, and O'Brien Drain. NPDES Permit Number MI0022802 [Appendix A] was last reissued to DWSD by MDEQ on October 7, 2003, became effective January 1, 2004, and expires on October 1, 2007. The permit authorizes the discharge of wastewater through five outfalls from the WWTP, four outfalls from CSO retention treatment basins, three outfalls from screening and disinfection facilities, and 70 CSO outfalls. The permit contains provisions regulating dry weather discharges from the WWTP as well as wet weather discharges from the WWTP, CSO treatment facilities, and CSO outfalls. The inspection and this report focuses on the wet weather CSO provisions of the permit and not dry weather discharges from the WWTP.

The following is a summary of the major CSO provisions of the permit that were evaluated during the NEIC investigation:

- **Combined Sewer Overflow Retention Treatment Basin Discharge Authorization, Monitoring Points 101A, 102A, 103A, and 104A (NPDES Permit MI0022802, Part I.A.6.)** – DWSD is authorized to discharge treated combined sewage from the Hubbell/Southfield CSO Retention Treatment Basin (RTB), Puritan/Fenkell CSO RTB, Seven Mile CSO RTB, and Conner Creek CSO RTB via monitoring points 101A through outfall 101, 102A through outfall 102, 103A through outfall 103, and 104A, through outfall 104, respectively. These discharges are authorized when the basins are full and wastewater flows exceed downstream interceptor capacity. The Conner Creek CSO RTB (104A/104) was under construction at the time of the inspection and requirements were not effective until October 1, 2005. The CSO RTB requirements include effluent limitation and monitoring requirements, total residual chlorine and disinfection requirements, basin dewatering and decanting requirements, and operation and maintenance plan implementation requirements.

- **Combined Sewer Overflow Screening & Disinfection Facilities Discharge Authorization, Monitoring Points 105A, 106A, and 107A (NPDES Permit MI0022802, Part I.A.7.)** – DWSD is authorized to discharge treated combined sewage from the Leib CSO Screening & Disinfection Facility, St. Aubin CSO Screening & Disinfection Facility, and Baby Creek CSO Screening & Disinfection Facility via monitoring points 105A through outfall 105, 106A through outfall 106, and 107A through outfall 107, respectively. These discharges are authorized when the wastewater flows exceed downstream interceptor capacities. The Baby Creek facility (107A/107) was under construction at the time of the inspection and requirements were not effective until December 31, 2005. The Screening & Disinfection Facility requirements include effluent limitation and monitoring requirements, total residual chlorine and disinfection requirements, and operation and maintenance plan implementation requirements.

- **Wastewater Treatment Plant Wet Weather Operational Plan (NPDES Permit MI0022802, Part I.A.8.)** – On or before January 1, 2004, DWSD shall submit to the MDEQ an approvable Wastewater Treatment Plant Wet Weather Operational Plan that provides the protocol for WWTP operations during the interim period before full completion of the Long-term CSO Control Plan. This plan shall maximize wet weather treatment at the WWTP, while complying with effluent limits and all other conditions of the permit, and minimizing untreated combined sewage discharges in the tributary collection system. The Wastewater Treatment Plant Wet Weather Operational Plan shall be coordinated with the Collection System and CSO Treatment Facilities Operational Plan, which is discussed below. Annually, on or before January 1, the Wastewater Treatment Plant Wet Weather Operational Plan shall be updated and submitted to the MDEQ for review and approval. DWSD is also required to maintain a wet weather primary treatment capacity of 1,520 million gallons per day (raw) and a wet weather secondary treatment capacity of 930 million gallons per day, including recycle (Part I.A.12.).

- **Discharges from Combined Sewer Systems – Limited Discharge Authorization (NPDES Permit MI0022802, Part I.A.13.a.)** – DWSD is required to utilize, to the maximum extent practicable, available sewerage system transportation capabilities for the delivery of combined sewage to treatment facilities. For an interim period during which the amended Long-term CSO Control Plan is to be implemented, DWSD is authorized to discharge during wet weather events (as defined in the permit) combined sewage from the outfalls and locations listed in the permit according to the following conditions:

  1) a flow rate equivalent to the peak dry weather flow rate has been conveyed to the secondary treatment facilities for treatment without bypass;

  2) the total sewerage system storage and transportation capacity for conveyance of wet weather flows to the treatment facilities for treatment has been utilized within the hydraulic design constraints of the system;

  3) all primary treatment plant capacity and secondary treatment plant capacity has been utilized, unless a storm event is localized to the extent that the hydraulic capacity of a portion of the collection system (considering storage) is exceeded prior to reaching plant capacities, and;

  4) DWSD is in full compliance with all requirements as set forth in Part I.A.13 of the permit (interim and final CSO control programs)

  This section of the permit lists all the CSO outfalls and lists those outfalls that will no longer be authorized once long-term control projects are completed.

- **Interim Combined Sewer Overflow Program (NPDES Permit MI0022802, Part I.A.13.b.2.)** – In the event of a CSO discharge, DWSD shall, in accordance with notification procedures approved by MDEQ, notify MDEQ, the local health departments, a daily newspaper of general circulation in the county in which Detroit is located, and a daily newspaper of general circulation in the county or counties in which the municipalities whose waters may be affected by the discharge are located. This requirement applies to all CSO discharges, including the partially treated RTB and Screening & Disinfection Facility discharges. Notification that the discharge is occurring

shall be made promptly after the discharge begins. After conclusion of the discharge, DWSD shall provide written notification to the above parties of the following:

1) the amount of discharge as measured in accordance with the procedures approved by MDEQ;

2) the reason for the discharge;

3) the time the discharge began and ended as measured in accordance with the procedures approved by MDEQ, and;

4) verification that DWSD is in compliance with the combined sewer overflow requirements of the permit. If such verification cannot be made, an explanation shall be provided detailing the reasons why DWSD is not in compliance with the combined sewer overflow requirements of the permit

DWSD shall also annually contact municipalities whose waters may be affected by DWSD's discharge of combined sewage, and if those municipalities wish to be notified in the same manner as specified above, DWSD shall provide such notification. Such notification shall also include a daily newspaper in the county of the affected municipality.

- **Collection System and CSO Treatment Facilities Operation Plan (NPDES Permit MI0022802, Part I.A.13.f.)** – DWSD shall continue implementation of the approved Collection System and CSO Treatment Facilities Operational Plan (Operational Plan). The implementation of the Operational Plan shall be coordinated with the Wastewater Treatment Plant Wet Weather Operation Plan. Any changes to the Operational Plan which affect the rate, volume, or characteristics of the discharge, or the system storage and transportation for conveyance of wet weather flows, shall be submitted to the MDEQ and approved prior to implementation. Annually, on or before October 1, DWSD shall submit an Operational Plan Update, which incorporates all changes made to the plan during the last year. The Operational Plan shall define the hydraulic design constraints of the system during both dry and wet weather operation. Each annual submittal of the Operational Plan update shall include operational data from the previous 12-month period for DWSD's in-service CSO RTBs. This permit condition also contains several required elements for plan inclusion.

The remaining major CSO provisions of the permit, found under Part I.A.13.e, pertain to implementing DWSD's Final (Long-term) CSO Control Plan. These provisions include required deadlines related to various projects intended to provide for the elimination or adequate treatment of combined sewage discharges. In some instances, the required deadline dates are past the expiration date of the permit. Table 1 is a summary of the long-term CSO control projects and the status of the projects at the time of the NEIC inspection.

A Second Amended Consent Judgment (SACJ) was entered on August 3, 2000 between to DWSD, MDEQ, Wayne County, Oakland County, Macomb County, and the United States to address NPDES permit compliance, mainly related to WWTP discharges and missed permit

compliance schedule deadlines [Appendix U]. The original Consent Judgment was entered on September 14, 1977 and was first amended on April 25, 1980. In addition to containing requirements regarding WWTP operation, the SACJ includes a list of permit compliance schedule extensions under Attachment C. The only two compliance schedule extensions active during the NEIC inspection were the Connor Creek Pump Station Rehabilitation project (PC-674) and the System-Wide Instrumentation and Control project (PC-713). The deadlines for those two projects were further extended under a Stipulated Order Amending Attachment C of the SACJ, issued on February 22, 2005 [Appendix V]. The PC-674 deadline was extended from July 9, 2004 to December 1, 2005, and the PC-713 deadline was extended from June 1, 2004 to December 31, 2005.

Table 1
SUMMARY AND STATUS OF LONG-TERM CSO CONTROL PROJECTS
Detroit, Michigan

Permit Provision	Project	Deadline	Status
Part I.A.13.e.1.a.	Commence construction of Baby Creek CSO Facilities.	January 1, 2004	Construction commenced on schedule, as required.
Part I.A.13.e.1.b.	Complete construction of Baby Creek CSO Facilities and place into full operation/service.	December 31, 2005	Screening and disinfection facility under construction at time of the inspection and scheduled to be completed on time.
Part I.A.13.e.1.c.	Submit Basis of Design Report to address outfalls 051-054 and 056.	February 1, 2009	Project to be determined. Final project required to be completed by August 1, 2012.
Part I.A.13.e.2.a.	Submit Basis of Design Report for CSO Retention Tunnel Facility to address outfalls 059-069, 072-075, 077, and 079.	May 1, 2005	Basis of Design Report submitted on April 27, 2005. Final plans and specifications and an implementation schedule for project completion is required by February 1, 2007.
Part I.A.13.e.3.a.	Submit Basis of Design Report for CSO control facilities to address outfall 082.	May 1, 2005	Basis of Design Report submitted on April 29, 2005. Construction is required to be completed by December 1, 2009.
Part I.A.13.e.4.a.	Submit CSO evaluation plan for Conner Creek CSO RTB.	September 1, 2004	Evaluation plan submitted on August 26, 2004 and approved on March 14, 2005.
Part I.A.13.e.4.b.	Complete construction of Conner Creek CSO RTB and place in full operation.	October 1, 2005	Conner Creek RTB construction substantially complete at time of inspection and on schedule for full operation.
Part I.A.13.e.5.	Complete construction of Conner Creek Pump Station rehabilitation and place into full service/operation.	July 9, 2004	Deadline modified to December 1, 2005 due to project scope expansion. Deadline extension covered under amendment to Second Amended Consent Judgment issued on February 22, 2005.
Part I.A.13.e.6.a.	Submit draft CSO Pilot Project Evaluation Reports for Leib and St. Aubin Screening and Disinfection Facilities.	January 1, 2005	Draft combined report submitted on December 23, 2004.

Permit Provision	Project	Deadline	Status
Part I.A.13.e.6.b.	Submit final CSO Pilot Project Evaluation Reports for Leib and St. Aubin Screening and Disinfection Facilities.	July 1, 2005	Final combined report submitted on July 1, 2005.
Part I.A.13.e.7.a.	Submit Basis of Design Report for CSO control facilities to address outfall 083 (Belle Isle Pump Station).	January 1, 2004	Submitted on time and construction permit issued on February 28, 2005 for RTB.
Part I.A.13.e.7.b.	Submit final plans and specifications for CSO control facilities to address outfall 083 (Belle Isle Pump Station).	June 1, 2004	Submitted on time and construction permit issued on February 28, 2005 for RTB.
Part I.A.13.e.7.c.	Commence construction of CSO control facilities to address outfall 083 (Belle Isle Pump Station).	March 1, 2005	Deadline changed to April 1, 2005 through minor permit modification. Project under construction at time of inspection. Project required to be completed by March 1, 2007.
Part I.A.13.e.8.a.	Complete construction of the primary treatment capacity upgrade and place into full service/operation.	October 1, 2004	Completed project on schedule, including addition of two new primary clarifiers and addition of new pump at pump station 2. Note: actual primary treatment capacity fluctuates due to WWTP rehabilitation projects (PC-744).
Part I.A.13.e.8.b.	Complete construction and place the system-wide instrumentation and control improvements (PC-713) into full service/operation, commence documentation of rainfall and discharge frequency and duration, and establish notification procedures.	June 1, 2004	Deadline modified to December 31, 2005 due to project scope expansion. Deadline extension covered under amendment to Second Amended Consent Judgment issued on February 22, 2005. The project was nearing completion during the NEIC inspection and DWSD was preparing to conduct a system performance test during August 2005.
Part I.A.13.e.8.c.	Complete construction of in-system storage facilities (13 inflatable dams) and place into full service/operation.	July 1, 2005	All but one inflatable dam scheduled to be completed by the deadline. The remaining dam is to be completed and in operation by October 30, 2005 as required by an MDEQ District Compliance Agreement issued on May 23, 2005.
Part I.A.13.e.8.d.	Submit a list and description of the collection system rehabilitation projects planned for the following calendar year.	October 1 (annually)	List and description submitted as part of Collection System and CSO Treatment Facilities Operational Plan. Most recent plan was submitted on September 30, 2004.
Part I.A.13.e.9.	Submit amended Long-term CSO Control Plan for the Rouge River and Detroit River.	December 1, 2008	To be determined.
Part I.A.13.c.	Conduct in-stream Escherichia coli testing of CSO discharges.	On-going	According to MDEQ, this requirement was waived by the Wayne County Health Department, as allowed by the permit.

Permit Provision	Project	Deadline	Status
Part I.A.13.d.	Eliminate direct connections of eaves troughs and roof downspouts or provide demonstration that disconnection is not a cost-effective means of reducing CSO frequency or duration.	January 1, 2005 for residential property; January 1, 2009 for commercial and industrial properties	DWSD submitted an evaluation of downspout disconnection cost effectiveness to MDEQ on December 30, 2004. The evaluation, which determined that disconnection is not cost effective, was under review by MDEQ at the time of the NEIC inspection.
Part I.A.13.f.12.	Pursue coordination of operational plans with tributary communities and submit the results of the coordination effort.	February 1, 2004	Results of coordination effort were submitted to MDEQ on February 1, 2004.

FACILITY INSPECTION/DISCUSSIONS

The following section describes the observations and discussions that occurred during the on-site inspections of the DWSD combined sewer system. The descriptions are based on city-provided documentation, oral descriptions by city representatives, and visual observations of the combined sewer system. Photographs taken during the NEIC inspections are included in Appendix B along with complete photograph logs.

City Organizational Structure

Management of the combined sewer system falls under the jurisdiction of the DWSD, which manages both public water supply and wastewater sewer operations for the city. The DWSD, with about 2,800 employees, is governed by a seven-member Board of Water Commissioners whose members are appointed by the Mayor of Detroit. Four of the commissioners represent Detroit residents and three commissioners represent suburban wholesale customers with appointees from Wayne, Oakland, and Macomb counties. The DWSD is directed by an Executive Management Team led by Director Victor M. Mercado and Deputy Director Gary Fujita. The DWSD is organized into six operating groups: Public Affairs, Asset Maintenance, Engineering Services, Financial Services, Wastewater Operations, and Water Supply Operations. The Wastewater Operations Group includes WWTP operation and maintenance, CSO control operations, laboratory operations, and industrial waste control. The Asset Maintenance Group includes the Maintenance and Repair Division (sewer inspection and repair, sewer cleaning, catch basin cleaning, basement backup response) and Mechanical Maintenance Division (moving equipment maintenance – pumps, backwater gates, regulators, sluice gates, inflatable dams). The Engineering Services Group oversees sewer design and construction, sewer inspections, WWTP design and construction, and CSO control facility design and construction. The Systems Operation Control Division, which does not fall directly under one of the six operating groups, includes the Systems Control Center (SCC). The SCC consists

of the staff and equipment used to control and monitor various components of the wastewater collection system, including CSO controls.

From a day-to-day standpoint, operation of CSO control facilities is staffed under the Wastewater Operations Group. At the time of the inspection, a staff of 12 DWSD people provided general operation and maintenance of the CSO facilities (three RTBs and two screening and disinfection facilities). Electrical and instrumentation maintenance for the CSO facilities was being provided by contractor Wade-Trim. Once all the proposed long-term CSO control facilities are in place and in operation, the DWSD plans on having east and west operations groups, with offices proposed at the Conner Creek RTB on the east side and the CSO Retention Tunnel Facility on the west side.

DWSD Combined Sewer System

The DWSD sewer system serves the cities of Detroit, Hamtramck, and Highland Park (140 square miles, 1 million people), as well as over 70 suburban sanitary districts and communities (700 square miles, 1.9 million people). The majority of the system's combined sewers are within Detroit, Hamtramck, and Highland Park, with some suburban communities also containing combined sewers. A total of 222 square miles of tributary area is currently served by combined sewers. In general, combined wastewater is delivered through the DWSD sewer system through interceptor sewers to the DWSD WWTP for treatment and discharge. Wet weather flows in excess of the WWTP treatment capacity are either discharged to existing CSO treatment facilities or discharged to the Detroit and Rouge Rivers through permitted CSO outfalls. The WWTP treatment capacity and response to wet weather events is discussed in further detail in the "WWTP Wet Weather Operational Plan" section of this report. Appendix C contains a general overview figure of the DWSD collection system, including CSO treatment facilities and CSO outfalls.

The areas tributary to the WWTP are divided into sewer districts, consisting of the Detroit sewer district, the suburban wastewater districts serving multiple communities, and the individual communities that contract directly with the DWSD. The Detroit sewer district is divided into nine primary drainage districts. Appendix D contains an overview of the DWSD sewer system, including a detailed description of the sewer districts, drainage districts, and major interceptors.

The WWTP is served by three main interceptors designated as the Detroit River Interceptor (DRI), Oakwood-Northwest Interceptor, and the North Interceptor-East Arm (NI-EA). The DRI is about 10 miles long and runs southwest along the Detroit River to the WWTP, ranging in size from 8 feet at the upstream end to 16 feet at the WWTP. The DRI conveys dry weather flow and a portion of the wet weather flow to the WWTP. Flows into the DRI are

limited by regulators or stainless steel sluice gates, based on the water levels in the interceptor. Flows in excess of the DRI capacity are discharged to CSO treatment facilities or to the Detroit River through permitted CSO outfalls.

The Oakwood-Northwest Interceptor consists of the Oakwood Interceptor and Northwest Interceptor (NWI). The Oakwood Interceptor runs about 1.5 miles along the Rouge River from the Baby Creek regulator to the WWTP and is 12-feet, 9-inches in size. The Oakwood Interceptor receives flow from the Wayne County Rouge Valley interceptor, the city of Dearborn, and regulated flows from Detroit sewer drainage districts. Flows in excess of the Oakwood Interceptor capacity at the regulated inflow points are discharged to the Rouge River through permitted CSO outfalls. The NWI begins at the upstream end of the Oakwood Interceptor and runs about 8 miles to the north and west along the Rouge River on the west side of the city. The NWI ranges in size from 4 feet to 10 feet in diameter. In addition to several Detroit sewer drainage districts, the NWI serves Melvindale, Allen Park, portions of Dearborn, portions of Farmington, and the Rouge Valley Sewage Disposal District. Many relief sewers discharge directly into the NWI and many discharges to the Rouge River are directly from the NWI, unlike a traditional interceptor. Several discharge locations along the NWI are controlled by double-leaf gates located at CSO outfall locations. Flows in excess of the NWI capacity are discharged to CSO treatment facilities or to the Rouge River through permitted CSO outfalls.

The NI-EA was constructed to convey sanitary sewer flows from Oakland and Macomb counties to the WWTP. The upper portion of the interceptor begins at the Northeast pumping station, which receives flows from the Clinton-Oakland and Macomb Sanitary Districts. From the Northeast pumping station, the NI-EA runs about 15 miles through the City of Detroit, ranging in size from 17.5 feet to 12 feet in diameter. Along this route, the NI-EA receives regulated flow from the Conant-Mt. Elliott, First-Hamilton, and Meldrum sewers. Those sewers convey flows from the Southeast Oakland County Sanitary District, Evergreen-Farmington Sanitary District, and some northern areas of the City of Detroit. Flows from the NI-EA, which are mainly suburban sanitary discharges, enter the WWTP at Pump Station 2 and receive preferential secondary treatment.

System-Wide Instrumentation and Control Improvements

The NPDES permit requires DWSD to implement a project to improve the system-wide instrumentation and control of the collection system and the associated pumping and treatment systems (Part I.A.13.e.8.b.). The project, referred to as PC-713, was originally required to be completed and placed into full service/operation by June 1, 2004. The deadline was modified to December 31, 2005 due to project scope expansion under an amendment to the Second Amended Consent Judgment issued on February 22, 2005. New and upgraded processes that resulted from WWTP improvements were added to the scope of PC-713, contributing to the delay in

completion. The project was nearing completion during the NEIC inspection and DWSD was preparing to conduct a system performance test during August 2005.

A major component of PC-713 involved moving the SCC from the downtown Detroit location to the Central Services Facility located at 6424 Huber Street, northeast of downtown. The Central Services Facility is also the location of DWSD's maintenance yards and equipment storage. During the NEIC inspection, DWSD and contractor personnel provided an overview of PC-713, including a demonstration at the new SCC.

PC-713 involves the installation of a system-wide, real-time process monitoring and control infrastructure. The scope of PC-713 includes the entire DSWD sewer collection system, WWTP, new control centers at the WWTP and the SCC, and systems for data archival and retrieval. The scope of PC-713 also includes the DWSD water supply system. In general, PC-713 will allow DWSD to monitor, control, and/or collect data from the various sewer system features, including pump stations, CSO treatment facilities, CSO outfall structures, inflatable dams, sewer level sensors, precipitation gauges, sewer meters, and flow control gates. As an example, CSO outfall structures will be equipped with upstream sewer level sensors, river level sensors, and backwater gate proximity switches. Therefore, DWSD will be able to monitor the discharge status of CSO outfalls in real-time. During the NEIC inspection, the PC-713 system was demonstrated to show how operation of a remote sewer valve and pump station can control flows to interceptors and the WWTP.

Prior to PC-713, the old SCC and WWTP control centers were separate systems, unable to communicate with the other. The new SCC and WWTP control centers will be fully integrated. The WWTP will have a main control center and five area control centers for the pump stations, primary/secondary treatment, sludge processing, dewatering, and incineration. The new SCC includes workstations with displays for the water system, wastewater collection system, and WWTP. The new SCC also includes a large video wall display showing system maps and schematics. SCC staff will also be able to monitor the system with view-only, real-time displays in their offices. According to DWSD personnel, about 600 DWSD employees have been trained on the new system.

Communication and process data transmission is done mainly through leased, high-capacity phone lines with spread spectrum radio as a backup, depending on the site. If both phone and radio communications were to fail, sites will continue to operate in local mode. Data collection is managed using a Supervisory Control and Data Acquisition (SCADA) system. In general, real-time data is scanned continuously by servers. Data collected by the scanner servers is compared to collection criteria and stored in historical servers at both the SCC and WWTP, as appropriate. The data can be used to generate reports such as discharge monitoring reports, CSO notification reports, and operations reports.

The contract to install the PC-713 system includes a 7-year maintenance program. The contractor is responsible for maintaining the installed instruments, existing instruments connected to the new system, control system components and software, and ancillary devices supplied under the contract. The maintenance contract extends 7 years beyond the date of substantial completion, and will expire some time in 2012.

Nine Minimum Controls

The following is a brief description of DWSD's implementation of the Nine Minimum Controls (NMCs) outlined in EPA's April 19, 1994 CSO Control Policy. DWSD's current NPDES permit does not explicitly reference or require the implementation of the NMCs for CSOs. Certain provisions of the permit regarding CSO control, as mentioned in the Regulatory Summary of this report, implicitly pertain to some of the NMCs. Implementation of those provisions are discussed in detail following the discussion of the NMCs.

Proper Operation and Regular Maintenance Programs for the Sewer System and the CSOs

EPA guidance ("Combined Sewer Overflows, Guidance for Nine Minimum Controls," EPA 832-B-95-003, May 1995) states that the first minimum control should consist of a program that clearly establishes operation, maintenance, and inspection procedures to ensure that the combined sewer system will function in a way to maximize treatment of combined sewage. Essential elements of a proper operation and maintenance (O&M) program include maintenance of suitable records, including written procedures and schedules for routine maintenance activities.

Discussions with DWSD personnel, observations of the collection system, and review of records show that, in general, DWSD implements a proper O&M program for the combined sewer system. DWSD's O&M program includes routine inspections and maintenance activities, standard operating procedures, and supporting records management. O&M records are discussed in the Records/Document Review section of this report. Specific O&M deficiencies regarding the CSO treatment facilities are discussed later in this report. The Operational Plan, required by the NPDES permit, is an upper level document that describes the DWSD combined sewer system, including the O&M program. The Operational Plan and related deficiencies are also discussed later in this report.

Maximum Use of the Collection System for Storage

EPA guidance for the second minimum control states that maximum use of the collection system for storage means making relatively simple modifications to the combined sewer system

to enable the system to store wet weather flows until downstream sewers and treatment facilities can handle them. The guidance states that the first step is to identify possible locations where minor modifications can be made to the combined sewer system to increase in-system storage. Recommended control measures include collection system inspection, tide gate maintenance and repair, adjustment of regulator settings, retard inflows, localized upstream detention, upgrade/adjustment of pump operations at interceptor lift stations, and removal of obstructions to flow.

DWSD utilizes many measures designed to maximize the use of the collection system to store wet weather flows. In addition to traditional O&M activities, DWSD has installed numerous in-system storage devices, such as fixed dams, inflatable dams, double-leaf gates, and sluice gates. In-system storage devices are discussed later in this report. Also, while considered long-term projects and major in scope, the RTBs provide additional wet weather storage capacity.

Review and Modification of Pretreatment Requirements to Assure CSO Impacts are Minimized

EPA guidance for the third minimum control states that the municipality should determine whether nondomestic sources are contributing to CSO impacts, and minimize the impacts of discharges into the combined sewer system during wet weather events through implementation of a pretreatment program. Review and evaluation of DWSD's pretreatment program was not part of the scope of the NEIC inspection. DWSD provided an inventory of significant industrial users (SIUs) and associated flows, which is included in Attachment 2 of Appendix D. In addition, the SIUs are mapped, showing the location of the SIUs and the associated sewer district where the SIU discharge occurs.

Maximization of Flow to the POTW for Treatment

EPA guidance for the fourth minimum control states that maximizing flow to the POTW entails simple modifications to the combined sewer system and treatment plant to enable as much wet weather flow as possible to reach the treatment plant. Wet weather response at the DWSD WWTP, including the Wastewater Treatment Plant Wet Weather Operational Plan, is discussed later in this report.

Prohibition of CSOs During Dry Weather

EPA guidance for the fifth minimum control states that elimination of CSOs during dry weather includes any measures taken to ensure that the combined sewer system does not overflow during dry weather conditions. At the time of the NEIC inspection, DWSD was relying

on their O&M and inspection program to identify dry weather overflows (DWOs). DWSD stated that, to their knowledge, DWOs are infrequent and that none had occurred in the last 5 years. However, because of the size of the sewer system and number of overflow locations, identifying DWOs through visual inspections may not be adequate **[Area of Concern (AOC) A]**. Implementation of the system-wide instrumentation and control improvement project (PC-713), required to be completed by December 31, 2005, will provide real-time identification and notification of discharges through CSO outfalls, including during dry weather.

Control of Solid and Floatable Materials in CSOs

EPA guidance states that the sixth minimum control is intended to reduce, if not eliminate, visible floatables and solids using relatively simple measures. Simple devices including baffles, screens, and racks can be used to remove coarse solids and floatables from combined sewage, and devices such as booms and skimmer vessels can help remove floatables from the surface of the receiving water. In general, DWSD does not use baffles, screens, or racks at CSO outfalls and does not use booms or skimmers to remove floatables from the receiving waters. DWSD and the MDEQ have determined that these controls provide a "limited benefit." Instead, DWSD and the MDEQ are focusing on long-term control projects for all CSO outfalls that either eliminate CSOs or result in CSO discharges that meet water quality standards. Examples of long-term control projects that provide for control of solids and floatable materials are the RTBs and screening and disinfection facilities.

Pollution Prevention

EPA guidance states that the objective of the seventh minimum control is to reduce to the greatest extent possible the amount of contaminants that enter the combined sewer system. Recommended pollution prevention measures include street cleaning, public education programs, solid waste collection, and recycling. While DWSD does not have a formal pollution prevention plan, the city is implementing many pollution prevention measures. Street cleaning is conducted by the Detroit Department of Public Works. Detroit implements a household hazardous waste collection program. The DWSD Industrial Waste Control Division implements several programs related to pollution prevention including spill control plans, a restaurant grease program, and a regional PCB/Mercury minimization program.

Public Notification to Ensure that the Public Receives Adequate Notification of CSO Occurrences and CSO Impacts

The intent of the minimum control for public notification is to inform the public of the location of CSO outfalls, the actual occurrences of CSOs, the possible health and environmental effects of CSOs, and the recreational or commercial activities curtailed as a result of CSOs.

Notification of actual CSO discharge events is discussed later in the report, including DWSD's current notification procedures as well as changes that will occur once the PC-713 project is completed. Regarding public awareness of CSOs, the DWSD website includes a Wet Weather Pollution Information Kit and information about CSO treatment facilities. The DWSD website includes a copy of the NPDES permit which lists the CSO outfall locations. One of the recommended measures for public notification is posting signs at CSO outfall locations. DWSD did not have signs posted at most of the outfall locations **[AOC B]**. Outfalls were observed in the vicinity of parks, marinas, and fishing locations. Some signs have been posted at CSO outfall locations on the Rouge River by the Rouge River National Wet Weather Demonstration Program.

Monitoring to Effectively Characterize CSO Impacts and the Efficacy of CSO Controls

EPA guidance states that the ninth minimum control is an initial characterization of the combined sewer system to collect and document information on overflow occurrences and known water quality problems. This minimum control is intended to be a precursor to the more extensive characterization and monitoring efforts to be conducted as part of the long-term control plan (LTCP). DWSD's LTCP was initially submitted in July 1996 and updated during December 2001. Therefore, DWSD is well into implementing long-term control projects and beyond the initial characterization phase of this minimum control. Extensive information exists regarding the characteristics of the DWSD combined sewer system. DWSD currently uses modeling data to determine overflow occurrences where real-time monitoring does not exist. Following the completion of project PC-713, DWSD will have real-time notification of overflow occurrences from all CSO outfalls.

Discharges from CSO treatment facilities are required to be monitored and results are reported on discharge monitoring reports (DMRs). At the time of the NEIC inspection, monitoring of overflow discharges was being conducted at three RTBs and two screening and disinfection facilities. DMRs for those facilities are discussed later in this report. In addition, once CSO treatment facilities are brought on-line, each facility's performance is evaluated including impacts on receiving waters. The 2001 LTCP update includes a water quality work group report that discusses receiving water quality monitoring efforts such as shoreline surveys, benthic macroinvertebrate surveys, river transect surveys, CSO plume tracking surveys, and continuous in-situ monitoring. The 2001 LTCP update states that, in general, the Detroit River is a high quality water body that supports its designated uses, while the lower Rouge River has difficulty meeting its designated uses due to impacts from CSOs, SSOs, and storm water discharges.

The following is a discussion of the major CSO provisions of the NPDES permit as summarized in the Regulatory Summary of this report. The discussion includes descriptions and observations of inspected facilities as well as associated compliance activities.

CSO Treatment Facilities

The NPDES permit contains provisions for the operation of CSO treatment facilities, including effluent monitoring and reporting (Parts I.A.6. and I.A.7.). NEIC conducted compliance evaluations at five CSO treatment facilities which were fully operational and controlled by specific conditions in the current NPDES permit. Three facilities were RTBs (Hubbell-Southfield, Puritan-Fenkell, and Seven Mile) and two were screening and disinfection facilities (Leib and St. Aubin). The Baby Creek screening and disinfection facility, under construction at the time of the NEIC inspection, was also visited during the inspection. The following discussion is based on a review of relevant documentation such as reports, work plans, procedures, manuals, work orders, and maintenance/testing/operational records; interviews with DWSD and contractor personnel; and walk-through inspections at each facility.

Retention Treatment Basins (RTBs) Overview

The function of the three RTBs [Appendix C – system overview figure] is to provide storage and treatment (screening, settling, skimming, and disinfection) of combined wet weather flow which might otherwise overflow untreated into the Rouge River. These RTBs were constructed as part of the Rouge River National Wet Weather Demonstration Project and DWSD's LTCP. An 18- to 22-month performance evaluation followed the completion of each facility in 1999. The results of the performance evaluations were presented in the 2001 LTCP update. The update states that the performance evaluation was intended to determine the overall performance of each facility toward achieving "adequate" CSO treatment, as defined by the MDEQ in its "Criteria for Success in CSO Treatment" guidance document [Appendix E].

Design criteria for each RTB were specified in the 1997 NPDES permit. Among other factors, a design storm of 1-year, 1-hour (1 inch) was used to size the capacity of each facility. The general design of the RTBs includes bar rack screens at the influent end, a bleach delivery system with mixers, two basins, a shunt channel, and a flushing system. All three RTBS may be operated in a first flush/capture mode, a parallel flow-through mode, and a bypass mode utilizing the shunt channel for flows which exceed the basins' flow capacity. DWSD personnel stated that the first flush/capture mode is the preferred mode of operation at all three RTB facilities. Captured influent that is not discharged to the Rouge River is dewatered back into the NWI. Flood gates (i.e., roller gates at Hubbell-Southfield RTB and butterfly valves at the Puritan-

Fenkell and Seven Mile RTBs) on the outfalls for each RTB prevent the Rouge River from entering the effluent and shunt channels during high water conditions.

The current permit authorizes discharges from each RTB to the Rouge River "when the basins are full and wastewater flows exceed downstream capacity." A numerical daily maximum is imposed for fecal coliform bacteria (400 counts/100 milliliters). Testing and reporting requirements (but no numerical limits) for other water quality parameters are specified for the influent and effluent flows when the RTBs discharge to the Rouge River. Background documentation and statements by DWSD and MDEQ personnel to NEIC indicate that a level of 1.0 mg/L for total residual chlorine (TRC) is targeted in the discharged effluent.

The Hubbell-Southfield and Puritan-Fenkell RTBs are staffed by two DWSD operators 5 days a week during business hours (i.e., from 7:00 a.m. to 3:30 p.m.). Personnel from the Puritan-Fenkell RTB make daily visits to the Seven Mile RTB 5 days a week. Besides operating the facilities during wet weather events, on-site operators perform general housekeeping at the facilities and routine preventative maintenance on equipment. Corrective maintenance (i.e., repair work) is typically handled by the mechanical maintenance group at the WWTP. At all three RTBs, Wade-Trim personnel are responsible for installing, maintaining, and repairing all electrical and instrument components. The current contract for this support is scheduled to expire in October 2005.

The response to potential flow into the Hubbell-Southfield and Puritan-Fenkell RTBs begins when an autodialer telephones DWSD and Wade-Trim personnel when pre-set levels are detected in level sensors in the NWI. The first call is made to Terry Moore of the DWSD and Eric Davis of Wade-Trim. A number sequence must be entered on the receiving party's telephone key pad to acknowledge the alarm. The autodialer will continue to call others on its call list until the alarm is acknowledged. The SCC also receives alarm status information. At any time, level sensor readings may also be checked via telephone.

Once an alarm for potential flow into an RTB is received, Terry Moore (or his backup, Fio Fabris) contacts on-call operators when the event occurs during off-hours. Two operators are sent to the RTB to respond to the event. Once on-site, the operators monitor the conditions, check the status of flow into the facility, and based on their assessment, contact the "senior chemist" in the operations lab group to dispatch two chemists for event monitoring and sampling.

Once on-site, the chemists activate the automatic samplers and prepare instruments to perform on-site analyses of dissolved oxygen (DO), pH, and TRC. Samples are collected for on- and off-site analyses at intervals specified in the NPDES permit. Fecal coliform analyses are performed at the WWTP laboratory, and may be transported to the laboratory during an event to meet the 6-hour holding time limit. Sample analyses for ammonia, total suspended solids (TSS),

phosphorus, and 5-day carbonaceous biological oxygen demand (CBOD-5) are performed at the DWSD Analytical Laboratory at 2727 Second Avenue in Detroit. Additional details of sampling and laboratory analyses are provided below under the Records/Document Review section of this report.

Flow into each RTB is automatic (i.e., does not require operator intervention or control) based on pre-programmed responses in associated upstream or facility control devices. To date, all three RTBs have been operated in a first flush/capture mode as follows: basin 1 is filled first and closed; additional flow is routed to basin 2; overflow occurs when basin 2 fills, and flow will continue through basin 2 until inflow ceases. The shunt channels have not been used to date except during the performance evaluation period when flow was forced through the channels for testing purposes. Appendix F contains flow diagrams for each RTB.

Sodium hypochlorite is introduced into the influent flow upstream of the bar racks. All three RTBs have been retrofitted with a recirculation system to prevent stratification within the sodium hypochlorite storage tanks. Dose is controlled by the feed rate, which is typically determined with the system set in automatic mode. Because of different operating conditions, each facility has its own operating strategy for sodium hypochlorite addition. Additional details are provided below under the on-site summaries for each RTB.

After inflow ceases and levels in the NWI are below the 8/10ths level (generally), basins 1 and 2 are dewatered (i.e., solids and liquids removed) to the NWI. The basins are then cleaned by first flushing with event water retained in the effluent channel and then flushing with potable water. Spray nozzles are employed at the Hubbell-Southfield RTB, and tipping buckets are used at the Puritan-Fenkell and Seven Mile facilities to flush the basins. The flushed water and solids are collected in a sluice trench which drains to a wet well. The wet well contents are pumped out to the NWI. The target timeframe for completing the entire dewatering/flushing sequence is approximately 36 hours from the time inflow is no longer received at an RTB facility.

On-Site Summary of RTBs

At each of the three RTBs, NEIC conducted walk-through inspections from influent to effluent ends; interviewed DWSD operators, lab personnel, and support staff, and Wade-Trim personnel; and observed operating, maintenance, and sampling/analysis procedures and records.

Hubbell-Southfield RTB

The Hubbell-Southfield RTB is a 22-million-gallon storage facility which can accept approximately 3,200 cubic feet per second (cfs) of inflow [Appendix F]. Flows above 2,200 cfs

are routed through the shunt channel after screening and disinfection. According to DWSD personnel, the maximum flow observed to date is approximately 800 cfs.

Flow into the facility is controlled by two inflatable dams in a reverse gradient double box conduit of the Hubbell-Southfield sewer. The dams are inflated during dry weather, but begin to deflate when approximately 8 feet of liquid is detected by upstream level sensors. Prior to the onset of deflation, an alarm condition is triggered when a level of 5 feet is reached, and an autodialed call is made to Terry Moore. Once the dams begin to deflate, approximately 4 pounds per square inch (psi) of pressure is maintained in the dams to modulate flow into the facility.

A sodium hypochlorite solution – delivered to this facility and the other two RTBs at a concentration of 12 to 15 percent – is introduced into the inflow above the bar racks via a pump system, which is initially set in automatic mode. The sodium hypochlorite is stored in two 5,000-gallon, below-grade, storage tanks. The delivery system is configured to allow sodium hypochlorite additions to basin 1, basin 2, the shunt channel, and the effluent chamber. As an event progresses, adjustments to the feed rate (i.e., pump speed) may be made automatically or manually based on TRC levels from a continuously-recording TRC monitor in the effluent channel. According to the operator at the Hubbell-Southfield facility, the contents of the tanks are recirculated once a week, and sampled once a month.

Incoming flow spreads out across six bar screens equipped with mechanical scrapers. The scrapers remove debris from the screens and lift it up to a conveyor system which discharges to a roll-off dumpster. The inflow gates into basin 1 are located under the screenings building, near the front of the bar screens. From the screenings building, NEIC walked over the tops of basins 1 and 2, observed the tops of the inflow gates to basin 2, observed the filling of the effluent chamber with potable water (for flushing after a recent event), and observed the outfalls. As at all RTBs, the facility is equipped with separate outfalls for the shunt channel and the effluent chamber. DWSD personnel stated that the discharge gates for the shunt channel are maintained in a locked-out position.

As at all three RTBs, the facility's operations are monitored and controlled with a stand-alone Bailey computer system. Certain basin operations can currently be monitored (but not controlled) by the SCC and the WWTP. Once the PC-713 related systems are operational, the SCC will be able to monitor additional basin operating data (e.g., equipment operational status such as inflation status of the inflow dams and real-time measurements such as liquid levels detected by level sensors).

Wade-Trim personnel stated that contract support records, procedures, etc. at the RTBs were maintained at the Hubbell-Southfield RTB as the main repository. Details of NEIC observations about the on-site records (e.g., sampling/analytical, operational, maintenance) are summarized in the Records/Document Review section of this report.

DWSD laboratory personnel (from the laboratory operations support group at the WWTP) stated that records of sampling, on-site monitoring (i.e., pH, DO, and TRC), calibrations, and preventative maintenance for sampling and testing equipment for each RTB were retained on-site. NEIC also observed logbooks; labeled and dated standards/reagents for on-site analyses; and instruments used to perform the analyses.

Dedicated automatic wastewater samplers collect sidestreams from piping from sample pumps in the inflow channel, basin 1, basin 2, the shunt channel, and the effluent chamber. Except for the influent sampler, sampling and monitoring equipment was contained in the main building at the facility. A digital-readout display for the TRC continuous monitor, as well as readouts from water level sensors, were also present in the main building at the facility. Facility personnel stated that effluent flow values reported pursuant to the NPDES permit are calculated from measured water levels at the effluent weir.

By far the most active CSO facility, the Hubbell-Southfield RTB took on flow on 26 occasions during its evaluation period from April 2000 to August 2001. The facility discharged to the Rouge River during 17 of these events. Recent Discharge Monitoring Reports (DMRs) indicate that the facility discharged (through permitted outfall 101) in 10 separate months from January 2004 to May 2005. In the effluent, the maximum fecal coliform concentration over this 15-month period was reported to be 347 cts/100 ml, with most levels falling within the range of 20 to 50 cts/100 ml. TRC concentrations ranged from approximately 2 to 5 mg/L. For events in which the RTB did not overflow to the Rouge River, the captured, chlorinated inflow was dewatered back into the NWI.

Puritan-Fenkell and Seven Mile RTBs

Except as noted below, the general design, operation, and control of these RTBs is nearly identical to corresponding features of the Hubbell-Southfield RTB.

Located to the north of the Hubbell-Southfield RTB, the Puritan-Fenkell RTB has a design storage capacity of 2.8 million gallons and can accept flows up to 845 cfs [Appendix F]. Flows above 320 cfs are routed through the shunt channel after screening and disinfection. Further north along the Rouge River, the Seven Mile RTB has a design storage capacity of 2.2 million gallons, and can accept flows up to 656 cfs [Appendix F]. Flows above 230 cfs are routed through the shunt channel after screening and disinfection.

The Puritan-Fenkell facility receives continuous dry weather inflow which is pumped from a wet well into the NWI. As flow increases during a wet weather event, the wet well pump is overcome and stops pumping, and all inflow goes directly into basin 1. Pre-set alarms are activated (and autodialing is initiated) when levels in basin 1 are 2 feet and 4 feet. Approximately 5 feet of liquid must be present in basin 1 to activate the sampling pumps.

During the evaluation period from February 2000 to August 2001, the Puritan-Fenkell facility took on flows 40 times, and discharged to the Rouge River during four of the inflow events through outfall 102. According to DWSD personnel, the facility has not discharged since the year 2000. According to the November 30, 2001 Puritan-Fenkell and Seven Mile Evaluation Report, the last two discharges of treated effluent from the Puritan-Fenkell RTB were on June 3/4 and September 10/11, 2000. No discharges are reported on the DMRs for the Puritan-Fenkell facility from January 2004 to May 2005. Consequently, effluent monitoring data was not reported over this time period.

The Seven Mile facility does not receive dry weather flow, but takes on flow from lateral sewer lines when levels in the NWI are approximately 3.5 feet. Unlike the other two basins, the level sensors associated with the Seven Mile facility are not equipped with an autodialer. Operators are dispatched to the Seven Mile facility when operators are sent to the Puritan-Fenkell facility in response to an autodialer call. According to DWSD operators, the Seven Mile facility usually receives about 1 foot of inflow into basin 1. Outflows from the effluent chambers at both the Puritan-Fenkell and Seven Mile facilities are monitored with accusonic flow meters. Flow between the two facilities is modulated with the Shiawassee sewer slide gate.

The Seven Mile facility took on flows on 17 occasions during its evaluation period from April 2000 to August 2001. During its operation since the evaluation period, the facility has taken on flow but has not discharged to the Rouge River. The outfall for the Seven Mile facility is designated as 103 in the NPDES permit.

According to DWSD personnel, both the Puritan-Fenkell and Seven Mile facilities take on wet weather-related flow, but in volumes which typically do not approach their respective design storage/treatment capacities **[AOC C]**. The facilities are succeeding in preventing overflows to the Rouge River, and thus are capturing all the excess combined wastewater from the upstream, contributing drainage areas. However, the under-utilization (and perhaps over-design) of the facilities is a concern in light of the continued overflows from other drainage areas through other outfalls along the Rouge River. DWSD personnel acknowledged the flow limitations due to the size and configuration of the contributing drainage area to the two facilities, and indicated that options were being evaluated for routing flow from other drainage areas into the facilities. At the time of the NEIC inspection, a strategy for rerouting flow from other drainage areas had not been formalized.

The general under-utilization of the full storage/treatment capacities at the Puritan-Fenkell and Seven Mile RTBs has resulted in prolonged storage intervals for the sodium hypochlorite disinfectant. Consequently, the unused sodium hypochlorite decays to concentrations (typically 3 to 4 percent) at which it can no longer provide adequate disinfection at design delivery rates and contact times **[AOC D]**. DWSD has disposed of the off-

specification sodium hypochlorite by discharging it into the NWI. DWSD is currently evaluating this practice and is reassessing its current dosing strategy – adding sodium hypochlorite to the inflow once pre-set water levels are reached within the facilities – due to concerns about increased chlorine loadings at the WWTP. DWSD is also assessing alternative sodium hypochlorite storage/delivery options.

Screening and Disinfection Facilities Overview

The current NPDES permit contains provisions for three CSO screening and disinfection facilities: Leib, St. Aubin, and Baby Creek[1]. The NPDES permit provides limitations and monitoring requirements for the three CSO screening and disinfection facilities including discharge authorization and monitoring points. The designated monitoring points and outfalls for each CSO screening and disinfection facility are listed below.

CSO Screening and Disinfection Facility	Monitoring Point	Outfall
Leib	105A	105
St. Aubin	106A	106
Baby Creek	107A	107

The effluent characteristics required to be monitored by the permit for all screening and disinfection facilities include: flow, fecal coliform bacteria, TRC, $CBOD_5$, TSS, ammonia nitrogen, total phosphorus, pH, and DO. The Baby Creek facility will also be required to monitor the effluent for oil and grease. A number of samples are collected during wet weather events. The ISCO samplers are set on a time basis during normal operations. A sample is collected every 2 hours the first 8 hours, and every 4 hours thereafter for the duration of the event. During the evaluation period, samples were collected every 15 minutes for the first 90 minutes, every 30 minutes for the next 2 hours, every hour for 12 hours, and every 2 hours thereafter until the end of the event. TSS, CBOD ammonia, and phosphate sample analyses are performed at the DWSD Analytical Laboratory. Fecal coliform is analyzed at the WWTP operations laboratory. The WWTP operations laboratory maintains solutions used for on-site analyses at the Leib facility.

At the time of the NEIC investigation, the Leib and St. Aubin CSO facilities were in operation and the Baby Creek CSO facility was under construction. The Leib screening and disinfection facility is intended to provide control for one existing outfall, Leib. The St. Aubin facility is intended to provide control for three existing outfalls, Chene, Dubois, and St. Aubin. The four outfalls are located upstream of marinas on the Detroit River where complaints alleging aesthetic problems were received. The screening and disinfection control technology is designed

[1] *The provisions for the Baby Creek CSO facility are not yet effective because the construction of the facility is not required to be complete until December 31, 2005.*

to remove identifiable sanitary materials and to protect the public health by achieving State water quality standards for pathogenic microorganisms. The Leib and St. Aubin screening and disinfection facilities are considered DWSD CSO "Pilot Projects" and, therefore, the DWSD is required to perform an evaluation of the Leib and St. Aubin facilities to determine the effectiveness of sanitary trash removal, disinfection, and to evaluate receiving water quality impacts. The DWSD submitted a draft DWSD CSO Pilot Project Evaluation Report to the MDEQ on December 23, 2004 for the Leib and St. Aubin facilities, as required by the NPDES permit. The DWSD was also required to and submitted a final DWSD CSO Pilot Project Evaluation Report for the Leib and St. Aubin screening and disinfection facilities on July 1, 2005. Appendix G contains schematic diagrams for the Leib and St. Aubin screening and disinfection facilities.

During dry weather periods, the daily hours of operation at the screening and disinfection facilities are 6:00 a.m. to 2:30 p.m. The facilities are on a 24-hour schedule during wet weather with 12-hour shifts. DWSD has a wet weather schedule for operator coverage at all CSO facilities that is updated after each wet weather event. Based on discussions with CSO facility operators, all CSO facility operators will rotate to all the CSO facilities (RTBs and screening and disinfection facilities).

Leib

The Leib facility has a design capacity of 1,550 cfs. Overflows from the Leib facility discharge to the Leib outfall (outfall 105) on the Detroit River. All sewer connections from the Leib facility to the south toward the river have been disconnected. The Leib facility has been in operation since 2003. Two overflows have occurred since 2003. A diesel powered back-up generator is capable of providing back-up power for the entire facility. The back-up generator is on a weekly preventative maintenance schedule.

The Leib facility receives flow from the 16-foot diameter Mount Elliot sewer. Dry weather flow is routed through an influent chamber in the Leib facility; however, the dry weather flow does not pass through the actual screening and disinfection portions of the facility. There are also two by-pass gates on the influent diversion chamber which could allow all flow to completely bypass the Leib facility; however, these are normally closed. Dry weather flow passes through the dry weather flow channel, control gate chamber, and through a 7-foot, "toward treatment" line routed to the 12-foot DRI at the intersection of Jefferson and Belleview. The "toward treatment" line is a DWSD term that describes a sewer line connecting the Leib treatment facility to the DRI. The Mt. Elliott sewer flows south of the Leib facility and enters the DRI at the Leib regulator chamber through a SCUBA actuated gate. When the water level in the influent chamber rises above 13 feet, the SCUBA gate to the DRI closes. Dry weather flow is continuously metered with an ultrasonic flow meter. As at the RTBs, the DWSD services the mechanical devices at the facility. Wade-Trim maintains the level sensors and flow meters

including calibration. See the Records/Document Review section of this report for more detailed information regarding records.

During wet weather events, flows in the 16-foot diameter Mount Elliot sewer increase significantly. Water begins to build up in the Leib influent channel. When the water level in the influent channel reaches a height of 13 feet, the dry weather flow control gate closes (forcing the facility influent to pass through the screens) and the influent screens are automatically turned on. The screen flow is videotaped during events to view the screen operation. The Leib facility utilizes 4-mm mechanical screens, both vertical and horizontal, to separate sanitary trash from the CSO stream. There are two sets of vertically mounted (Romag) screens and two sets of horizontally mounted (Copa) screens. The flow is evenly distributed between the four channels. The screened water flows under a weir to a common channel that feeds four mixing/disinfection chambers. The combs travel back and forth across the screens and move any accumulated debris (screenings) to one end of the screens. A portion of the influent flow stream is used to move the screenings through the flushing gate, into the 7-foot toward treatment sewer to the DRI, and ultimately, to the WWTP for disposal. The screenings are always sent to the DRI even when the DRI is near capacity.

When the level of the screened flow in the mixing chambers reaches the top of the effluent channel weir wall, the chemical feed pumps and flash mixer start and a solution of sodium hypochlorite is introduced into the screened flow. The mixing chambers each have four mixers per chamber. There are two mixers in front of and two mixers behind a hanging wall. The chlorine contact time is 10 minutes at peak flow. The water flows over the effluent wall to the effluent channel. The solids collected (screenings) on the screens are washed through a gate at the end of the screens to an upper channel, then to a gate chamber, and are positive gravity fed into the DRI for treatment.

There are two 10,000-gallon capacity sodium hypochlorite storage tanks at the Leib facility. DWSD is required to maintain the sodium hypochlorite tanks at 50 percent capacity as described in Appendix D of the approved Operational Plan. There are eight pumps available for sodium hypochlorite distribution: six low rate (22 gpm) and two high rate (330 gpm). Sodium hypochlorite samples are collected from each load received at the facility and from each tank. The target concentration for the sodium hypochlorite is eight percent with the concentration maintained at a minimum of five percent. Low concentration sodium hypochlorite (less than five percent) is pumped to the dry weather channel and then to the DRI.

The effluent channel routes the wet weather effluent, by gravity, to the south to a 16-foot diameter sewer. The flow goes to the Leib regulator. The west side of the Leib regulator has been filled and abandoned. The 16-foot diameter sewer then splits at Mt. Elliot and Lafayette streets into two, 11-foot diameter lines. The two sewers then join back together. There are two flap gates to the DRI that are closed during wet weather. During wet weather periods, the water

flows over a concrete dam with flashboards to the Leib outfall (105). There are two, 10-foot length by 10-foot width outfall boxes for discharge to the river. There are two backwater flap gates on the outfall that are equipped with proximity switches with the readout for the proximity switches on the workstation at the Leib facility control room.

There is a TRC analyzer that takes TRC readings on both influent and effluent streams during events. The TRC analyzer takes flow readings every 5 seconds and averages the readings over 1 minute. Sodium hypochlorite is used for disinfection of the wastewater. To determine the dosage rate of the sodium hypochlorite, operators enter the stock concentration of the sodium hypochlorite and the inflow rate into the computer. The daily process log trend is saved on the computer for CSO events.

Once the influent water level is below 12-feet, the dry weather flow gate re-opens. The facility is dewatered by gravity to the DRI. The chlorine mixing chambers are drained through the screening channel to the DRI. When flow volume is captured at the Leib facility but does not overflow, it is retained at the facility until the interceptor has capacity to convey the captured flow, and then the captured flow is sent via the DRI to the WWTP. There are also two dewatering pumps at the outfall to remove water from the section of pipe downstream of the Leib regulator dam to the outfall. The dewatering pumps can remove all but the bottom 2 feet of water in the discharge pipe.

St. Aubin

The St. Aubin screening and disinfection facility (St. Aubin facility) operations were discussed with Fio Fabris, Operator, DWSD. The design flow rate for the St. Aubin facility is 250 cfs, which is regulated by a control gate. St. Aubin, Dubois, and Chene Street sewers can flow to the St. Aubin facility. There is a regulator on each of the three sewers that regulates flow to the DRI. If the DRI level is high, the regulators mechanically limit the flow to the DRI and divert more flow towards the St. Aubin facility. Prior to construction of the St. Aubin facility, there were three outfalls routed directly to the Detroit River – Chene, Dubois, and St. Aubin. The Chene Street and St. Aubin Street outfalls have been bulk headed and the flows are now routed to the St. Aubin facility. The Dubois outfall was modified by adding an inflatable dam to aid in the control of untreated overflows to the Detroit River. Since the St. Aubin facility has been in operation, there have been no overflows to the Dubois outfall. There have been 11 overflows from the St. Aubin facility effluent outfall (outfall 106) from June 2003 through May 2005. The operators maintain a daily operational logbook at the St. Aubin facility to document general information and anything unusual.

The Dubois outfall and inflatable dam status are monitored at the St. Aubin facility. The Dubois diversion chamber water level is also monitored at the St. Aubin facility. The Dubois Street line has a 3-foot concrete dam with an inflatable dam on top of the concrete dam.

There is a 5.5-foot set point at the Dubois diversion chamber to deflate the dam and allow flow to the Dubois outfall. The inflatable dam programmable logic controller (PLC) is on an uninterruptible power supply. The St. Aubin Street flow and Dubois St. flow are routed through the Dubois diversion chamber whereas the Chene Street sewer goes directly to the St. Aubin facility.

During wet weather events, flow enters the influent junction chamber upstream of the St. Aubin facility. The combined influent flow is conveyed south through a 10-foot diameter sewer line to the influent chamber. The influent flow is monitored with an Accuview flow meter. When the water level in the influent chamber reaches 5 feet and 8 feet, the autodialer notifies the appropriate personnel. If the combined flow reaches 250 cfs, then an isolation gate on the Dubois sewer located in the influent junction chamber will begin to close, resulting in the CSO flow rate from the Dubois sewer to be reduced or eliminated. As this gate closes, flow from the Dubois sewer will back up in the Dubois diversion chamber. When the level in the Dubois diversion chamber reaches 5.5 feet, the inflatable dam will deflate and allow excess flow to pass untreated to the Detroit River via the Dubois outfall. As the inflow decreases below 250 cfs, the isolation gate will modulate open allowing CSO flow from the Dubois sewer to enter the St. Aubin facility and lower the level in the Dubois diversion chamber. As the level in the chamber decreases, the inflatable dam is reinflated and untreated discharge ceases.

When the water in the influent chamber reaches a height of 9.5 feet (94.75 foot elevation), the screens are automatically engaged with the control system. The influent from the influent chamber is split and routed to one of two, 4-mm vertical Romag mechanical screens. The flow passes through the Romag screens and into a screened flow channel. The screened flow in the channel is split and goes to one of two disinfection/mixing chambers where sodium hypochlorite is added for disinfection. Each disinfection chamber has three mixers. The mixers are set to start when the level in the mixing chamber reaches 7 feet. The water initially goes into an area with two mixers, then flows under a hanging wall to the third mixer. The water then passes over a discharge weir wall and into the effluent channel. The effluent goes into a 10-foot by 10-foot conduit box, through a length of pipe, and to outfall 106 on the Detroit River.

Screenings caught on the influent side of the screens are mechanically cleared from the screen surface by an automatic rake. The screenings go to a screen collection box, are routed to the dewatering chamber, and are pumped back to the DRI with one of three chopper pumps through the "toward treatment" sewer. The "toward treatment" line is a DWSD term that describes a sewer line connecting the St. Aubin treatment facility to the DRI. When the level in the DRI reaches 8 feet, the pumps shut off and the screenings stay in the dewatering chamber.

Sodium hypochlorite is used for disinfection of the influent. There are two 5,800-gallon sodium hypochlorite tanks. Sodium hypochlorite is distributed from the storage tanks via the

chemical feed pumps to the mixers located in the disinfection chambers. Both tanks are kept full in accordance with the St. Aubin standard operating procedure. The operator orders a sodium hypochlorite delivery when at least 2,500 gallons are needed. Sodium hypochlorite deliveries can be received within 24 hours of ordering. The tanks are pumped off the bottom. There are five chemical feed pumps: two low rate (7.6 gpm) and three high rate (22.8 gpm). When the sodium hypochlorite concentration in the storage tanks is between two and three percent, the sodium hypochlorite is dumped to the wet well (dewatering chamber) and is pumped to the DRI. A sample of each load of sodium hypochlorite delivered to the facility is collected. Also, the tank concentration is sampled after the contents in the tank have been recirculated. To recirculate, DWSD personnel manually pump and recirculate the tank approximately once per quarter using a fire hose. Because this is a dangerous practice, DWSD plans on adding hard piping to recirculate the contents of the sodium hypochlorite tanks.

There are drain gates on the influent chamber, mixing/disinfection chamber, and effluent chambers. The water from the three drain gates is routed to a dewatering chamber and then pumped to the DRI. The St. Aubin facility has three dewatering pumps. The dewatering pumps automatically turn on at a 2-foot level in the dewatering chamber and turn off at a 1-foot level. If the level in the DRI is below 8 feet, the facility can dewater to the DRI. When the water level in the DRI reaches 10 feet, the dewatering pumps shut off.

When flow volume is captured at the St. Aubin facility but does not overflow, it is retained at the facility until the interceptor has capacity to convey the captured flow, and then the captured flow is sent via the DRI to the WWTP.

Outfall 106 is two, 7-foot diameter pipes with flap gates equipped with proximity switches. There is a flap gate proximity switch readout at the St. Aubin facility. The discharge is submerged into the Detroit River. Outfall 106 is located next to Tri-Centennial State Park.

The St. Aubin facility is equipped with an air scrubbing system to scrub the air in the influent chamber for odor control. The scrubbing system has not been used, but preventative maintenance is conducted on the equipment.

The St. Aubin facility has a diesel powered back-up generator. The generator is cycled once per week for 20 minutes by DWSD personnel. The generator can supply full power to the facility. The preventative maintenance for the generator is performed by a contractor.

The 30-day performance test began at the St. Aubin facility in January 2002. There was a 2-year evaluation sampling period at the facility. On June 1, 2005, the St. Aubin facility was phased over from the evaluation period to normal operations.

Baby Creek

The Baby Creek screening and disinfection facility was under construction during the NEIC on-site investigation in June 2005. The NPDES permit required DWSD to commence construction by January 1, 2004. The facility plans were discussed with Mirza Rabbaig, DWSD, Mahanvir Prasher, DWSD, and Brian Cruickshank, Walbridge Aldinger, General Contractor. By December 31, 2005, the DWSD is required by the NPDES permit to have construction of the Baby Creek facility complete and to have placed the facility into full operation/service. The DWSD indicated they were on target to complete the Baby Creek facility by the permit required deadline.

The design flow rate for the Baby Creek facility is 5,000 cfs. The Woodmere Pump Station will tie into the Baby Creek facility. The Woodmere Pump Station (located behind the Baby Creek facility) was built in the 1940s and pumped combined sewage to the Rouge River via Baby Creek. There are three, 14.5 feet by 17.5 feet box sewers in the area which service 15,000 acres including Detroit and Dearborn. There are three major sewers: Elmer Torres, Baby Creek (two barrels), and Dearborn. All three major sewers will feed the Baby Creek facility. The pump station to the Baby Creek facility receives water from the Vernor Sewer (8-foot sewer) and the Woodmere Sewer (9.5-foot sewer). During dry weather, three sewer barrels (west, central, and east) flow into two barrels through a regulator and then the flow goes to the Oakwood Interceptor. Once Baby Creek is operational, all dry weather flow will go through the toward treatment pipe to the Oakwood Interceptor. The normal dry weather flow is 80 to 90 cfs.

The Baby Creek facility will have 16 screens made from 6-mm perforated plate stainless steel. The screens are vertical and have round holes with a rotating brush at the top of the screens. The weir elevation for the influent is 91 feet for four screens and two mixing chambers and the weir elevation for the influent is at 92 feet for the remaining 12 screens and 6 mixing chambers. There are tipping bucket flushing stations for each of the two sets of screens with the same weir elevations. The screened water will flow from the screens to one of eight mixing chambers to be disinfected with sodium hypochlorite. The mixing chambers have four mixers per chamber. Two mixers are high and two are low in the 26-foot high chambers. The screenings are sent to the toward treatment sewer, a 6-foot pipe with 125 cfs capacity which goes to the Oakwood Interceptor.

There are four, 36,000-gallon sodium hypochlorite tanks. The sodium hypochlorite is distributed to the mixing chamber with eight chemical feed pumps, with a total pumping capacity of 3,100 cfs.

The Baby Creek facility is approximately 1 mile from the outfall that discharges to the Rouge River downstream of the Ford Complex where the river flow increases to 500 to 600 cfs.

The facility will gravity dewater to the toward treatment pipe. The facility has dual power feeds from Detroit Edison and Public Lighting Department (PLD). Either power feed can supply enough power for the Baby Creek facility and pump station. There is an odor control system that uses charcoal canisters: two sides with 65 canisters per side.

WWTP Wet Weather Operational Plan

The NPDES permit requires DWSD to submit an approvable WWTP Wet Weather Operational Plan to the MDEQ that provides the protocol for WWTP operations during the interim period before full completion of DWSD's LTCP (Part I.A.8.). The plan shall maximize wet weather treatment at the WWTP while minimizing untreated combined sewage discharges in the tributary collection system. The plan is required to be updated annually and submitted to the MDEQ for review and approval. The original plan was submitted on December 22, 2003. The most recent plan update was submitted on December 28, 2004 and approved by MDEQ on February 15, 2005 [Appendix H].

WWTP Capacity Overview

The DWSD WWTP receives influent flows from Detroit and surrounding communities via the DRI, Oakwood Interceptor, and NI-EA. The DRI and the Oakwood Interceptor enter the plant at Pump Station 1 during normal operations. The North Interceptor- East Arm (NI-EA) enters the plant at Pump Station 2. The Oakwood Interceptor may be routed to Pump Station 2 during wet weather events, when flow elevations in the interceptor exceed 73.5 feet National GeodeticVertical Datum (N.G.V.D.). The Oakwood and DRI lines convey both sanitary and storm water, while the NI-EA conveys primarily concentrated sanitary wastewater. Flow from the NI-EA is given priority to receive primary and secondary treatment, even during wet weather events, because of its concentrated nature. Annual average dry weather flow to the WWTP is 700 mgd.

Pump station 1 is the older of the two pump stations at the WWTP. The total capacity of the pump station is 1,300 mgd, and normal wet well elevations range from 74 to 80 feet N.G.V.D. Effluent from Pump Station 1 typically goes to one of 12 rectangular clarifiers for primary treatment.

Pump station 2 has two wet wells, one to receive the concentrated wastewater from the NI-EA, and the other to accept combined flows from the Oakwood Interceptor during wet

weather events. The total capacity of Pump Station 2 is 800 mgd. Effluent from Pump Station 2 typically goes to one of six circular clarifiers for primary treatment.

The rectangular primary clarifiers each have a 90 mgd capacity, contain 2-6 percent solids, and provide 1 to 3 hours of retention time for settling. The circular primary clarifiers are 250 feet in diameter, have a design flow of 180 mgd each, and provide 1 to 3 hours of retention time for settling. Although each set of clarifiers is normally operated in conjunction with one pump station, flows may be diverted if necessary. Currently the WWTP can provide primary treatment for flows up to 1,700 mgd, depending on the status of WWTP rehabilitation projects (PC-744). DWSD notifies MDEQ of the primary treatment capacity, secondary treatment capacity, and sludge processing capacity on a quarterly basis through shutdown schedules related to PC-744. During storm events, WWTP personnel visually monitor the primary clarifier weirs to determine whether overflows to the Rouge River are necessary when primary treatment capacity is exceeded. When the primary clarifier weirs are submerged, gates to the Rouge River via outfall 050 are opened in 6-inch increments, until the weirs are no longer submerged. Overflows to Rouge River outfall 050 are monitored and reported, as required by the NPDES permit.

Full secondary treatment can be provided at the WWTP for 930 mgd. There are 25 secondary clarifiers, each with a capacity of 45 mgd, but typically 23 clarifiers are in service. Flows receiving secondary treatment at the WWTP include 50 to 100 mgd of recycle flows such as dewatering process flows, incineration scrubber blowdown, thickener flows, and maintenance water. Therefore, the secondary treatment capacity for flows entering the plant is reduced to 830 to 880 mgd depending on processes operating within the WWTP.

Chlorination is physically done in a junction box, adjacent to the treatment plant. Contact time for disinfection is provided while in the pipe between the junction box and the Detroit River outfall 049 (DR01). Approximately 20 minutes of contact time is provided in-line and flash dechlorination is done at the diffusers into the Detroit River. Chlorine used in disinfection and sulfur dioxide used in dechlorination are stored in rail cars, at a location between the treatment plant and Detroit River outfall 049. The TRC set point is 1.4 to 1.5 mg/L and is based on the flow rate through outfall 049 and the desired residual. The concentrated gases are returned to a liquid state, diluted and fed into either the junction box or diffuser.

Wet Weather Operational Plan

The Wet Weather Operational Plan divides wet weather events into three storm periods: pre-storm, storm, and collection system dewatering periods. The pre-storm period is 2 to 8 hours before a storm event is expected. Pump station wet well elevations are pumped down to the low end of the normal operational range to maximize available storage. Normal wet well operational

range is between 74 and 80 feet. Pumping rates are utilized to maximize drawdown, while not exceeding full secondary treatment capacity of the plant.

The storm period begins as soon as influent flows to the treatment plant exceed dry weather flows. Flow rates are increased into the primary and secondary treatment processes as quickly as possible, up to the capacity of each process. The maximum rate of increased flow to the primary treatment system is 900 mgd over a 4-hour period; the maximum rate of flow to the secondary treatment system is 90 million gallons per hour.

Collection system dewatering begins as soon as all overflows from CSO treatment facilities have ended and ends when flow returns to dry weather conditions. Primary and secondary treatment capacity at the treatment plant is maximized, and flows are treated as quickly as possible.

The NPDES permit requires the use of all available primary and secondary treatment capacity during wet weather events. All flows exceeding the primary capacity of 1,700 mgd (pending completion of PC-744) are discharged untreated to the Rouge River via outfall 050. Flows exceeding 930 mgd (including recycle flows), but less than 1,700 mgd (pending completion of PC-744) currently receive primary treatment. Flows greater than 930 mgd and up to approximately 1,250 mgd receive primary treatment and chlorination/dechlorination prior to discharge to the Detroit River through outfall 049 (DRO1) via monitoring point 049A. The discharge through outfall 049 is hydraulically limited to about 1,250 mgd depending on the Detroit River elevation. Therefore, flows greater than 1,250 mgd and up to the primary treatment capacity are discharged to the Rouge River through outfall 050 and receive primary treatment but not chlorination/dechlorination.

The NPDES permit has provisions for a new primary treated effluent conduit to the Detroit River designated as outfall 084 (DRO2). Discharges in excess of the hydraulic capacity of outfall 049 would then be discharged through outfall 084 and receive chlorination/dechlorination in addition to primary treatment. Once outfall 084 is constructed, discharges through outfall 050 to the Rouge River would be prohibited. The current NPDES permit included a deadline for completing construction of outfall 084 by May 1, 2005. Construction of outfall 084 was halted due to construction problems. DWSD has submitted a revised schedule to MDEQ for completing outfall 084 by 2009. The revised schedule was under review by MDEQ at the time of the NEIC inspection.

Outfall 049B is the combined secondary treated effluent conduit for all dry weather flows and all wet weather flows up to and including a peak hourly flow of 930 mgd (including recycle flows). Outfall 049A is a primary treated effluent conduit which is authorized only when the

discharge via outfall 049B exceeds 930 mgd. Both 049A and 049B are monitoring points upstream of the final discharge to the Detroit River through outfall 049.

During the on-site investigation, NEIC discussed wet weather operations with wastewater process controllers (Della Young, Antonia Julius, and Lester Willis) at the WWTP process control room. The wastewater process controllers walked through the general process followed during a wet weather event. Although each wet weather event is different, the general process described by the wastewater process controllers is similar to the wet weather operational plan. The WWTP goes into pre-storm pump down mode for wet weather. 2 to 8 hours before a storm, the wastewater process controllers try to pump down the wet wells to the lower end of normal wet well elevation . The wastewater process controllers call every shift area supervisor to check the status of service of the different units. The primary clarifiers are physically inspected to see if weirs are submerged. If the clarifier weirs are submerged (which means the Detroit River levels are higher than outfall discharge point 049), the discharge is routed to the Rouge River through outfall 050.

The wastewater process controllers have guidelines for pump rates based on wet well levels and the inflow to the plant. They also use the NPDES permit as a guideline and there was a copy of most current wet weather operational plan in the control room.

In-System Storage Devices

The NPDES permit requires DWSD to utilize available sewer system storage and transportation capacity for conveyance of wet weather flows to the treatment facilities for treatment (Part I.A.13.a.2.). Several types of in-system storage devices are used by DWSD to maximize use of available in-line storage. Fixed concrete dams are located between regulating structures and associated outfalls to contain dry weather flows, increase storage capacity in the system, and prevent river water from backing into the collection system. Often, the fixed dams are equipped with flash boards or inflatable dams mounted on top to increase the dam crest height, further increasing the system storage capacity.

12 of 13 inflatable dams have been installed in 2005 throughout the DWSD sewer system for in-system storage, as required by the NPDES permit (Part I.A.13.e.8.c). The remaining inflatable dam is scheduled to be completed by October 30, 2005 in accordance with an MDEQ District Compliance Agreement issued on May 23, 2005 [Appendix W]. In addition, there are three previously existing inflatable dams, two upstream of the Hubbell-Southfield RTB and one in the Livernois Relief Sewer.

At each dam location, a concrete structure houses a pneumatic control system, which includes blowers and vacuum pumps to inflate/deflate the dam. Each site is equipped with an uninterruptible power supply and sump pumps to remove water from the control structure. Level

sensors are placed immediately upstream and downstream of each dam to automatically control the inflation and deflation of each dam [Appendix I]. For the 13 new dams, the dams are completely deflated during dry weather flow. During wet weather flow, a downstream trigger depth signals the dam to inflate until the upstream control depth (80 percent of the sewer depth) is reached, allowing combined wastewater to be stored behind the dam. The Hubbell-Southfield RTB dams are normally inflated during dry weather to prevent dry weather flow from entering the RTB and begin deflating at 80 percent of the upstream sewer depth. The Livernois Relief Sewer inflatable dam, normally deflated during dry weather, is set to inflate when upstream sewer level sensors indicate 25 percent sewer depth. A target elevation of 80 percent of the upstream sewer depth is then maintained by inflation or deflation of the dam. The dams works automatically and will be monitored by the SCC, with remote operation capability, once project PC-713 is completed.

The 2001 LTCP update estimates that the 13 new inflatable dams will provide approximately 54 MG of in-system storage volume. Using modeling information, DWSD estimates that the new dams will reduce CSO volume for a 1-year, 1-hour storm from 1,116 MG to 968 MG, or 13.3 percent. Modeling runs for a range of storms expected during an average year show an estimated reduction from 8,802 MG/year to 7,800 MG/year with the dams in place.

Seven double leaf slide gates were installed in 1998 at seven CSO outfalls in the Rouge River sewer district for in-system storage. Each gate structure consists of an inner and outer leaf gate with level sensors upstream and downstream of each gate [Appendix J]. During dry weather the leaf gates remain in the closed position. As wet weather flows increase, the leaf gates are programmed to open, one at a time, when the upstream sewer level reaches 80 percent of the sewer depth, allowing combined wastewater to be stored behind the gates until that sewer depth is reached.

The gates are equipped with an uninterruptible power supply and backup generator. The gates are programmed to operate automatically, but can also be operated manually with local controls. At the time of the inspection, the status of the gates could not be seen remotely by the SCC, but will, once project PC-713 is completed. Preventative maintenance on the gates is conducted by consultant Wade-Trim. DWSD personnel check the gates after each wet weather event.

CSO Discharge Notification

DWSD is required by the NPDES permit (Part I.A.13.b.2.) to notify the MDEQ, local health departments, and daily area newspapers in the event of a CSO discharge, in accordance with notification procedures approved by the MDEQ. The notification must include the amount of discharge, the reason for the discharge, the time the discharge began and ended, and

verification that the permittee is in compliance with the CSO requirements of the permit. According to the MDEQ, until the completion of project PC-713, DWSD is providing CSO notification in accordance with an interim procedure submitted on May 9, 1995 and approved by MDEQ on June 26, 1995 [Appendix K]. Once project PC-713 is completed, DWSD and the MDEQ will revisit the notification procedure to address DWSD's ability to monitor all CSO outfalls with telemetric equipment. A proposed protocol for monitoring and reporting the volume, duration, and frequency of CSO discharges following completion of project PC-713 was submitted to the MDEQ on February 11, 2002 [Appendix L].

The 1995 notification procedure states that DWSD will provide immediate notification of CSO discharges from pump stations and monthly reports for gravity CSO discharges based on rainfall data and modeling information. The procedure states that immediate notification will be made within 4 hours of the onset of the discharge followed by a written report within 5 days containing the information required in the permit. Locations subject to immediate CSO notification were expanded from pump station discharges to include discharges from CSO treatment facilities as they became operational. Therefore, at the time of the inspection, DWSD was providing immediate notification of CSO discharges from the Conner Creek pump station (outfall 002), Freud pump station (003), Oakwood pump station (082), Leib screening and disinfection facility (105), St. Aubin screening and disinfection facility (106), Hubbell-Southfield RTB (101), Puritan-Fenkell RTB (102), Seven Mile RTB (103), WWTP primary effluent (049), and WWTP Rouge River outfall (050). At the time of the inspection, DWSD was providing immediate notification by fax and follow-up written notification to the MDEQ, Wayne County Health Department, the Detroit News and News Herald, the U.S. Coast Guard, and the cities of Gibraltar, Riverview, Trenton, and Wyandotte. Sample notification report forms are included in Appendix M.

For all other unmonitored CSO discharges, the 1995 notification procedure states that DWSD will estimate the volume and duration of the discharges on a monthly basis. The estimates are based upon rainfall data from six strategically located rain gauges obtained from Southeast Michigan Council of Governments (SEMCOG) precipitation data. The data is put into the Greater Detroit Regional Sewer System (GDRSS) hydraulic model to generate an estimated CSO volume and duration for each overflow event. The results for each month are compiled and sent to the MDEQ. The 1995 notification procedure states that the monthly reports are dependent on the release of rainfall gauge data from SEMCOG and may not be available until at least 60 days after the end of the month. At the time of the inspection, DWSD stated that monthly notification reports are typically submitted with a lag time of 3 to 4 months. Appendix N contains the monthly notification report for January 2005, which was submitted on April 22, 2005.

Collection System and CSO Treatment Facilities Operation Plan

The NPDES permit (Part I.A.13.f.) requires DWSD to implement and annually update the approved Collection System and CSO Treatment Facilities Operational Plan (Operational Plan). Changes to the plan which affect "the rate, volume, or characteristics of the discharge..." must be approved by the MDEQ prior to implementation, and then incorporated into the annual update for that calendar year. The permit also specifies general requirements such as defining "the hydraulic constraints of the system during both wet weather and dry weather operation" as well as including detailed operating procedures, such as the sampling protocol for the stored sodium hypochlorite at the CSO treatment facilities.

The original Operational Plan was submitted in its entirety in 1993, and updated in full in 1994. Subsequent annual updates have consisted of modified replacement pages and/or completely new sections or topics for existing sections. The most recent annual plan update was submitted on September 30, 2004 and approved by MDEQ on May 24, 2005. Because all updates since 1994 have consisted of stand-alone sections, a complete and current Operational Plan does not exist. Consequently, NEIC assembled the "unified plan" by selecting the most recent sections from the entire history of updates. NEIC reviewed the "unified plan" first to determine if the permit-required information was present, and then to determine if the information was up to date and accurate.

The resulting document [Appendix O], is primarily composed of sections from the 1994 update, the 2003 update, and the 2004 update. Although certain provisions were satisfied – for example, the coordination of operational plans between DWSD and its tributary communities (and the results of the meetings) was described in the 2003 and 2004 updates – the Plan does not address several of the specific permit requirements, and in general, does not reflect the substantial changes to both the infrastructure and operation of the collection and treatment systems. **[Area of Noncompliance (AON) 1]**.

The following are notable deficiencies in the plan:

- Items 7 and 10 in the permit specify inclusion of hydraulic grade lines and operational elevations for major collection system components/structures. Much of the information is contained in the model runs in plan appendices A and B, GDRSS Model Runs for dry and wet weather flows, respectively. The appendices have not been updated since 1994.

- Items 5, 6, 8, and 9 in the permit specify general standards to maximize treatment, convey dry weather flow without bypass, full utilization of system storage and hydraulic capacity, and convey greatest quantity of wet weather flow to treatment facilities. Section 4 (Current Operation) of the Operational Plan and to a lesser degree, Sections 2 (System Description) and 6 (Operational Plan Revisions), contain most of the relevant information to meet these requirements. However, the majority of the information in both sections (including the referenced tables and figures), is derived from the 1994

update, and is thus outdated. Specific observations of sections 2 and 4 of the plan are as follows:

- A description of many new structures (i.e., double leaf gates) or replacement structures (e.g., stainless steel sluice gates replacing many of the regulators within the DRI) is not provided.

- New facilities (e.g., the CSO treatment facilities) and/or activities (e.g., the rehabilitation of pump stations) are discussed but are not addressed in a broad, general operational strategy for meeting these permit requirements.

- Plan Section 5 (Maintenance) was updated in 2003. Ongoing maintenance activities such as catch basin cleaning, sewer line inspection, sewer line rehabilitation, and street cleaning are described, but not presented as part of a general maintenance strategy for meeting these permit requirements.

- Plan Section 6.1.4, the WWTP Wet Weather Operational Plan, references the plan but does not provide highlights of the overall strategy for preparing and operating the wastewater treatment plant during a wet weather event.

- Item 11 in the permit requires the inclusion of procedures for ongoing sewer inspections to reduce infiltration and inflow. Although DWSD has undertaken such a study, no procedures were present in the unified plan.

- Item 12 in the permit requires that the plan identify the location of rain gauges used to define a wet weather event. The NPDES permit requires the use of "six strategically located rainfall gauges" to define a wet weather event. The rain gauge information comes from the 1994 update. Discussions with DWSD personnel indicate that select rain gauges are monitored for this purpose. The Operational Plan lists the location of 30 rain gauges for precipitation monitoring, but does not identify any six strategically located rain gauges for defining a wet weather event.

- Plan Section 3 (Staffing and Organization) and the organization charts, from the 1994 and 1997 updates respectively, are no longer current. Portions of Section 3 are not consistent with parts of Section 5.

NEIC's compliance review of the Operational Plan highlighted the limitations of the format specified in the NPDES permit. Because the permit requires the submission of updates (as opposed to a complete document) which only address changes to the plan, the resulting plan is not functional or readily reviewable for regulatory purposes. A truly complete and current plan does not exist (and may be difficult to create within the permit-imposed framework), and thus, the plan may have lost its effectiveness as an implementing document **[AOC E]**.

In addition, DWSD operations staff interviewed by NEIC were not familiar with the plan. DWSD management stated that it believed the document to be a higher level system overview rather than a comprehensive system-wide operating "manual".

As described in the Records/Document Review section of this report, DWSD maintains O&M manuals, operating procedures, work orders, and records that support the type of Operational Plan the NPDES permit appears to contemplate. However, a central reference document (i.e., the Operational Plan or any other plan) does not exist which unifies all this information with DWSD's general system-wide strategy for responding to wet weather events.

System Features Inspected by NEIC

Table 2 is a summary of system features, including outfalls and in-system storage devices, that were inspected by NEIC personnel during the on-site investigation in June 2005. As mentioned earlier, there were no signs posted at any of the outfall locations observed by NEIC. In addition, there was some initial confusion between NEIC and DWSD personnel regarding outfall designations. The NPDES permit lists outfall numbers (e.g., 074), outfall location names (e.g., McNichols), and backwater gate numbers (e.g., B80) as references to specific outfall locations. DWSD personnel typically refer to outfalls by backwater gate number or outfall location name, rather than by the traditional outfall number. NEIC personnel attempted to inspect outfall locations by outfall numbers. Through cross referencing, NEIC and DWSD personnel were able to determine outfall locations, and it was clear that DWSD staff knew where specific outfalls were located. DWSD has prepared an atlas of outfalls including a map of each outfall location. However, the concern is that there is no on-site designation of the outfall locations (sign, plaque, marker, etc.) **[AOC F].**

Table 2
SYSTEM FEATURES INSPECTED BY NEIC
Detroit, Michigan

Outfall Number/ Control Device Number	Other References (DWSD ID)	Latitude and Longitude[1]	Receiving Stream	NEIC Photo Number(s)[2]	General Conditions/Observations/Control Devices
106	St. Aubin (B13) (previously outfall 015)	42°19'59" 083°01'25"	Detroit River	Group 1: DSCN0013-14	Submerged discharge; Tri-Centennial State Park next to outfall; area secured with fence
105	Leib (B08) (previously outfall 010)	42°20'22" 083°00'34"	Detroit River	Group 1: DSCN0026-28;73	Located in Harbor town area-limited access; marina nearby
057	Baby Creek (B52)	42°17'36" 083°08'36"	Rouge River	Group 1: DSCN0053	
054	Fort St. (B50); DWSD Northwest Interceptor; West shore	42°17'25" 083°08'35"	Rouge River	Group 1: DSCN0052	
053	Fort St. (B48); East shore	42°17'29" 083°08'31"	Rouge River	Group 1: DSCN0054	Does not have a backwater gate; has a dam with flashboard
Livernois & Ranspach Inflatable Dam	Livernois Relief Dam			Group 1: DSCN0055-59	Inflatable dam; Set point is 8/10 of sewer capacity; If over 8/10 dam deflates; 2 sensors – 1 at dam & 1 downstream at DRI; automatic; installed an automatic control dam recently; manually operated dam in same location before for approx. 20 years; has an uninterruptible power supply
043	Dragoon (B41); Livernois Relief; P-39	42°17'49" 083°05'41"	Detroit River	Group 1: DSCN0060-62	2 backwater gates – one on river side and one on sewer side
034	West Grand Blvd. (B32)	42°18'41" 083°04'50"	Detroit River	Group 1: DSCN0063-68	By Riverside Park; People fishing by outfall ; stainless steel sluice gate replaced old regulator; backwater gate; check valve to DRI
008	Helen St. (B06)	42°20'40" 083°00'06"	Detroit River	Group 1: DSCN0072	Outfall consists of three pipes; View from Belle Isle
Belle Isle Pump Station & Imhoff Tank				Group 1: DSCN0069-71	Pumps station is underground; Imhoff Tank collects sanitary & storm water; Overflow to Belle Isle CSO outfall 083 when wet well fills up
006	Fischer (B04); Fischer Pump Station	42°21'16" 082°59'15"	Detroit River	Group 1: DSCN0074-76	Near Emma Henderson Park; People fishing by outfall; flow goes through Agnes sewer to Fischer pump station. Normally pumped to DRI; if pump station can't manage flow, discharges to river. Controls – level sensor, proximity switch at pump station readout. No controls for PC-713 yet
029	Rosa Parks (B27)	42°19'13" 083°03'56"	Detroit River	Group 1: DSCN0077-82	People fishing near outfall; Dam and sluice gate with rubber check valve; outfall sewer is two, 4 foot pipes; diversion chamber upstream of B27

Outfall Number/ Control Device Number	Other References (DWSD ID)	Latitude and Longitude[1]	Receiving Stream	NEIC Photo Number(s)[2]	General Conditions/Observations/Control Devices
074/ Double-leaf gate in-system control device	McNichols (B80 & B81)	42°24'52" 083°15'59"	Rouge River	Group 2: DSCN0122-130	At 8/10 sewer capacity of NWI, top leaf comes down. As flow rises, the top leaf comes down further and both leafs open; During dry weather leaf gate closed fully blocking outfall; river sensor and interceptor sensor; Backup generator with UPS; gates can be manually operated; Backwater gates on outfalls
068	Brammel (B71)	42°23'30" 083°15'56"	Rouge River		
069 Double-leaf gate in-system control device	Lyndon (B72)	42°23'35" 083°15'57"	Rouge River	Group 2: DSCN0131-141	
059	Warren (B54)	42°20'34" 083°14'57"	Rouge River	Group 2: DSCN0142-146	Backwater gates; No stop logs because outfall configured such that outfall opening can be covered for maintenance
101	Hubbell/Southfield (Previously outfall 058)	42°18'29" 083°12'24"	Rouge River	Group 2: DSCN0038-45	
102	Puritan/Fenkell (5-mile) (Previously outfalls 070 &071)	42°23'59" 083°16'19"/ 42°24'27" 083°16'30"	Rouge River	Group 2: DSCN0069-70	
103	Seven Mile (Previously outfall 076)	42°25'44" 083°16'11"	Rouge River	Group 2: DSCN0109-110	
104	Conner Creek (replaces outfalls 001,002,&003)		Conner Creek		

1 *Latitude and longitude listed in Table 2 are taken from the NPDES permit*

2 *Photograph logs for each NEIC group are included with the photographs in Appendix B*

RECORDS/DOCUMENT REVIEW

The following is a discussion of pertinent records and documents reviewed during and after the inspection that have not been discussed previously in this report. Compliance-related and general operational/maintenance records and procedures were reviewed at each RTB during the NEIC inspection. NEIC also discussed the generation, execution, and documentation of preventative and corrective maintenance work orders for equipment managed by DWSD and Wade-Trim.

DWSD Records

Operation Records

For equipment controlled by DWSD, NEIC reviewed original equipment manufacturer (OEM) manuals, site-specific operating procedures, and records maintained at each site. With the exception of the concern described below, no areas of concern were identified in the documentation reviewed by NEIC.

In general, site-specific operating procedures for the three RTBs were consistent with statements by DWSD operators to NEIC. However, certain operating parameters for the Seven Mile and Puritan-Fenkell facilities are not specified in the operating procedures for these two facilities. Examples include absent values (denoted by question marks) for levels or rates relevant to the addition of sodium hypochlorite, influent flow meter conditions indicating the end of an event, and levels at which the effluent weir is overtopped for discharge. [See the "inflow," "outflow," and "end" sections of the two operating procedures, Appendix P]. Statements by facility operators to NEIC indicated that this information was typically known. The missing information should, however, be added to the procedures to ensure that the documents can fully and accurately serve their intended purpose **[AOC G]**.

Maintenance Records

As discussed previously in this report, maintenance activities on the collection system and wastewater treatment plant (including the CSO treatment facilities) are primarily performed by DWSD personnel from one of following three groups:

- On-site operators: routine preventative maintenance
- Mechanical Maintenance Division: more involved preventative maintenance and corrective maintenance on equipment with moving parts in the collection system, such as pump stations, backwater gates, CSO facilities, etc.
- Maintenance and Repair Division: preventative maintenance and corrective maintenance on non-moving equipment/structures such as sewers, catch basins, etc.

In general, work orders for preventative maintenance (PM) tasks performed by the first two groups are generated by the Maintenance Planning Division (located at the Central Services facility) from PM schedules developed from OEM manuals, operating procedures, and historical information. Work orders are generated and tracked using the EMPAC ("Enterprise Maintenance Planning and Control") computer software program. According to DWSD personnel, EMPAC has been operational (i.e., in the implementation phase) in the Mechanical Maintenance Division and the WWTP for 2 to 4 years (depending on whom NEIC asked), and was coming on-line for the Maintenance and Repair Division at the time of the NEIC inspection.

Work orders reviewed by NEIC contained instructions for performing the specific PM activity, as well as identifying the location and specific piece of equipment. The EMPAC system can be queried by work order number or by piece of equipment based on location. Corrective maintenance (i.e., repair) is also performed by Mechanical Maintenance and managed within the EMPAC system. Repair requests originate from on-site operators, previous work orders, the systems control center (including "traveling operators" which make daily rounds to specific collection system components like pump stations), and contractor personnel.

Preventative and corrective maintenance work orders for the Maintenance and Repair Division may be generated from a variety of sources. According to DWSD personnel, most are complaint-driven from customers (e.g., the public, other city of Detroit departments). Besides catch basin cleaning, the Maintenance and Repair Division also conducts or directs sewer line inspections, and coordinates the lining of sewer pipes in need of repair. Records reviewed by NEIC indicate that 244,031 linear feet of sewer was cleaned and 185,657 linear feet of sewer was lined from July 2004 through June 2005, as part of DWSD's inspection and in-place sewer rehabilitation program.

At the Central Services Facility (co-located with the SCC) and at the Hubbell-Southfield RTB, NEIC reviewed new, uncompleted work orders; completed, closed-out work orders; and various summary status reports of unfinished and completed work orders. No areas of concern were identified in the DWSD-generated documentation reviewed by NEIC.

Sampling and Analysis Records

Laboratory support for an event (e.g., when a CSO treatment facility takes on flow) is provided by chemists from the operations group within the WWTP laboratory. Chemists interviewed by NEIC at the RTBs stated that records are maintained at each CSO treatment facility which document the on-site analyses (DO, pH, and TRC), equipment calibration and maintenance, and sampling activity. DWSD chemists and support staff stated that quality control measures for the on-site analyses include the following:

- monthly equipment calibration
- equipment calibration prior to analysis of event samples
- analysis of pre-prepared "blind"quality control samples for pH and TRC prior to the analysis of event samples
- routine performance testing of chemists with "blind" quality control samples, and other measures at the WWTP laboratory [Appendix Q]
- maintaining "fresh" calibration standards and reagents at the sites

At each RTB, NEIC observed an operation logbook (describing general sampling-related activity and maintenance), a calibration log, and a binder with chain-of-custody sheets and operating procedures for the on-site analytical equipment. Records at the Hubbell-Southfield RTB were consistent with statements by DWSD personnel and spot-checked records noted below at the WWTP. No areas of concern were noted in the Hubbell-Southfield RTB records or sampling-related documentation.

No entries were present in the calibration logbook for the Seven Mile facility, and were largely absent in the calibration logbook for the Puritan-Fenkell facility. At the Puritan-Fenkell facility, entries were not present for the aforementioned discharge events in the year 2000. The DWSD chemists stated that the equipment at these two facilities was in fact, not calibrated at regular intervals due to the infrequency of discharges from the facilities. The chemists stated that calibrations (and blind sample analyses) for the on-site analyses are performed prior to event sample testing, but were not recorded in the calibration logbook.

As a result, records which documented the operational status (e.g., readiness and calibration) of equipment for on-site DO, pH, and TRC analyses were not being maintained for the Puritan-Fenkell and Seven Mile facilities. Regularly-scheduled calibrations – which were not performed for the on-site instruments at these two upper RTBs – and full and accurate documentation of all maintenance/calibration activities is essential to ensure compliance with the permit-imposed testing requirements **[AON 2]**.

Discharge Monitoring Reports (DMRs)

DMRs for discharges from CSO treatment facilities for the period of January 2004 through March 2005 were reviewed. The DMRs include effluent monitoring results for outfall monitoring points 101A (Hubbell-Southfield RTB), 102A (Puritan-Fenkell RTB), 103A (Seven Mile RTB), 105A (Leib facility), and 106A (St. Aubin facility). Appendix R contains a summary of the effluent monitoring results reported on the DMRs for the time period reviewed. There were no exceedances of effluent limitations reported on DMRs for that time period.

Wade-Trim Records

NEIC reviewed documentation related to field contract support provided by Wade-Trim. Wade-Trim provides instrument and electrical support for equipment at the three RTB facilities, seven double leaf gates, and the two screening and disinfection facilities currently in full operation. The equipment includes level sensors and/or flow meters directly upstream of the CSO facilities and control devices. Wade-Trim uses a separate work order generation and tracking system for its support activities. Its EPAC system is functionally similar to DWSD's EMPAC system, but is not linked with or integrated into the DWSD system.

According to Wade-Trim personnel, the Hubbell-Southfield RTB serves as the repository for all records, procedures, and manuals for the equipment serviced by Wade-Trim. Wade-Trim submits weekly work plan schedules for preventative and corrective maintenance work to DWSD, and prepares a monthly progress report for DWSD which summarizes the status of work orders.

During the on-site inspection of the Hubbell-Southfield RTB, NEIC requested that Wade-Trim produce a completed work order (and associated documentation) for preventative maintenance on a level sensor associated with a double leaf gate observed earlier in the inspection. Specifically, NEIC asked for the original work order, with detailed instructions, for performing a routine calibration of the sensor and hard-copy records of the field calibration. Wade-Trim was unable to produce the requested records during the inspection. A scanned copy of the hard-copy field data was e-mailed to NEIC following the inspection, but an original work order was not produced **[AOC H]**.

Long Term CSO Control Plan (LTCP)

DWSD originally submitted the LTCP for the Detroit and Rouge Rivers to the MDEQ on July 1, 1996 [Appendix S]. An update to the LTCP was submitted to the MDEQ on December 31, 2001 [Appendix T]. In general, DWSD is in the midst of implementing long term CSO controls in accordance with the original LTCP, updated LTCP, and NPDES permit requirements. The LTCP update provides information on the status of current and proposed CSO control projects, performance evaluations at completed CSO control facilities, a rain water control pilot program, water quality monitoring efforts, capital cost updates, and information on other major CSO control projects, such as PC-713. The current NPDES permit requires DWSD to submit approvable amended LTCPs for the Rouge River (Amendment Rouge) and the Detroit River (Amendment Detroit) by December 1, 2008. Each LTCP amendment shall include a description of the programs and/or facilities needed to adequately treat or eliminate CSOs to comply with water quality standards at the time of discharge.

Greater Detroit Regional Sewer System (GDRSS) Model

The GDRSS model is a mathematical computer model used to predict wet weather response within the collection system tributary to the DWSD WWTP. The GDRSS model is based on EPA's Storm Water Management Model (SWMM) and has been under development since 1988. The model has been developed in three phases, and was originally prepared by the DWSD to help determine if operational changes to the collection and treatment systems could help reduce CSOs. The second phase involved model expansion to include the surrounding suburban sanitary districts and tributary communities and collection of data for model calibration. The third phase of model development involved using additional flow data for system-wide calibration for evaluation and analysis of system-wide CSO controls, including planning and design work. Because the model is used for many projects throughout the collection system area, a technical committee was formed in 1992 to monitor progress and provide oversight to the modeling work. The committee, which currently meets quarterly, includes representatives from the DWSD, Wayne County, Oakland County, Macomb County, MDEQ, and the Federal Court.

The GDRSS phase III model was completed in 1998. A system-wide validation of the phase III model was completed in 2001 to confirm the model's predictive capability and to verify model updates. The model was extensively evaluated and updated, including additional calibration and validation, in 2003 as part of the DWSD Wastewater Master Plan project. The Wastewater Master Plan, completed in October 2003, is intended to project the long term needs of the DWSD service area over the next 50 years. The model update as part of the Wastewater Master Plan included incorporating in-system storage facilities, the screening and disinfection facilities, and CSO facilities under design or construction. Additional model updates are planned for 2005, including additional calibration and validation of the model using recent flow monitoring data. The model will also be reevaluated once project PC-713 is completed and on-line for a period of time.

FINDINGS

Based on inspection observations, discussions with DWSD personnel, and review of documentation, the following areas of noncompliance and areas of concern associated with Clean Water Act requirements were identified during the NEIC investigation. Areas of concern are inspection observations of potential problems/activities that could impact the environment, result in future noncompliance with permit or regulatory requirements, and/or are areas associated with pollution prevention issues.

Areas of Noncompliance

1. **NPDES Permit MI0022802 Part I.A.13.f. – Collection System and CSO Treatment Facilities Operational Plan** – *The permittee shall continue implementation of the Detroit Water and Sewerage Department's (DWSD's) approved Collection System and CSO Treatment Facilities Operational Plan (Operational Plan). Any changes to the Operational Plan which affect the rate, volume, or characteristics of the discharge, or the system storage and transportation for conveyance of wet weather flows, shall be submitted to the Department and approved prior to implementation. Annually, on or before October 1, the permittee shall submit an Operational Plan Update, which incorporates all changes made to the plan during the last year. The operational plan shall define the hydraulic design constraints of the system during both dry and wet weather operation.*

   Annual updates to the Operational Plan have not fully reflected changes to the collection system. The original Operational Plan was submitted in its entirety in 1993, and updated in full in 1994. Subsequent annual updates have consisted of modified replacement pages and/or completely new sections or topics for existing sections. Because all updates since 1994 have consisted of stand-alone sections, a complete Operational Plan does not exist. A complete Operational Plan assembled by NEIC is primarily composed of sections from the 1994 update, the 2003 update, and the 2004 update. As such, the plan does not address several specific permit requirements, and in general, does not reflect the substantial changes to both the infrastructure and operation of the collection and treatment systems

2. **NPDES Permit MI0022802 Part II.B.2. – Test Procedures** – *The permittee shall periodically calibrate and perform maintenance procedures on all analytical instrumentation at intervals to ensure accuracy of measurements. The calibration and maintenance shall be performed as part of the permittee's laboratory Quality Control/Quality Assurance program.*

   Regularly-scheduled calibrations were not performed on the on-site compliance-related testing equipment at the Puritan-Fenkell and Seven Mile RTB facilities. In addition, records which documented maintenance, calibration, and analysis activities for these instruments used for dissolved oxygen, pH, and total residual chlorine testing were not maintained.

Areas of Concern

A. Because of the size of the sewer system and number of overflow locations, DWSD's practice of identifying DWOs through visual inspections may not be adequate. At the time of the NEIC inspection, DWSD was relying on their O&M and inspection program to identify DWOs. DWSD stated that, to their knowledge, DWOs are infrequent and that none had occurred in the last 5 years. Implementation of the system-wide instrumentation and control improvement project (PC-713), required to be completed by December 31, 2005, will provide real-time identification and notification of discharges through CSO outfalls, including during dry weather.

B. While DWSD has a program for notifying the public once a CSO discharge occurs, there is no mechanism in place to inform the public of the location of CSO outfalls. DWSD has not placed signs at any of the CSO outfall locations to notify the public of the presence of potential CSO discharges. Outfalls were observed in the vicinity of parks, marinas, and fishing locations.

C. The Puritan-Fenkell and Seven Mile RTBs take on wet weather-related flow in volumes which typically do not approach their respective design storage/treatment capacities. The facilities are succeeding in preventing overflows to the Rouge River, and thus are capturing all the excess combined wastewater from the upstream, contributing drainage areas. However, the under-utilization (and perhaps over-design) of the facilities is a concern in light of the continued overflows from other drainage areas through other outfalls along the Rouge River. DWSD personnel acknowledged the flow limitations due to the size and configuration of the contributing drainage area to the two facilities, and indicated that options were being evaluated for routing flow from other drainage areas into the facilities. At the time of the NEIC inspection, a strategy for rerouting flow from other drainage areas had not been formalized.

D. The general under-utilization of the storage/treatment capacities at the Puritan-Fenkell and Seven Mile RTBs, and the infrequent overflows at the Leib screening and disinfection facility have resulted in prolonged storage intervals for the sodium hypochlorite disinfectant at each facility. Consequently, the unused sodium hypochlorite decays to concentrations (typically 3 to 4 percent) at which it can no longer provide adequate disinfection at design delivery rates and contact times. DWSD has disposed of the off-specification sodium hypochlorite by discharging it into the interceptors draining each facility. DWSD is currently evaluating this practice and is reassessing its current dosing strategy – adding sodium hypochlorite to the inflow once pre-set water levels are reached within the facilities – due to concerns about increased chlorine loadings at the WWTP. DWSD is also assessing alternative sodium hypochlorite storage/delivery options.

E. NEIC's compliance review of the Operational Plan highlighted the limitations of the format specified in the NPDES permit. Because the permit requires the submission of updates (as opposed to a complete document) which only address changes to the system, the resulting plan is not functional or readily reviewable for regulatory purposes. A truly complete and current Operational Plan does not exist and, thus, the plan may have lost its effectiveness as an implementing document.

F. There is no on-site designation of CSO outfalls locations (sign, plaque, marker, etc.), causing some initial confusion between NEIC and DWSD personnel regarding outfall designations during the NEIC inspection. The NPDES permit lists outfall numbers (e.g., 074), outfall location names (e.g., McNichols), and backwater gate numbers (e.g., B80) as references to specific outfall locations. DWSD personnel typically refer to outfalls by backwater gate number or outfall location name, rather than by the traditional outfall number. NEIC personnel attempted to inspect outfall locations by outfall numbers. Through cross referencing, NEIC and DWSD personnel were able to determine outfall locations, and it was clear that DWSD staff knew where specific outfalls were located. DWSD has prepared an atlas of outfalls including a map of each outfall location.

G. Certain operating parameters for the Puritan-Fenkell and Seven Mile RTBs are not specified in the operating procedures for these two facilities. Examples include absent values (denoted by question marks) for levels or rates relevant to the addition of sodium hypochlorite, influent flow meter conditions indicating the end of an event, and levels at which the effluent is overtopped for discharge. Statements by facility operators to NEIC indicated that this information was typically known. The missing information should, however, be added to the procedures to ensure that the documents can fully and accurately serve their intended purpose.

H. A sample of electrical and instrumentation preventive maintenance records maintained by Wade-Trim were not readily available during the NEIC inspection. During the on-site inspection of the Hubbell-Southfield RTB, NEIC requested that Wade-Trim produce a completed work order (and associated documentation) for preventative maintenance on a level sensor associated with a double leaf gate observed earlier in the inspection. Specifically, NEIC asked for the original work order, with detailed instructions, for performing a routine calibration of the sensor, and hard-copy records of the field calibration. Wade-Trim was unable to produce the requested records during the inspection. A scanned copy of the hard-copy field data was e-mailed to NEIC following the inspection, but an original work order was not produced.

APPENDICES

A	NPDES Permit MI0022802, effective January 1, 2004
B	NEIC Inspection Photographs
C	DWSD Collection System Overview Figure
D	DWSD Wastewater Collection System Overview
E	MDEQ Criteria for Success in CSO Treatment
F	RTB Flow Diagrams
G	Screening and Disinfection Facility Schematic Diagrams
H	WWTP Wet Weather Operational Plan
I	Inflatable Dam Figure
J	Double Leaf Gate Figure
K	May 9, 1995 CSO Notification Procedure and MDEQ Approval Letter
L	February 11, 2002 Proposed CSO Notification Protocol
M	DWSD CSO Reporting Forms
N	April 22, 2005 CSO Notification Report for January 2005
O	NEIC-Developed Unified Collection System and CSO Treatment Facilities Operational Plan
P	Puritan-Fenkell and Seven Mile RTB Standard Operating Procedures
Q	DWSD Operations Laboratory's Quality Assurance Program Goals
R	DMR Summary Table
S	July 1, 1996 Long Term CSO Control Plan (separate CD-ROM)
T	December 31, 2001 Long Term CSO Control Plan Update (separate CD-ROM)
U	Second Amended Consent Judgment
V	Stipulated Order Amending Attachment C of Second Amended Consent Judgment
W	MDEQ District Compliance Agreement, May 23, 2005