UNITED STATES DISTRICT COURT
FOR THE MIDDLE DISTRICT OF TENNESSEE
(Nashville Division)

THE UNITED STATES OF AMERICA and THE STATE OF TENNESSEE, Plaintiffs, v. METROPOLITAN GOVERNMENT OF NASHVILLE AND DAVIDSON COUNTY, Defendant.	CIVIL ACTION NO. 3 07 1056 JUDGE ECHOLS

CONSENT DECREE

INTRODUCTION

WHEREAS, the United States of America, on behalf of the Administrator of the United States Environmental Protection Agency ("EPA"), filed a Complaint alleging that the Defendant, the Metropolitan Government of Nashville and Davidson County, Tennessee ("Metro"), acting by and through its Department of Water and Sewerage Services, has violated the Clean Water Act, 33 U.S.C. § 1251, *et seq.* ("CWA"); and

WHEREAS, the CWA imposes strict liability based upon any violation of the CWA; and

WHEREAS, on April 30, 2007, the State of Tennessee ("State") issued a sixty (60) day notice of intent to sue Metro pursuant to 33 U.S.C. § 1365, and thereafter filed a Complaint

APPENDIX F

STATE PROJECT

State Project
Metro Water Services of
Metropolitan Government of Nashville and Davidson County, Tennessee

This Appendix contains a description of the proposed State Project ("SP") to be funded by Metro Water Services of the Metropolitan Government of Nashville and Davidson County, Tennessee as part of a consent decree resolving alleged unauthorized discharges from Metro Water Services Combined and Separate Sanitary Sewer System. Metro Water Services will dedicate two hundred eighty-two thousand and nineteen dollars ($282,019) to The Cumberland River Compact (The Compact) within this SP.

A. Project Purpose

With this SP, Metro Water Services will contract with The Compact to address water quality issues through Project Blue Streams, a new small stream restoration program The Compact is launching in Metro Nashville and Davidson County. A targeted watershed approach will be used to address local water quality problems through pollution prevention, pollution reduction, public health avenues, and environmental education, restoration and protection.

The Compact, with the support of Metro Water will develop a program similar to and possibly in cooperation with the 10,000 Rain Gardens program of Kansas City. In addition to traditional rain garden materials, The Compact will also dovetail in the elements of a Tree Planting Initiative both to be implemented in Nashville It will be a non-governmental program working with neighborhood associations, homeowners associations, garden clubs, businesses, schools and churches. This initiative will augment considerations such as stormwater infiltration, the benefits of slowing stormwater runoff and the filtration of the first "flush" of stormwater leaving a site. Additionally, the tree planting initiative will seek to restore trees to the natural hydrologic cycle on land that is denuded or impacted as Nashville's urban watersheds develop/redevelop with ever-increasing impervious surface.

The SP will result in a broad range of citizenry including lawn care companies, being exposed to water quality issues through clean ups, rain garden trainings, riparian enhancement, benthic macro-invertebrate counts, and visual stream assessments. These activities will be used as motivation for greater citizen stewardship and public awareness, but results will also be reported to Metro Water Services to red flag potentially polluted streams and monitor success toward restoring streams.

Metro Water Services recently added an Adopt a Stream program to its department. The SEP will be utilized to promote the Adopt a Stream program in excess of what Metro Water is currently doing with the targeted results being more local stream miles being adopted, tended and restored.

Large-scale restoration projects are planned for each of three targeted watersheds – Mill Creek, Whites Creek and Richland Creek. Lessons learned from these demonstration

projects will be used to educate local citizenry and showcase the biodiversity present in our Mid Cumberland Basin.

Metro Water Services recently enacted new Storm Water regulations with an increased buffer zone. This SP will be used to enhance species diversity within targeted buffer areas providing optimal stormwater runoff infiltration and filtration.

One goal of this SP is to educate people of all ages about the natural water cycle, our role and relationships with local small streams and the ensuing impacts of actions in small streams upon the larger watershed. The activities resulting from the SP will foster immediate restoration efforts as well as long term stewardship leading to water conservation and cleaner waters. This in turn will yield a healthier stream system in the Nashville Metro area for both people and aquatic life.

Another goal of this SP will be to bring attention to/educate the development community on the water quality/stormwater issues created by the use of extensive imperviousness on development sites. The objective of this initiative will be to educate those making decisions regarding property development and to reach their design professionals while projects are still in the planning phase so as to identify possible opportunities to reduce imperviousness without compromising development objectives.

The specific goals for this SP are to:

- Build an average of 60 rain gardens per year in the first five (5) years of the SP in Metro Nashville and Davidson County and based on achievement of these milestones, plan for additional rain garden installations in future years.
- Plant 10,000 trees of ½ inch diameter or greater in Metro Nashville and Davidson County
- Educate residents of Metro Nashville and Davison County about water quality through stream clean-ups, rain garden trainings, macro-invertebrate counts, riparian enhancement projects and stream walks
- Enhance existing impaired riparian buffer zones
- Facilitate the adoption of at least 15 stream segments through Metro Water Service's Adopt a Stream Program
- Formulate (and distribute via Metro) educational materials specific to Metro Nashville/Davidson County outlining the impacts of "imperviousness" on ambient water quality and stormwater quality considerations, as well as what Stormwater Best Management Practices (BMPs) can be utilized to minimize imperviousness and the various related stormwater runoff impacts.
- Educate local citizenry about the federally endangered Nashville Crayfish and other unique species residing in Nashville's streams

The Compact will provide complete documentation of their various activities relating to the performance of this SP to Metro Water Services as needed to submit any related compliance documentation to State or Federal officials.

B. Project Scope

To complete this SP, Metro Water Services shall:

- Provide $50,000 per year in years one (1) thru five (5) and $32,019 in year six (6) to The Cumberland River Compact to implement the SP goals outlined above.
- Provide meeting facilities as deemed appropriate by Metro Water Services to facilitate SP activities.

C. SP Costs

Metro Water Services shall set aside $282,019 toward the performance of the previously stated SP activities.

D. Project Schedule

The duration of the SP will be six (6) years from the date of acceptance of this SP and subsequent written notification to The Compact. At the end of six (6) years the partnership will be evaluated for possible further funding by Metro Water Services.

APPENDIX E

SUPPLEMENTAL ENVIRONMENTAL PROJECT

Appendix E

Metropolitan Government of Nashville & Davidson County Supplemental Environmental Projects (SEPs)

This Appendix contains a description of the two proposed Supplemental Environmental Projects (SEPs) to be funded by the Metropolitan Government of Nashville & Davidson County, Department of Water and Sewerage Services ("Metro") as part of the Consent Decree resolving alleged unauthorized discharges from Metro's combined and separate sewer systems. Metro will dedicate two million six hundred thousand dollars ($2,600,000) for the first SEP and two hundred thousand ($200,000) for the second SEP, for a total of two million eight hundred thousand dollars ($2,800,000).

SEP #1 – Brandywine Sewer Extension to eliminate 329 homes on septic tanks

A. Project purpose

This SEP is intended to address water quality issues presented by septic tank failures in the 40 year old Brandywine Subdivision. This project will reduce bacteriological impairments to the Old Hickory Lake, land surface areas, streams within the subdivision, and contamination of the groundwater in the area by providing a more effective alternative for sewage disposal by extending Metro's sewer lines to this area. This project is supported by the Metro Public Health Department of Nashville and Davidson County and ranks as the second worst area in Metro's sewer service area needing public sewer extensions. The second SEP presented later in this appendix was deemed to be the worst area in Metro's service area needing public sewers extensions. There have been at least 117 observed septic tank failures in this subdivision of approximately 329 homes. This does not include the failures that are not surfacing and have not been observed that are potentially contaminating the groundwater.

B. Project Scope

The Brandywine subdivision is located adjacent to Old Hickory Lake in Hermitage, Tennessee (see map on next page). Old Hickory Lake is one of several lakes that, along with the Cumberland River, make up the Cumberland Lake watershed. There are approximately 329 homes that will have access to sewer with completion of this SEP. This SEP consists of installing approximately 30,000 feet of gravity and pressure collector sewer, including service stub outs to the right-of-way line of each home. It will capture approximately 3.6 million gallons of sewage per month and convey it for treatment through a series of gravity mains and pumping stations to Metro's Central Waste Water Treatment Plant. The homeowners will be responsible for installing the individual grinder pumps at close proximity to their homes and running the individual service discharge lines to the service stub out in the right-of-way.

C. Cost and Schedule

Metro shall spend at least $2.6 million for the implementation of this SEP. This will furnish the gravity sewers, collector force mains and the stub outs to the right-of-way line for ease in connecting the individual discharge lines from each grinder pump. The cost of planning, designing, inspecting, along with any other program administrative costs will not be counted towards the $2.6 million devoted to this SEP. This project will be completed no later than December 31, 2010

D. Modification / Substitution of Projects

Metro may substitute a similar project for the project identified above or may modify the project upon advanced written approval of the EPA in accordance with Section XXI of the Consent Decree. Such approval shall not be unreasonably withheld. Any such modification shall be considered a Material Modification

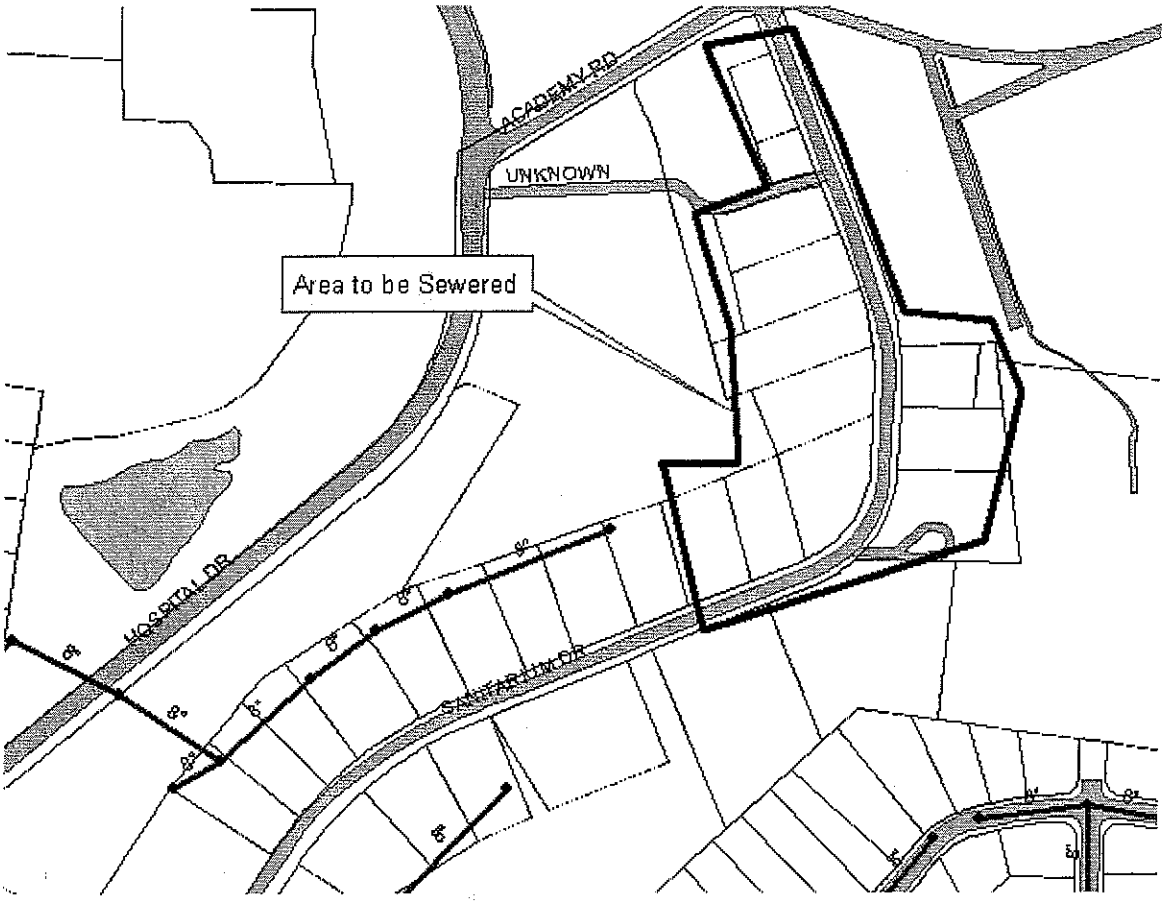
SEP #2 – Sanitarium Drive Sewer Extension to eliminate 12 homes on septic tanks

A. Project purpose

This SEP is intended to address water quality issues presented by septic tank failures in the Sanitarium Road area. This project will reduce bacteriological impairments to streams within the area and contamination of the groundwater in the area by providing a more effective alternative for sewage disposal by extending Metro's sewer lines to this area. This project is supported by the Metro Public Health Department of Nashville and Davidson County and ranks as the worst area in Metro's sewer service area needing public sewer extensions. There have been 7 observed septic tank failures in this area of 12 homes.

B. Project Scope

Sanitarium Drive is located in the northeast portion of Metro's sewer service area inside Davidson County (see map on next page). There are approximately 12 homes that will have access to gravity sewer with completion of this SEP. This SEP consists of installing approximately 2,000 feet of 6" public gravity sewer and gravity sewer stub outs to the property line of each home. It will capture approximately 130,000 gallons of sewage per month and convey it for treatment through a series of gravity mains and pumping stations to Metro's Dry Creek Waste Water Treatment Plant. The homeowners will be responsible for installing the gravity service line from their homes to the stub out.



C. Cost and Schedule

Metro shall spend at least $200,000 for the implementation of this SEP. This will furnish the gravity main and the stub outs to the property line for ease in connecting the individual sewer service lines from each home. The cost of planning, designing, inspecting, along with any other program administrative costs will not be counted towards the $200,000 devoted to this SEP. This project will be completed no later than December 31, 2010.

D. Modification / Substitution of Projects

Metro may substitute a similar project for the project identified above or may modify the project upon advanced written approval of the EPA in accordance with Section XXI of the Consent Decree. Such approval shall not be unreasonably withheld. Any such modification shall be considered a Material Modification.

APPENDIX D

CAPACITY ASSURANCE PROGRAM

CAPACITY ASSURANCE PLAN ADDENDUM

June 2007

Original Capacity Assurance Plan Specifications (August 1990)

Available capacity = Capacity of pipe flowing full (Manning's) – Peak Dry Weather Flow – Committed Flows

MWS could allocate up to 50% of existing capacity based on the Criteria for Assignment of Points described below:

- (10 Points)

Developed Density	Percent
Lightly Developed	100
Moderately Developed	80
Densely Developed	50

- (10 Points)

Frequency of Overflows	Percent
<10 per year	100
>10 per year	80
>15 per year	60
>20 per year	30
>25 per year	0

- (12 Points)

Magnitude of Overflows	Percent
<1 million gallons (MG)	100
>1MG	80
>10MG	60
>20MG	30
>25MG	0

- (18 Points)

Discharge of Receiving Stream	Percent
0 cfs	20
<5 cfs	50
<10 cfs	60
<50 cfs	80
>50 cfs	100

Downstream pumping stations are also required to be capable of handling peak and committed flows with the largest pump out of service (e.g. rated capacity).

Limitations of the Original Plan

- Previous model was "static" instead of "dynamic". As a result, the model assumes that individual peak flows occur simultaneously and overestimates the total peak flow.
- Base flows have changed since 1990 in the negative direction in basins where I/I remediation has been performed.
- Design criteria flows are different than actually realized.

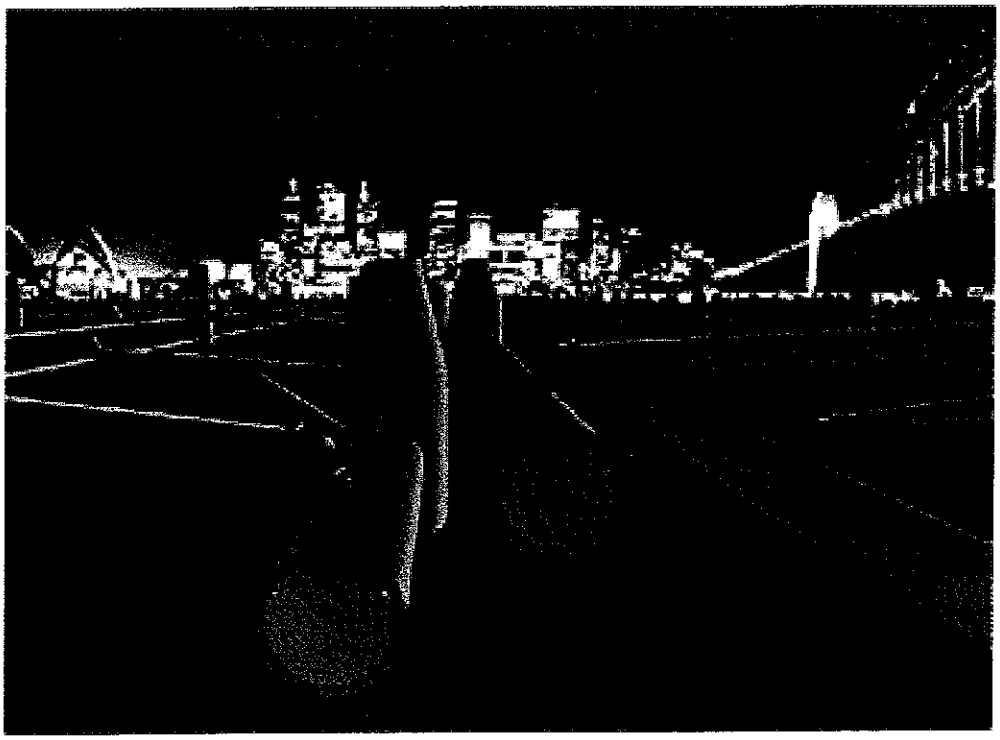
Status of the Existing Plan In 1994

Static model was frequently recalibrated using permanent and temporary flow monitors. Analysis was performed by applying:

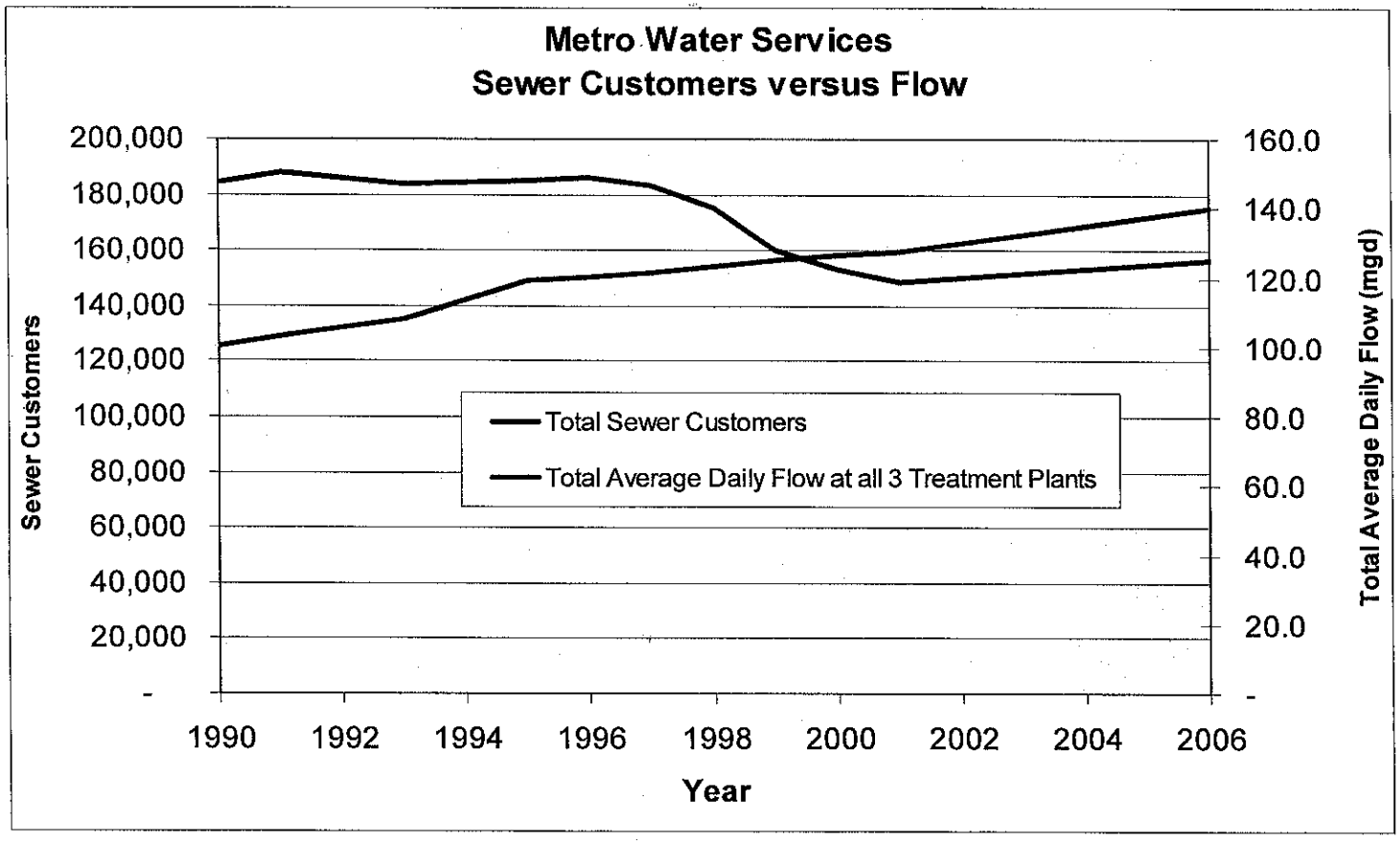
70% of capacity = critical point

70% triggers capital improvement project to improve capacity

At critical point a maximum of 50% of the remaining capacity could be allocated so long as progress was being made on identified capacity recovery project and rehabilitation / equalization project for downstream sanitary sewer overflows (SSOs).



Successes of the 1990 Capacity Assurance Plan and Overflow Abatement Program



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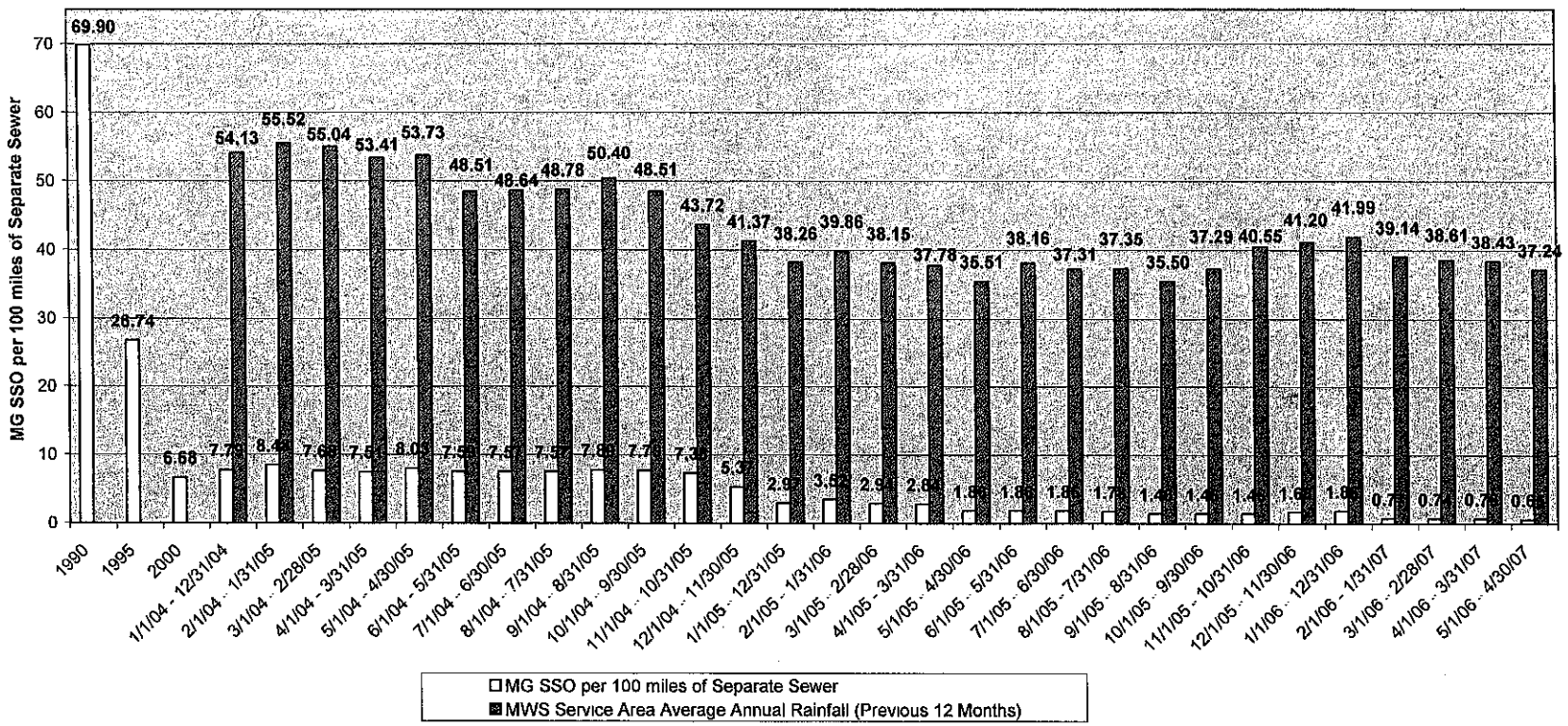
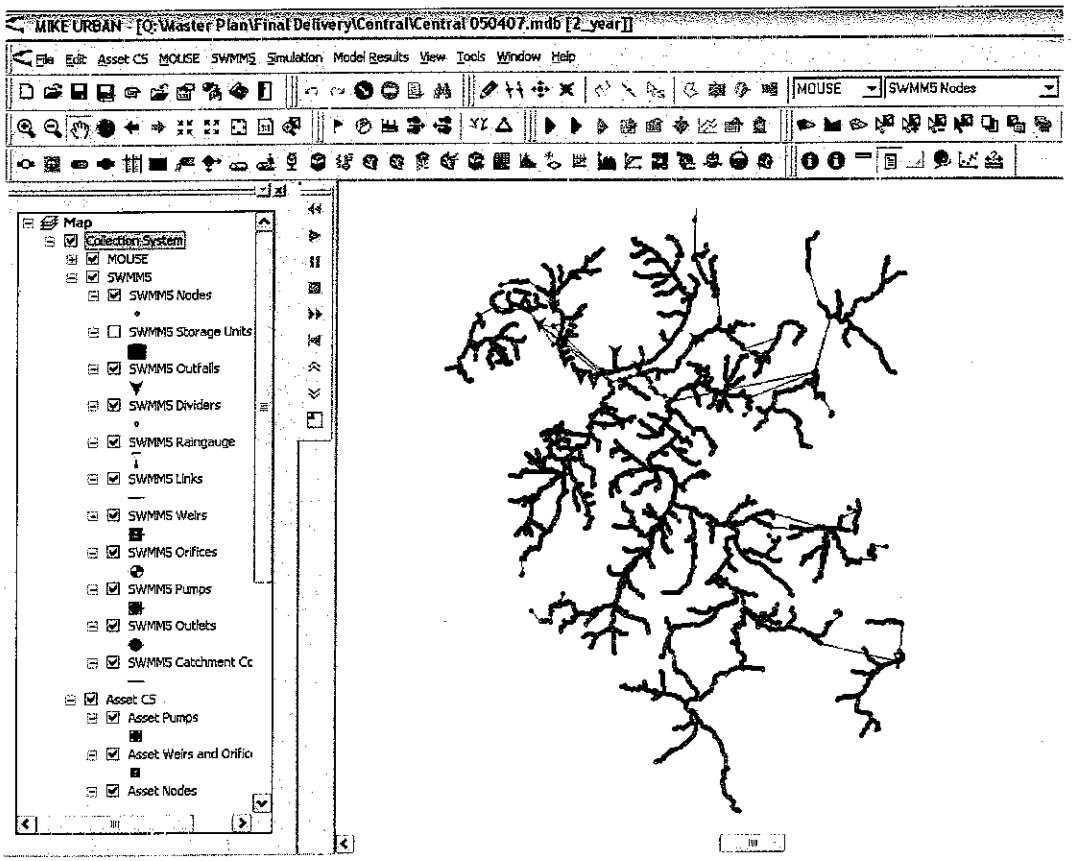
MG SSO per 100 miles of Separate Sewer



Proposed Modifications to Original Capacity Assurance Plan

- The new plan's modeling standard will be a dynamic sewer hydraulic model that has recently been developed for MWS and is based on the EPA SWMM5 engine.



- MWS could allocate up to 85% of existing capacity based on the Updated Criteria for Determining Available Capacity described on the following page.

UPDATED CRITERIA FOR DETERMINING AVAILABLE CAPACITY

Volume of Closest Downstream Overflow (15 points)

>10 MG in the past 12 months	0 points
5-10 MG in the past 12 months	5 points
1-5 MG in the past 12 months	10 points
0-1 MG in the past 12 months	15 points

Frequency of Closest Downstream Overflow (15 points)

>12 in the past 12 months	0 points
8-12 in the past 12 months	5 points
4-8 in the past 12 months	10 points
0-4 in the past 12 months	15 points

Discharge of Receiving Stream/ Public Exposure (15 points)

0 cfs	0 points
<5 cfs	2 points
<10 cfs	5 points
<50 cfs	8 points
>50 cfs	10 points
Discharge to recreational water body or area with high likelihood of public exposure.	0 points
Discharge to non-recreational water body or area with low likelihood of public exposure.	5 points

Past 5 years and Future Projects Defined to Correct/ Abate SSO (25 points)

Remedial projects completed in basin* within the past 5 years.	25 points
Remedial projects in the basin* are under construction or have been funded for construction.	20 points
Remedial projects in the basin* are being designed.	10 points
Remedial projects in the basin* are in the CAP/ER but design has not begun.	5 points
Remedial projects in the basin* have not been planned.	0 points

* The "basin" is defined as all upstream areas that are contributing the closest SSO.

MWS Meeting Consent Decree Milestones including CAP/ER (15 points)

No 0 points
Yes 15 points

APPENDIX C

SORP

Sewer Overflow Response Plan

Submitted to EPA May 4, 2007

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering such information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Hal Balthrop

Hal Balthrop, P.E.

May 3, 2007

Date

Executive Summary
MWS's Sewer Overflow Response Plan

The Sewer Overflow Response Plan (SORP) outlines the actions MWS will take to reduce the impact of sanitary sewer overflows (SSOs) on our customers and the environment as well as to comply with regulatory requirements.

1. Staff Communication and Duties

To ensure that MWS is made aware of each SSO as expeditiously as possible, there are several methods by which SSOs will be identified. The most common and effective notification comes from individuals who witness the event and call MWS's Customer Service Center (CSC). CSC representatives take reports ranging from manhole overflows to sewage on private property. MWS employees/field crews, city employees, 911, or other agencies may also report SSOs to the CSC Dispatch. Some calls originate in the Control Room at the Omohundro Water Treatment Plant as a result of the Department's Supervisory Control and Data Acquisition System (SCADA). Automated systems, such as ADS flow monitors with Intelliserve and Data Acquisition System (SCADA) at pumping facilities, alert MWS that an investigation is warranted. The processes by which SSOs are reported and the actions generated from a report of an overflow are detailed in Sections 4.1, 4.2, and 4.3.1. The responsibilities of MWS employees charged with responding to SSOs are outlined in Sections 3.3-3.6.

2. Prompt Response to SSOs

MWS will make all reasonable efforts to respond to an SSO with qualified and equipped personnel within sixty (60) minutes of being notified (Section 4.2). Allowances will be made to ensure that the safety of the Responder and the public is the first priority. Records of all SSO responses, including response times, will be maintained (Sections 3.4, 4.3.1, 4.6, and 4.10). The details pertaining to MWS's response to SSOs will be stored in a database that will be used for reporting and to analyze MWS's performance. A log of building backups will be maintained in a database separate from other SSOs (Section 2.3).

3. Assessment of Cause and Impact

An important first step is the identification of the cause of an SSO (Section 4.3.2). The various causes will determine the type of mitigation or remediation that is most appropriate. Wet weather overflows are usually caused by inflow and infiltration (I/I), while dry weather overflows may result from blockages caused by roots, debris, grease or a combination of some or all. SSOs occurring during rain events are not in themselves considered wet weather events. When evaluating the potential impact of an SSO on public health and the environment, sensitivity factors will be identified. These factors will determine the level of public notification and clean up activity required. These sensitivity factors may include:

- Streams, creeks, and other natural waterways
- Heavy pedestrian areas
- Special facilities to include schools, public parks, walking trails, etc.

The process by which MWS will assess if an SSO has had any adverse impact on human health or the environment is described in Sections 4.3.5, 4.3.6, and 4.3.9. If a backup has occurred on private

property, MWS will respond to backups in accordance with the SORP. MWS will conduct an investigation to determine if the cause is a problem in the MWS system or is a result of a failure on the customer's side (considered private trouble). The process a property owner will follow to dispute the determination that a building backup is caused by a failure in their private lateral is outlined in Section 4.3.2.

4. Elimination of Cause and Mitigation of Impact

Once the cause of an SSO has been identified, the proper type of remediation can be chosen. Section 4.3.11 summarizes common abatement resolution activities and repairs that can be used independently or combined based on field conditions and television inspection. The MWS resources, including personnel and equipment needed and available to perform these activities and repairs, are listed in Sections 3.5, 3.6 and 3.8. When possible, flow diversion techniques provide an effective means of conveying the overflow back into the sewer system. This procedure reduces additional potential impact on the immediate area and the possible impact downstream. Flow diversion techniques employed by MWS when practicable are listed in Section 4.3.10. Control zones will be established for every SSO to help prevent public access around the perimeter of the affected surface area using appropriate signs and barricading practices (Section 4.3.6). Other methods for minimizing human contact with overflows can be found in Sections 4.3.9, 4.3.10, 4.3.12, and 4.4. Standard containment procedures for typical SSOs can be found in Section 4.3.9.

5. Clean up of SSOs

After an overflow has occurred, MWS's clean up of the impacted area will be thorough and comprehensive. General practices, depending on the individual situation, are outlined in Section 4.3.12. To minimize any further impact on human health or the environment, follow-up inspections and root cause analyses will be performed to identify the specific cause of the overflow. Methods for determining the causes of SSOs may include television inspection, smoke testing, visual inspection, etc. (Section 4.3.13). If a building backup is found to be caused by a collection system failure on the public main, MWS notifies Metro Nashville Legal Claims to dispatch an independent cleaning and restoration contractor to assist in cleaning, sanitizing, and repairing damage (Section 4.3.2). If a building backup is found to be caused by a service lateral failure, the customer will be advised that the public collection system is functional and that they may need to seek the services of a third party agent (plumber) to remedy the problem. If efforts on the part of the customer to remedy their service lateral failure is unsuccessful, MWS will perform any investigatory and corrective work on portions of the customer's service lateral that are inside the right-of-way or easement. Residential customers will not be charged for this service. Commercial customers will be charged the actual cost of this service at no profit.

6. Routine Reports to the Public

MWS will provide an initial notice to TDEC of an SSO within twenty-four (24) hours of the time it becomes aware of an SSO, as required by NPDES permits. The complete reporting process that includes the Immediate, Final, and Monthly Overflow Reports by which MWS notifies TDEC is summarized in Sections 4.2 and 4.5. MWS will post a monthly summary of each SSO (excluding building backups) on MWS's Web site.

MWS' Sewer Overflow Response Plan (SORP)

1. **Utility-Specific**
   Based on the needs of our service area and customer base, MWS has developed this Sewer Overflow Response Plan (SORP) to serve as a guide to provide an efficiently maintained and operated sanitary sewer system and to reduce the negative impact on the environment and hazards to public health.

2. **Purposeful**
   This program will reduce the potential negative impact of SSOs on public health and the environment through the implementation of a systematic response to overflows. This program:
   - Supports customer service
   - Standardizes reporting procedures
   - Establishes system performance goals
   - Protects system assets
   - Protects public health
   - Protects water quality

3. **Goal-Oriented**
   MWS developed this SORP to reduce the impact of SSOs for our customers and the environment and to comply with regulatory requirements. It provides structured guidance for response to overflows, including a range of appropriate and effective field activities MWS can choose from to meet the needs of each situation. MWS will use its discretion and best professional judgment to evaluate each event and choose the appropriate remediation tools.

4. **Uses Performance Measures**
   To measure the performance of the "respond to wastewater trouble" process, MWS will track performance indicators including, but not limited to the following:
   - Response time from notification to arrival of a qualified and equipped First Responder on site
   - Quality of response
   - Safety of personnel and equipment during wastewater service response

5. **Periodically Evaluated**
   MWS will review the SORP annually and amend it as appropriate. The review will include, at a minimum, the following activities:
   - Conduct workshop with managers and key personnel to review response activities and gather suggestions for new or revised procedures
   - Review all contact lists and update as necessary.

MWS' Sewer Overflow Response Plan (SORP), cont.

6. **Available in Writing**
   Hard copies and/or electronic versions of the SORP and any amendments will be distributed to any employee involved in responding to an overflow.

7. **Implemented by Trained Personnel**
   MWS personnel will conduct training for the appropriate response crews and support staff to ensure their understanding and proper execution of the SORP. Training sessions will be supplemented with a practical hands-on field component to ensure all response personnel are prepared for anticipated situations. Also, MWS will conduct refresher sessions annually or when changes are made to the SORP to ensure the same results. Maintenance Managers and Supervisors will oversee the SORP to ensure that the established procedures are being followed during implementation and field operation.

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Section 1

1.0 Definitions

This section is designed to help familiarize readers with common terms and acronyms used in this report. It includes basic definitions of a sanitary sewer system and sanitary sewer overflows, for example, which will give readers an overview to help understand the following sections.

1.1 General Definitions

Basin: Basins are small portions of the sanitary sewer system separated by boundaries of natural topography or system configuration (i.e. pumping stations). Separating the system into basins allows MWS to better identify and monitor system performance in those smaller areas.

Building Backup: A building backup means a wastewater backup into a building that is caused by blockages, malfunctions, or flow conditions in the collection system. A wastewater backup into a building that is caused by a blockage or other malfunction of a private lateral (service line) is not a Building Backup.

Catchbasin: an open to the surface structure used to collect surface run-off including rain and surface waters. This structure is connected to a gravity piping system or mechanically pumped facility used to transport to discharge locations.

Closed-Circuit Television (CCTV): MWS uses closed-circuit television to visually inspect the internal condition of pipes and sub-surface structures.

Combined Sewer Overflow (CSO): An overflow of combined storm and sanitary sewer in MWS' 450 miles of combined sewer system (downtown).

Combined Sewer System (CSS): A sewer collection system that collects both storm and sanitary sewers in the same pipe. MWS' CSS enables collected sanitary and stormwater flows to be transported and treated at the POTW (Publicly Owned Treatment Works). In heavy rainfalls, MWS' CSS may result in overflow causing a CSO.

Control Room: MWS's Control Room is an operating center at the Omohundro Water Treatment Plant that monitors pumping station, reservoir and other infrastructure monitoring devices for operating status. Controls and alarms throughout the system alert the Control Room of any anomalies that result in investigation and correction. The Control Room interfaces with Route Service, Sewer Maintenance, CSC Dispatch and other managerial and supervisory personnel in the notification of system issues. The Control Room is staffed 24/7/365.

Customer Service Center (CSC): MWS's Customer Service Center handles requests for emergency service including but not limited to outage or overflow reports, etc.

Computerized Maintenance and Management System (CMMS): The Collection Maintenance and Management System maintains records of assets including physical

properties and any maintenance and repair records. It also generates work orders and facilitates workflow to other systems, such as MDS (Mobile Dispatch System), or between departments.

Customer Information System (CIS): The Customer Information System maintains records of account numbers, premise details, and other customer information. It also generates work orders and facilitates workflow to other systems, such as MDS (Mobile Dispatch System), or between departments.

Cleanout: A cleanout is a vertical pipe with a removable cap extending from a private service lateral to the surface of the ground. It is used for access to the private service lateral for inspection and maintenance.

Collection System: The network of pipes, manholes, and associated equipment that transports wastewater from homes and businesses to the treatment plant is referred to as the collection system.

Combination Cleaners: Combination cleaners are mechanical equipment with flushing and suction capabilities. This equipment is used to clear or collect wastewater and related debris from the sanitary sewer system.

Control Room: MWS' 24/7/365 manned operations center that utilizes remote communications including SCADA to monitor and report the status of all the departments, water and wastewater pumping stations, water reservoirs and critical sewer flow monitored sites.

Disruption of Service: A disruption of service is an interruption in customers' sanitary sewer service due to various reasons, such as blockages, pipe failures, etc.

Dry Weather SSO: An overflow of untreated sewage from a sanitary sewer system due to flow restrictions or system disruptions. **[See Section 1.2]**

Environmental Protection Agency (EPA): United States Environmental Protection Agency.

First Responder: Typically a designated sewer maintenance employee, or, any qualified MWS employee who assumes initial responsibility for an SSO event.

Force Mains: A pressurized line that conveys wastewater from a pump station.

FROG: Fats, Roots, Oils and Grease are components that affect collection system performance and are a source of system discharges. MWS has a dedicated FOG Program that manages, tracks and reports on all related activities. The "R" of FROG is in stages of further development to be more comprehensive and include private lateral contribution to this system problem.

Full Time Equivalent (FTE): An employee working at least forty (40) hours per week and

receives full benefits.

Gravity or Main Lines: Gravity or main lines represent the largest portion of the MWS system. They use changes in elevation to transport sewage between points.

Inflow and Infiltration (I/I): extraneous surface or ground water that enters the sanitary sewer.

Impacted Areas: Impacted areas are sites where sanitary sewage has collected or areas that have been affected as the result of an overflow from the sanitary sewer system.

Infiltration: Infiltration is the introduction of groundwater into a sanitary sewer system through cracks, pipe joints, manholes, or other system leaks.

Inflow: Inflow is the introduction of extraneous water into a sanitary sewer system by direct or inadvertent connections with storm water infrastructure, such as gutters and roof drains, uncapped cleanouts, and cross-connections with storm drains.

Interactive Voice Response (IVR): MWS's automated Interactive Voice Response system, which gives callers to the Customer Service Center various options to direct their calls appropriately. It also enables out-bound calls to customers affected by collection system problems such as grease, roots, and/or debris that is not acceptable in sanitary sewer collection systems.

Nashville - Davidson County - Metro Water Services (MWS) Geographic Information System (GIS): The GIS is an automated mapping and geographic information system created, owned, and funded by the City of Nashville, Davidson County, and MWS. The GIS maintains digital geographic data for all of Davidson County, Tennessee. Some of the core mapping information, including topography and aerial photography, are managed by Metro Planning Commission, while other map "layers," such as property, utility information, and address data, are maintained by the respective Metro Nashville departments.

MWS: Metro Water Services.

Lift or Pump Station: A lift or pump station is a mechanical method of conveying wastewater to higher elevations.

Manhole: A manhole provides a connection point for gravity lines, private service laterals, or force mains, as well as an access point for maintenance and repair activities.

Mobile Workfoce Management System (MWM): MWM is a workforce management system that includes desktop management for dispatchers, schedulers and GPS for crew location. MDS uses 800 MHz radio systems to transmit field orders directly to field crews through laptop computers located in various MWS vehicles to reduce response time. Field activity is then entered by the field respondent and uploaded into the CIS and CMMS as the field order is completed.

National Pollutions Discharge Elimination System Section (NPDES Section): MWS has established and utilizes a NPDES Section of its Stormwater Division that assists in the investigation, remediation and public notification of any sewer overflows within the Nashville Davidson County watershed.

Overflow Abatement Program (OAP): The Overflow Abatement Program consists of system assessment, capital improvement projects, maintenance programs, operational standards, and emergency response. MWS began the OAP in 1990. The first steps in the program (upgrading treatment plants, pumping stations and reducing the number of Separated Sewer Overflows (SSOs) and Combined Sewer Overflows (CSOs)) have been completed, and the focus now is on continuing to upgrade and maintain the collection system further eliminating SSOs and CSOs.

Overflow: An overflow is any release of treated or untreated wastewater (including that combined with rainfall induced by infiltration and inflow, or I/I) from a sanitary sewer system.

Private Service Lateral: Private sewer lateral shall mean that portion of a sanitary sewer pipe, which is not owned or operated by MWS, that extends from a structure to the point at which such pipe connects to the MWS collection system.

Public System: Public system refers to MWS's sanitary sewer system, excluding private service laterals and connections with private systems.

Sanitary Sewer Overflow (SSO): SSO shall mean an overflow, spill, or release of wastewater from the separated sewer system, including: (a) all Unpermitted Discharges; or (b) overflows, spills, or releases of wastewater that may not have reached waters of the United States or the State; and (c) all Building Backups excluding those caused by private service lateral failure.

Sanitary Sewer System: A sanitary sewer system collects, conveys, and treats residential, commercial, and industrial wastewater through a complex network of infrastructure that includes these components:

- Private service laterals
- Gravity or main lines
- Manholes, catchbasins or junction boxes
- Sewer lift or pump stations
- Force mains
- Treatment plants.

Sanitary Sewer Overflow Response Plan (SORP): MWS's Sewer Overflow Response Plan provides structured guidance, including a range of field activities to choose from, for a uniform response to overflows.

Sewer Maintenance (SM): Sewer Maintenance focuses specifically on collection system issues. SM team members have diverse backgrounds, including collection system operations,

engineering, process improvement, and communications. In certain locations within this document, SM may include collection system sewer maintenance performed out of the System Services Division and pumping station sewer maintenance performed out of the Operations Division.

Supervisory Control and Data Acquisition System (SCADA): SCADA is automated sensory control equipment that monitors the operation of the pump stations. The SCADA system will convey alarms when predetermined conditions occur. Monitoring parameters include, but are not limited to, power failures, high wet well levels, pump failures and high pipe depths that could potentially cause overflows.

Suspicious Substance: Any material not normally found in a wastewater system, including, but not limited to, caustic substances.

TDEC: Tennessee Department of Environment and Conservation.

Unpermitted Overflow: An overflow of pollutants from any location within the treatment works which reaches waters of the United States or the State, and which is not authorized by an NPDES Permit, including but not limited to any SSO which reaches waters of the United States or State.

Waters of the State: Waters of the State shall have the same meaning as "Waters" defined at TCA § 69-3-103 (33).

Wet Weather SSO or CSO: A discharge of untreated sewage from a sanitary sewer system due to excessive flows during rain events or elevated ground and surface water conditions. **[See Section 1.2]**

1.2 Types of Overflows

Sanitary sewer overflow is an encompassing term to describe the overflow of sewage from a sanitary sewer system anywhere except at a permitted overflow point. This SORP is developed to address the two fundamental types of SSOs:

- **Wet Weather Overflows**
  Wet weather overflows result from excessive flows during significant rain events or elevated ground and surface water conditions. They can be attributed to a number of factors, including, but not limited to, the following:
  - Downspouts
  - Footing drains
  - Sump pumps
  - Infiltration
  - Flooding from the stormwater system

- **Dry Weather Overflows**
  Overflows during dry weather are most often caused by flow restrictions or system disruptions. Dry weather SSOs can be attributed to a number of factors including, but not limited to, the following:
  - Bottlenecks and/or blockages
  - Grease
  - Roots
  - Debris
  - Mechanical failures
  - System overloads
  - Sewer breaks
  - Treatment facility malfunctions and/or overloads.

The SORP Goals (Section 4.0) discuss the type, location, destination, cause, impact, and containment and remediation requirements of SSOs, as well as prevention measures.

Section 2

2.0 Process Overview

MWS continues to work to provide an efficiently designed, maintained, and operated sanitary sewer system to safely collect and convey sewage to a wastewater treatment plant for appropriate treatment and discharge.

An SSO occurs when sewage escapes from the sanitary sewer system anywhere other than at an approved discharge point. An SSO can result from flow restrictions or system disruptions, or it may also result from excessive flows caused by elevated ground and surface water during significant rain events.

MWS developed this SORP to reduce the impact of SSOs for our customers and the environment and to comply with regulatory requirements. It provides structured guidance for response to overflows, including a range of appropriate and effective field activities MWS can choose from to meet the needs of each situation. MWS will use its discretion and best professional judgment to evaluate each event and choose the appropriate remediation tools and any needed long-term corrective action.

2.1 Process Objective

MWS's response to an SSO begins when a customer, MWS employee, internal automated system, or outside party reports a possible overflow. The SORP is intended to

- Protect public health and the environment
- Satisfy regulatory agencies and discharge permit conditions that require procedures for managing sewer overflows.

2.2 Scope and Summary

The SORP entails a series of steps or procedures that begins with a report of a possible SSO in the MWS system. The notification initiates a series of protocols to confirm the report, reduce the impact on the environment, report the occurrence to the appropriate individuals and agencies, and track the occurrence to help reduce or eliminate further incidents.

These are the key components of MWS' SORP:

- Receive, record, and dispatch calls in response to notification of a possible SSO
- Monitoring known wet weather active and watch list locations for overflow activity
- Assess the reported occurrence
- Determine if the cause of the SSO falls under MWS's area of responsibility or is a private lateral issue
- Contain the overflow, when practicable, to reduce any further negative impact
- Resolve system disruption
- Advise customers if the overflow is due to a problem on their property
- Implement appropriate notification procedures
- Track SSO occurrences
- Establish procedures to assess adverse impact to human health and the environment
- Develop and implement system improvements.

2.3 Assumptions and Limitations

MWS initiates the SORP promptly after notification of a possible SSO from a customer, passerby, emergency agency, or other individual or entity through the Customer Service Center Dispatch or when

alerted directly through Supervisory Control and Data Acquisition System (SCADA).

MWS' CSC is the primary contact for customers who have utility questions or need to report problems with their service, such as wastewater trouble. The CSC Dispatch is staffed 24-hours a day, seven days a week. CSC personnel receive customer calls and enter the information regarding the customer request or concern into the Customer Information System (CIS) and/or CMMS. MWS Control Room, utilizing SCADA, may also initiated needed field response. Any wastewater trouble calls are immediately transmitted to First Responder to initiate the SORP field response. [Refer to Section 4.1 for additional details of this process.]

Once dispatched, the process may vary depending on these factors:

- Determination of responsibility
  - MWS's wastewater system
  - Customer's private lines
- Location of SSO
- Potential impact on health and the environment.
  When evaluating the potential impact of an SSO on public health and the environment, sensitive factors will be identified. These factors will determine if additional response activities are required and whether to consult with regulatory assistance agencies.

  Sensitive factors include, but are not limited to
  - Streams, creeks, and other natural waterways
  - Accessibility to highly populated areas
  - Special facilities including schools, public parks, walking trails, etc.

A backup caused by failure in the customer's private system is referred to internally as "private trouble." If MWS identifies the problem is on the private portion of the system, the customer is notified. In these situations, the customer (often through a plumber) is responsible for any repair or clean up required. If the customer's effort to correct the problem are not successful and are inside the public easement or right-of-way, MWS will assist in performing any needed corrective action. This is reflected in the Metro Nashville Davidson County Code which states:

> 15.40.020 Regulation and enforcement--Authority of director.
> The director is authorized and directed to promulgate and enforce such rules and regulations as he may deem necessary for the enforcement of this chapter and for the safe, economical and efficient management, control and protection of the government's public sanitary sewerage system.
>
> 15.40.050 Maintenance of service connection--Owner's and Department's responsibility.
> A. The Owner will own and maintain his sewer service line from the public sewer main to the structure served.
> B. If the Owner experiences sewer service interruption as a result of a sewer service line failure and has demonstrated a good faith effort to remedy the problem, the Department shall make any necessary repair on the portion of sewer service line inside the public right-of-way or easement from the main to the boundary of right-of-way or easement. Provided, however, that before the Department will make such repairs, the Owner must provide an excavated clear and open access to the sewer service line at the right-of-way or easement boundary. Residential customers will not be billed for any repair performed by the Department under this Section. Commercial customers shall pay all costs of repair incurred by the Department under this Section and such costs shall be billed on the customer's next bill.

MWS will provide the same level of response to a building backup as prescribed for an SSO in the SORP. If a problem in MWS's system causes a backup into a building, MWS notifies its Claims Department immediately to coordinate communication with the customer and contract for any necessary clean up. MWS maintains emergency contracts with contractors and cleaning agencies that are equipped to address damage caused by the backup.

For backup emergencies, MWS personnel can contact the Claims Department staff on shift or on-call through the weekly generated emergency contact list. This list of contacts includes all personnel involved in emergency response including but not limited to repair, water quality (NPDES), laboratory (sampling), claims, etc. Refer to Section 4.3.2 for additional clarification of MWS's process for determining the cause of building backups.

MWS is a steward of the environment, and the first priority at an overflow is containing the overflow to minimize possible harmful impacts to the environment and public health to the extent reasonably possible. If the cause of the disruption of service and ultimately the SSO is found to be a private issue, then MWS representatives will notify the appropriate parties. Under those circumstances, MWS is not responsible for remediation although assistance may be offered in accordance with our Sewer Service Line Policy.

Section 3

3.0 System and Organizational Structures

Implementing the SORP requires these types of coordination among several MWS divisions and sections:

- Effective and timely communication
- Well-trained and experienced responders
- Structured and concise response procedures
- Accurate and comprehensive monitoring procedures
- Continuous and annually scheduled re-evaluations of the plan.

3.1 MWS Wastewater System

Today, MWS's wastewater system serves more than 171,000 customers in a 533-square-mile service area

The system is composed of:

- 2759 miles of main lines
- 77,090 manholes
- 142.2 miles of force main
- 101 pump stations
- 3 wastewater treatment plants.

3.2 MWS Operational and Functional Structure

MWS is a multifaceted organization with a systematic organizational structure in place to provide wastewater service, as well as water and stormwater services. The Sewer Maintenance Section of the System Services Division (SSD) performs all scheduled and emergency maintenance on the collection system piping network. The Operations Division's Route Services Section performs all scheduled and emergency maintenance and repair of the system's 101 sewer pumping stations. All work activities are recorded in the department's CMMS.

Execution and enforcement of the SORP includes professionals throughout MWS with backgrounds in engineering, wastewater collection system operations, process improvement, and communications.

Figure 1: MWS Organizational Structure

3.3 Resources for Customer Inquiries

MWS's CSC receives, records, and initiates response to customer inquiries or concerns through a dedicated phone number: (615) 862-4600, option 1, option 3.

Currently, 24 representatives are employed in the CSC that may have responsibility of receiving, dispatching and documenting collection system emergencies and/or complaints. Approximately 12 of the representatives provide around-the-clock customer service seven days a week in the Dispatch Section answering customer complaint calls and interfacing with field operations personnel. CSC representatives take reports ranging from manhole overflows to sewage on private property.

CSC enters customers' trouble calls into CMMS, which translates it into a field activity. Beginning July 2007, this will be interfaced through MWS' MWM.

3.4 Resources for Responding to SSO

The CSC Dispatch and Operation's Control Room provides dispatching function 24 hours a day, seven days a week. These groups receive field requests from customers, employees or other notification systems, such as the SCADA system, and dispatches wastewater trouble orders to the appropriate MWS responder crew.

Nextel direct talk enables field communication to the First Responder to initiate the field component of the SORP. CMMS tracks the orders a crew has worked, the time spent on the event, and the resolution of the wastewater trouble. Beginning in July 2007, MWM will be utilized to monitor all such activity from initial complaint through resolution. Global Positioning System (GPS) tracking will also provide dispatchers with crew locations.

Dispatch and the Control Room not only dispatch orders but also serve as a resource to field crews. They can obtain additional assistance from other crews to mitigate or clean up an SSO, as well as provide system information from various MWS databases such as CIS, CMMS, SCADA and GIS.

3.5 Resources to Respond to SSO Events at Pump Stations

Route Services, within the Operations Division, is responsible for the operations and maintenance of MWS's 101 wastewater pump stations.

Each pump station is equipped with a SCADA system that monitors the operation of the stations. The SCADA system will convey alarms when predetermined conditions are present at the station. Monitoring parameters include, but are not limited to: power failures, high wet well levels, and pump failures that could potentially cause overflows.

In addition to the continuous monitoring, each station is inspected on a regular basis. The frequency of these inspections is based on factors such as facility age, operating history and size of facility. Route Services maintenance personnel perform service and calibration of all

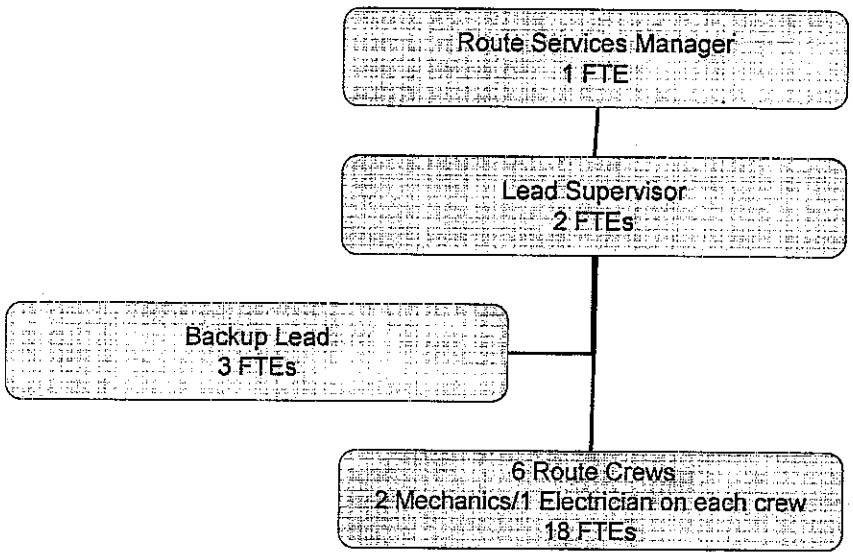
instrumentation, such as flow meters, level sensors, alarms, and SCADA equipment, on a periodic basis.

Route Services personnel serve as the First Responders for pump station trouble calls. For any incident that involves an overflow, Route Services executes the requirements of the SORP and takes the appropriate action to contain the overflow. Response to any overflow that may involve pumping stations including high wet well alarms, force main breaks, etc will be coordinated with Route Services

Route Services is broken up into different areas of maintenance responsibilities. This includes predictive, routine, preventive and corrective maintenance. This group also performs any emergency repair necessary. The following chart identifies which operating section is responsible for predictive, routine, preventive, and corrective maintenance.

Figure 2 summarizes the organizational structure of MWS's response to SSO events at pump stations.

Figure 2



Route Service Manager
The Route Services Manager is a member of the Operations Division Management Team. This Manager position assists in the coordination of emergency field responses to pumping station issues. This position also oversees resource allocation and monitors maintenance activities.

Lead Supervisor
The Route Services Lead is a member of the Route Services Management Team. This Lead position is responsible for the day-to-day field activities that maintain pumping stations and respond to emergencies. This position schedules and tracks activities in CMMS

Backup Lead
The Route Services Back-up Lead is a functional apprentice program format that enables a level of duplication in the event of Lead absence.

Mechanics

The Mechanics are functional positions charged with the maintenance and repair of pumps, piping and internal non-electrical components of the pumping stations.

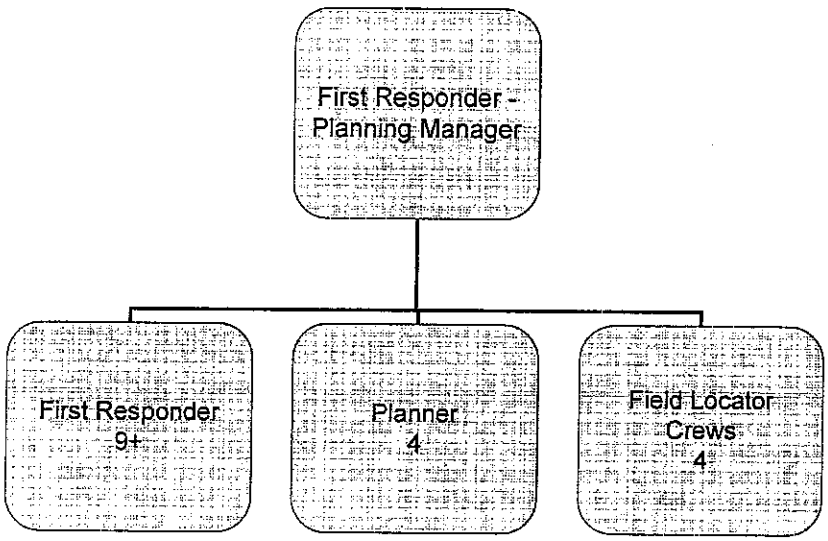
Electricians

The Electricians are functional positions charged with the maintenance and repair of motor, controls and non-mechanical components of the pumping stations.

3.6 Resources to Respond to SSO Events in the Gravity Line Systems

The following organization charts and job titles summarizes MWS' response to SSO events in the gravity line system

First Response - Planning

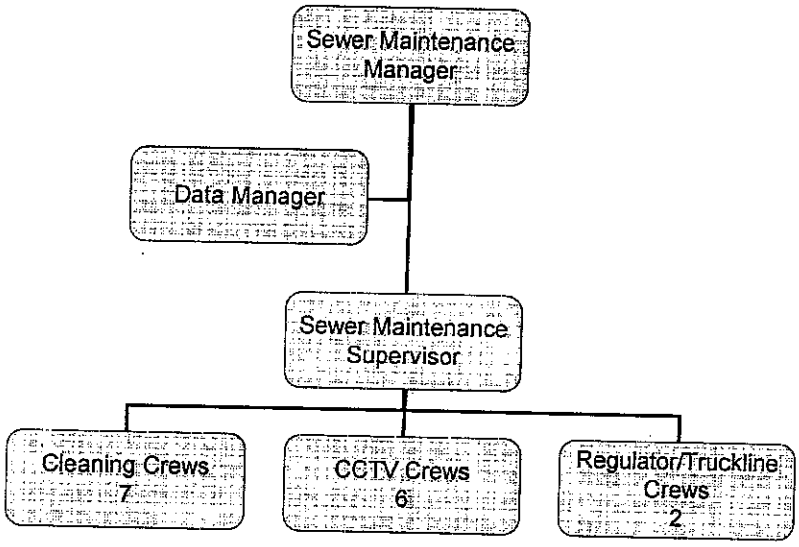


First Responder – Planning Manager
The First Responder - Planning Manager is a member of the System Service Division Management Team. This Manager position assists in the coordination of emergency field responses to wastewater and water complaints. This position also helps coordinates emergency and plans non-emergency corrective actions. This functional section also includes the Field Locator activities that field mark underground infrastructure for excavation activity inside and outside the Department. Depending on the shift and day, others Assistant Managers and Supervisors may function in the capacity of First Responder – Planning Manager.

First Responder The First Responders are employees of the System Services Division. They provide the initial response to SSOs or other unscheduled wastewater trouble. These resources traditionally are the first MWS representatives to arrive at a reported overflow. They will initiate the MWS field response per this SORP. As wet weather events

necessitate, other employees of MWS may serve as First Responders, depending on the severity of the weather event.

Sewer Maintenance – sewer collection system piping network operation and maintenance



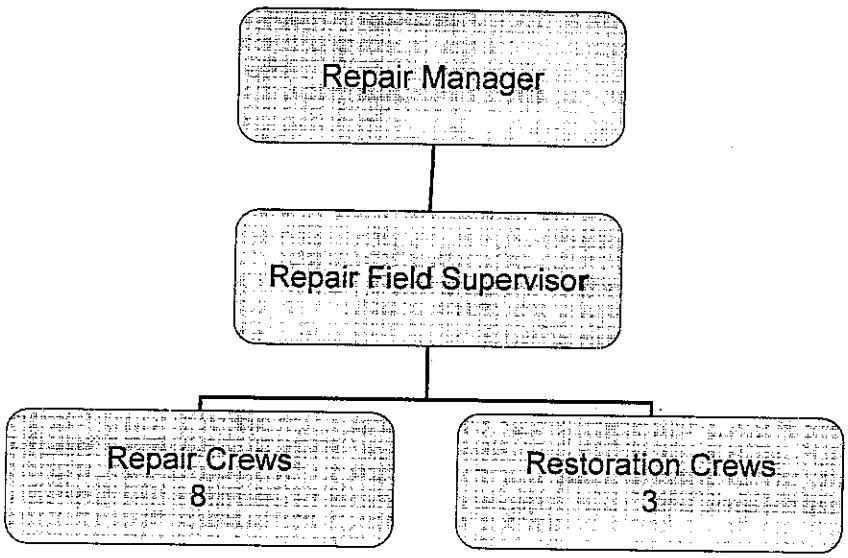
Sewer Maintenance(SM) Manager
The SM Manager is a member of the System Service Division Management Team. The SM Manager develops and tracks sewer maintenance activities, productivity goals and collection system compliance. This Manager also works on special projects and assists in solving system and customer problems and resolving special cause variations outside standard operating procedures.

Sewer Maintenance Supervisor
The SM Supervisor is a member of the System Service Division Management Team. The Sewer Maintenance Supervisor oversees the day-to-day activities of the CCTV and Cleaning Crews including scheduled preventive maintenance, SSO and CSO coordination and reporting and collection system facility operation such as regulator chambers, trash traps, etc for collection compliance. This position also addresses any short-term (daily) or long-term resource issues that impact sewer maintenance production goals involving staffing and equipment.

Cleaning Crew
The Cleaning Crews are part of Sewer Maintenance Section of the System Services Division. These crews primarily perform routine and emergency response cleaning and may function as a First Responder depending on their location in relation to sewer complaint. These crews will perform any containment and cleaning activities prescribed by this SORP in all areas of the public sewer collection system.

CCTV Crew
The CCTV Crews are employees of the Sewer Maintenance Section of the System Services Division. These crews primarily perform routine and emergency response closed circuit televising and may function as a First Responder depending on their location in relation to sewer complaint. Their historic records of maintenance and condition assessment are also used in the evaluation of any chronic system problems in coordination with our FROG and Overflow Abatement Programs.

Repair – crews perform work on both the collection system and distribution system



Repair Manager
The Repair Manager is a member of the System Services Division Management Team. The Repair Manager coordinates work activities requiring excavation and repair including all plan development, permitting, resource allocation and material needs. Depending on the

shift and day, others Assistant Managers and Supervisors may function in the capacity of Repair Manager.

Repair Supervisor
The Repair Supervisor is a member of the System Service Division Management Team. The Repair Supervisor oversees the day-to-day activities of the crews involved in repair, valve operation and restoration. This position also addresses any short-term (daily) or long-term resource issues that impact sewer maintenance production goals involving staffing and equipment.

Repair Crew and Restoration Crew (Water Maintenance Leader, Equipment Operators and Tech)
The Repair and Restoration Crews are employees of the System Services Division. These crews perform point repairs and restoration and can provide specialized resources during unique clean up activities following an SSO. Typically, the Repair Crew is utilized when the cause of the SSO cannot be resolved by flushing or root cutting and may require excavation.

3.7 Engineering Activities – Overflow Abatement Program and Flow Monitoring Program

The following are activities that have impact on the SORP. The Overflow Abatement Program's objective is to eliminate extraneous flow in the collection thus eliminating wet-weather overflows. The flow monitoring activity is a tool used in conjunction with other maintenance activities in the operation and maintenance of the collection system. Flow data is also used to calibrate the sewer model and to initiate investigation of collection system flow abnormalities.

Overflow Abatement Program (OAP) Manager
The OAP Manager is a member of the Engineering Division Management Team. The OAP Manager and assigned engineering staff develop and implement sewer system projects for with the goal of abating overflows caused by wet weather issues, in order to bring MWS into regulatory compliance. In conjunction with the Overflow Committee, locations where wet weather overflows occur are annually reviewed and ranked. This information is used to develop a Capital Improvement Program for abatement projects. Management of planning, design, and construction activities for these projects are performed by OAP engineering staff. This Manager also works on special projects and assists in solving system problems.

Flow Monitoring (FM) Manager
The FM Manager is a member of the Engineering Division Management Team. The FM oversees the collected data from MWS' 84 permanent monitors and 19 rain gauges. This information is used to generate regulatory reports, as a diagnostics tool for collection system performance and needed improvement, and to assess the effectiveness of OAP projects. Work also includes the definition and execution of additional flow monitors to further develop collection system objectives, operation and reporting of the MIKE URBAN Sewer Model for capacity allocation and trending and special projects related to collection system performance.

3.8 Equipment Resources

See Table 1 below for a list of equipment resources available for sewer system maintenance and SSO response.

Table 1

SEWER MAINTENANCE			
April, 2007 status	CCTV TRUCKS	ARIES	3
		CUES	2
		PIERPOINT	1
	JET RODDER TRUCKS	VACTOR	2
		SEWER EQUIPMENT COMPANY OF AMERICA (1 OR 3 IS BACK UP UNIT)	3
		SUPER PRODUCTS (BACK UP UNIT)	1
	COMBINATION JET/VACUUM TRUCKS		
		VACTOR	2
		VAC-CON	2
SSD REPAIR	CREW TRUCKS (R&M)	FORD	8
	TANDEM 10-YD DUMPS	FREIGHTLINER	14
	BACKHOE/LOADER	JCB	6
	BACKHOE/LOADER	NEW HOLLAND	4
	BACKHOE W/HYDL HAMMER	CASE	1
	BACKHOE TRAILERS	HURST	9
	PORTABLE AIR COMPRESSOR	LEROI	4
		INGERSOLL RAND	3
		SULLIVAN	4
	HYDL EXCAVATOR (TRACK)	JOHN DEERE	1
FLEET/GENERATOR			
SUPPORT SERVICES	HYDL POWER UNITS W/PUMP	H&H	4

	REPAIR/MAINTENANCE SHOP TRUCK	FORD	1
	GENERATOR SERVICE/FUEL TRUCK 800 GALLON	GMC	1
	GENERATOR/SERVICE/FUEL & PUMP TRUCK 100 GAL.	DODGE	1
	GENERATOR/SERVICE/FUEL & PUMP TRUCK 100 GAL.	FORD	1
	CRANE TRUCK/8-TON	RO STINGER	1
	CRANE TRUCK/28-TON	MANITEX	1
	TRUCK/TRACTOR W/6,000 GAL TANKER	MACK	
	SEWER BUCKET MACHINES	SRECO	5
	TRUCK/TRACTOR W/LOWBOY	MACK	1
CWWTP UNITS	TANDEM 10-YD DUMP	FREIGHTLINER	1
		INTERNATIONAL	1
	COMBINATION JET/VACUUM TRUCK	VACTOR	1
ROUTE SERVICES	CREW TRUCKS W/CRANE	FORD	3
	CREW TRUCK 3/4-TON	DODGE	6
	SKID STEER LOADER	NEW HOLLAND	1
	PORTABLE GENERATORS	500 KW	2
		250 KW	5
		125 KW	3

3.9 Approach for System Evaluation for the Purposes of Mitigating Wet Weather SSO

Wet Weather Investigations

In addition to the preventive maintenance, flow monitoring and reports of system problems, MWS' Wet Weather Investigations are an additional tool used to qualify the performance of the collection system. This program is a structured proactive inspection of locations in the sanitary sewer system that have demonstrated the likelihood to overflow during heavy rain events. These locations are identified in response to past activity, system flow monitoring and/or modeling data. Information gathered during these wet weather investigation may in the need for system upgrade and/or pipeline rehabilitation or replacement.

Wet Weather Investigations will be initiated under the following conditions:

- Forecasted weather conditions
- Current and/or recent wet weather conditions that are likely to have caused an overflow at historically active locations such as increased water tables
- Flow data at key monitoring points that indicate increased likelihood of an overflow at active and watch list locations.

Wet weather investigations are predetermined to enable optimization of resources. The need for this activity is defined through the efforts of MWS' Overflow Abatement Program and executed through collaborative efforts of many divisions and/or contract services.

Section 4

4.0 SORP Goals and Procedures

The goal of the SORP is to document MWS's procedure for responding to all SSOs and to ensure a consistent response. These protocols are intended to address all types of events and ensure that every effort is made to reduce the impact on the environment and protect the public from any potential health hazards associated with an overflow or backup. MWS will use its discretion and best professional judgment to evaluate each event and choose the appropriate remediation tools.

The SORP details events from the time MWS receives notification of a possible overflow until the confirmed SSO is contained and the site is remediated. The identification of the responsibilities and responses for typical SSOs are detailed in Appendix E, titled Sewer Overflow Response Plan Flowchart.

Appendix F outlines the standard operating procedures used in response to SSO events and the responsible parties for each work step.

4.1 MWS Receives Report of Possible SSO

MWS may receive a report of a possible SSO in a variety of ways. The most common and effective notification comes from individuals who witness the event and call the CSC at (615) 862-4600 option 1, option 3. As mentioned in Section 3.3, 24 representatives are employed in the CSC that may be involved in activities with collection system issues. Twelve of these representatives provide around-the-clock customer service seven days a week. CSC representatives take reports ranging from manhole overflows to sewage on private property. Other Customer Service employees, as well as cross-trained employees throughout MWS, can be pulled into CSC during emergencies.

MWS's more than 171,000 wastewater customers can identify a possible problem in the sanitary sewer system and alert MWS, through CSC, to initiate the SORP. When CSC representatives receive reports of potential wastewater problems, they initiate a Service Request through the CMMS as illustrated below. The call is then immediately dispatched to the First Responder.

Upon initial review by the First Responder, wastewater trouble calls associated with clean up require immediate investigation by the Claims Division of the Metro Nashville Legal Department. This requirement is weighed against the time of response by the Claims representative if customers are experiencing health and safety threat or property damage within their premises necessitating clean-up efforts beyond the scope or capability of MWS personnel. Immediate clean up efforts are begun asap in these cases. Non-threatening property damage and many other claims related calls are non-emergency situations and can be handled during regular business hours. Examples include yard damage, driveway or walkway damage, or damage to a vehicle from debris falling from a MWS truck, as long as no personal injury was involved. Any standing sewer is handled as an emergency and remediated asap.

Calls from crews or other MWS employees, city employees, 911, or other agencies may go through CSC, MWS's dispatching center. System Operations personnel are highly trained in responding to trouble calls and receive frequent updates from crews by two-way radio or cellular telephone. Beginning July 2007, MWS will also utilize MWM in addition to current communication means.

MWS also uses its many employees in the field for day-to-day operational purposes as a resource.

As MWS employees are working throughout the system, they have a duty to observe problems and notify MWS of wastewater trouble issues.

Designated field crews also proactively look for overflows at "active and watch lists" locations that MWS has identified by tracking SSOs that occurred during significant rain events. The crews initiate the survey based on predicted or recognized conditions that may cause wet weather SSOs. These locations are also tracked through hydraulic modeling and calibration of the systems 84 permanent flow monitors and 19 rain gauges. Temporary flow monitors are added as needed to further delineate basin activities.

Active and Watch List Locations

2 007 Rain Induced Overflow List

	Dry Creek Basin Sites - Active	2004	2005	2006	thru Mar. 2007
106	Vandiver SPS	9	4	2	0
109	Dry Creek SPS	4	3	3	0
110	Loves Branch SPS	12	5	3	0
112	Gibson Creek SPS	8	4	3	0
117	Neeley's Bend SPS	4	3	2	1
123	Lakewood SPS	1	4	2	0
127	Madison Heights SPS	3	3	2	0
132	Berwick Trail SPS	5	5	3	0
150	Hidden Acres SPS	1	0	2	0

	Dry Creek Basin Sites – Watch	2004	2005	2006	thru Mar. 2007
303	North Dupont	1	0	1	0

	Whites Creek Basin Sites - Active	2004	2005	2006	thru Mar. 2007
104	Whites Creek SPS	14	10	6	1
107	West Park SPS	8	2	1	0
114	Davidson Branch SPS	15	8	5	1
136	River Drive SPS	4	3	2	0
217	Basswood	16	7	5	1
337	Richland Creek – TDOT	4	2	2	0
339	Richland Creek – 23rd Street	1	1	2	0
379	622 Davidson	2	2	1	0

Whites Creek Basin Sites – Watch	thru Mar.

		2004	2005	2006	2007
126	Cleeces Ferry SPS	2	2	0	0
145	Joelton SPS	9	5	2	0
170	Edinburgh SPS	5	1	1	0
206	Brookwood Terrace	1	1	1	0
321	Morrow Road	1	1	0	0

Central Basin Sites – Active

		2004	2005	2006	thru Mar. 2007
103	McCrory Creek SPS	1	3	0	0
124	Williamson Ferry SPS	3	4	2	0
130	Browns Creek SPS (Visco Dr.)	7	7	2	0
133	Holiday Travel Park SPS	6	3	4	0
176	Dodson Chapel SPS	10	3	3	1
189	Langford Farms SPS	5	4	1	0
222	Barker Road	11	10	2	3
226	Cowan Street SPS	9	5	4	0
329	Village Ct	1	0	0	0
338	Benita Drive	0	0	0	0

Central Basin Sites – Watch

		2004	2005	2006	thru Mar. 2007
140	28th Ave. SPS	8	0	0	0
151	Shelby Park SPS	6	0	0	0
184	Munn Road SPS	5	1	0	0
187	Peppertree SPS	3	1	0	0
190	Town Village SPS	1	0	2	0
308	Omohundro (West of WTP incl 309 & 311)	0	0	1	0
328	Cooper Lane	1	0	1	0
370	Lisa Lane	0	0	0	0
371	Apex St.	0	0	2	0
382	Mill Creek / Mud Island				

CSO Sites		
18	Van Buren	Active
19	Kerrigan	Active
23	Benedict & Crutcher	Active
24	Washington Dee Cee	Active
33	Schrader Lane	Active
35	Driftwood	Active
47	Boscobel	Active
20	Broadway	Emergency Overflow
34	Fort Nashboro	Eliminated

In addition, automated systems also alert System Operations to possible problems. The SCADA system, for example, is installed on all 101 MWS pump stations, and it helps predict or identify an event and determine its duration and volume. There are also historic overflow activity threshold

alerts correlated to the systems 19 rain gages. A SCADA notification prompts dispatchers to contact the First Responder and/or Sewer Maintenance personnel either on shift or on-call, which investigates and remediates problems. Using a Web browser, IntelliServe by ADS Environmental Services allows MWS to monitor real time flows in the collection system at strategic locations. Rain data is combined with high depth identification to produce wet and dry weather-induced overflow alarm notification. These alarm notifications can then be sent through email or directly to a phone for further investigation by MWS' personnel.

[See Appendix A for Information Technology Resources and Descriptions.]

For all reports of possible sewer overflows, MWS collects the following information:

- Time and date of the call
- Name of person reporting the occurrence
- Location of the event
- Description of the event
- Time noticed
- Name and phone number of the caller
- Observations such as odor and duration
- Any other information to help in response time, containment, and remediation.

When CSC receives a report of wastewater trouble, the data is entered in the CMMS as a Service Request (below) and dispatches to the MWS First Responder.

The following is a sample CMMS screen used to complete a sewer complaint field investigation.

Metro Water Services

Nashville TN
( ) -

Service Request Detail

Report Date 04/27/2007 10:41 AM **Submitted By** Lyn Fontana

Service # 127102
Problem SSSBU SEWER(AGE) BACKING UP
Address 2501 FINLAND ST
NASHVILLE TN 37208

Call Date 04/12/2007 09:28
Taken By FRAJ2 FRAZIER JOHN W
Source
☐ Customer Contact Requested

Priority
Responsibility SM SEWER MAINTENANCE
Project
Budget #

Duration of Call 00:00
# of Calls 1

Service Request Progress

Schedule	(resolved)
Inspect	Not inspected with no due date. Assigned to MCCSP STEVEN MCCLAIN
Resolve	Resolved at 04/12/2007 10:55 AM with code RES RESOLVED. No work orders are required

Location XST OSAGE
Area
District
Parcel 08110016000
Template Type
Asset

Sub-Area
Map #
A/P #

Primary Caller

Name KING
First,MI DARRELL
Address
City
State/Province
Country
E-Mail
Day Phone (615)569-2584 x
Call Date 04/12/2007 09:28
Comments
SEWER BACKING UP

CALLED OUT TO MCCLAIN @ 0930 4/12 JF

Title
☐ **Foreign**
ZIP/PC
Reference #
Evening Phone
Taken By FRAJ2

Call List

There are no additional callers for this service number

Log Type / Comments	Description	Log Started	Log Ended	Entered By
RES CHECKED METRO LINES CLEAR TALKED TO PROPERTY OWNER PRIVATE TROUBLE	RESOLUTION	04/12/2007 10:55		ERNJD

Inspected
By | Date | Time

Resolution
Code | Date | Time

Scheduled Resources

Employee ID	Scheduled Start	Scheduled End	Work Description
No resources scheduled.			

Equipment ID	Scheduled Start	Scheduled End	Work Description
No resources scheduled.			

Vehicle ID	Scheduled Start	Scheduled End	Work Description
No resources scheduled			

4.2 System Response to Reported Discharges

Receive a Call and Dispatch First Responder

MWS CSC Dispatch receives a call or automated notification that initiates the field response, creates a Service Request in CMMS, and dispatches a field order by direct talk and/or by land to cell phone to a First Responder in MWS's SSD. All reports of sewer system failure or overflow is handled as an emergency and is responded to immediately.

The table below illustrates MWS's associated actions.

Response Actions

Response Level	Definition	Response	Actions
Emergency	Pump Station Failure *(Mechanical, Electrical, Electronic, or Power Supply)* Collection System Overflow	Dispatch First Responders immediately and available crews if necessary	First Responders will assess situation and begin SORP activities. They can request additional resources through dispatch.
Routine	Typical Wet Weather Events	During/after wet weather events, Sewer Maintenance Crews investigate for activity or signs of activity for clean-up and any corrective action	Sewer Maintenance Crews field verify each site and begin SORP activities.

MWS considers all system failures resulting in an overflow or backup to be a high priority.

MWS will make all reasonable efforts to respond to an SSO within sixty (60) minutes of notification with qualified and equipped personnel. Allowances will be made to ensure that the safety of the Responder and the public is the first priority.

Dispatch waits for the First Responder to confirm the SSO report. Until the First Responder confirms there actually is an overflow, the report is not considered an SSO.

After confirmation of the overflow, Dispatcher(s) stand by to dispatch additional resources as needed or close out field orders.

All sewer complaints and overflows are recorded and reported through the Department's CMMS and can be generated in a variety of ways including by date, by cause, by location, etc.

First Responders and/or SM Crew Leaders managing the overflow correction is also responsible for making the initial and any follow-up Overflow Notification Form to TDEC. Any public notice beyond what was necessary at the overflow site is then determined.

MWS Overflow Notification Form:
This form is transmitted to TDEC (Ann Rochelle) within 24 hours of an overflow. Up-date notices are also sent to advise of additional information as needed. All overflow incidences are also included on MWS' Monthly Overflow Report to TDEC and are posted on the MWS website. (see next page)

METRO WATER SERVICES

Sewer Overflow Notification Form
Davidson County

TO: Tennessee Department of Environment and Conservation
e-mail to: MWS Sewer Overflow Notification Group – this e-mail address includes (Ann Rochelle (TDEC FAX: (615) 687-7078 OR (615) 687-7072), MWS – Hal Balthrop, Anthony Waggoner, Jim Paulus, Brent Freeman, Michael Hunt, Leanne Scott, Dale Binder, Steve Winesett, Cyrus Toosi, Greg Ballard, Mike Morris)

Check all that applies (fill in every line even if entry is n/a or unknown)

ORIGINAL NOTICE ☐ UPDATED NOTICE ☐ DATE: ☐

REPORTING CONTACT:
☐ Anthony Waggoner (615-566-3953) ☐ Billy Raines (615-456-9212)
☐ Eddie Waynick (615)-566-4015) ☐ Other: phone:
☐ MWS Control Room (615) 862-4980

MWS TELEPHONE NUMBER: 615-862-4600 (option 1 and option 3)

DATE OVERFLOW REPORTED: TIME:

TIMES: ☐ Observed ☐ Alarmed start: am/pm end: am/pm

VOLUME OF OVERFLOW (Estimated): ☐ seep ☐ over 100 gallons
☐ over 1000 gallons Other:

LOCATION OF PUMPING STATION, MANHOLE or BREAK :
☐ MH map quad # ☐ SPS name:
Street or address cross street

WATERBODY IMPACTED: ☐ none (surrounding ground only) ☐ stormwater system
☐ Waterbody name if unnamed indicate downstream waterbody

CAUSE: ☐ grease ☐ grit/debris ☐ roots ☐ line break ☐ under review ☐ I/I (rain caused)
☐ SPS mechanical ☐ SPS power outage ☐ other (explain)

CORRECTIVE ACTION TAKEN/INCORPORATED: ☐ remove blockage
☐ Contained, est volume ☐ recovered, est volume ☐ bypass pumpage
☐ filtration (hay bales) ☐ other

EXPECTED COMPLETION TIME & DATE FOR CORRECTIVE ACTION or REPAIRS & CLEAN-UP:
Follow-up clean-up necessary ☐ yes ☐ no due to: Date: Time: am/pm
☐ wildlife impacted
Reported for televising ☐ yes ☐ no

ACTION TAKEN TO MINIMIZE HEALTH HAZARDS TO PUBLIC & IMPACT ON WATER QUALITY: ☐ none necessary ☐ coordinated with MWS NPDES ☐ WQ sampling
public notice: ☐ barricades ☐ signage ☐ door hanger ☐ outbound call ☐ website ☐ press release

INFORMATION REPORTED BY:

4/27/2007 1:39 PM Q:\SYSSERV\SEWER\Sewer Overflow Response Plan\Electronic Sewer Overflow Notification to TDEC update April 2007.doc

4.3 First Responder

4.3.1 Receive Work via Direct Talk (two-way radio) or cellular communication

Depending on the day and work shift, First Responders will be Technicians, Maintenance and Repair Supervisors or Sewer Maintenance Crew Leaders. They will receive notices from either Dispatch or the Operation's Control Room indicating a sewer complaint or system alarm. All activities are logged into CMMS.

4.3.2 Confirm Sanitary Sewer Overflow

The First Responder immediately dispatches and investigates the scene of a possible overflow, and then reports to Dispatch to confirm system status and any needed resources. Until confirmed, the report of a possible overflow is not considered an SSO.

The First Responder is responsible for ascertaining the source of any discharge or origination point of observed flow and determining the cause of the discharge. This determination may vary depending on the type of overflow. To illustrate this determination process, a typical SSO originating from a MWS manhole is described.

To determine if a manhole is overflowing, the First Responder will trace either the flow or watermarks indicating the path of flow back to its source. In this example, the manhole would be recorded for the SORP notification practices. The SORP Training Component contains more information relating to the process of confirming if the overflow is an SSO.

Backup in buildings require additional investigation to determine if the wastewater trouble is due to problems on the MWS's system or are a result of a failure on the service lateral. To determine responsibility for a backup, the First Responder will need to ascertain the location of the cause of the backup.

<u>Process for Investigating Building Backups</u>

1. MWS Responsibility

    a. MWS inspects water levels in manholes to determine if the backup may be caused by a blockage in the main. This type of manhole inspection is conducted by inspecting downstream manholes with respect to the blockage location. If no water is flowing in the downstream manhole, or if a significant change in the flow is observed in the manhole, then MWS will flush the upstream line. This is then followed up with mainline CTTV to determine any system defect that may be causing the blockage or result in further problems.

    b. If the First Responder inspects the manholes and no evidence of a blockage

is found in the main, then MWS will have the segment jet cleaned and subsequently physically inspect the main using CCTV technology. If this investigation process does not reveal a blockage in MWS' wastewater collection system, then MWS will advise the customer to contact a plumber to resolve the disruption on private property.

c. During severe wet weather events, or if the blockage is found to be MWS' responsibility, the First Responder will advise the customer and contact Claims to assist with cleanup and any other property restoration determined to be MWS' responsibility. If Claims is not immediately available, the First Responder will initiate clean-up activities through Metro contracts and emergency contact lists.

2. Customer Responsibility

a. Consistent with Metro Code, the customer owns and is responsible for the maintenance of their service line from the main to the structure served. If the property in unsuccessful in making correction of the service line blockage, MWS will assist after the property owner has provided a clear and open access to the service line.

b. If the private service lateral is not retaining wastewater at the cleanout or open access located at property or easement lines, then the cause of the disruption is probably located toward the structure served. MWS will utilize a service line camera to inspect the service line from the cleanout or open access toward the main. If there is a blockage or failure in this segment, MWS will perform the necessary work to restore service. Residential customers will have no charge, Commercial customers will be billed at-cost.

c. If the private service lateral is retaining wastewater at the cleanout, then the cause of the disruption is downstream from this location toward MWS' main; therefore, additional investigation is required to determine if the blockage is in the main or in the remaining portion of the private service lateral.

d. If a property owner disputes a determination by MWS that a building backup is due to "private trouble," then they may appeal the First Responder's assessment through the Metro Claims.

Property Damage

As needed, MWS Claims and MWS uses independent cleaning and restoration contractors to assist in cleaning, sanitizing, and repairing damages caused by SSOs that are directly attributed to blockages or structural failures within MWS's wastewater collection system. All restoration contractors are licensed professionals in their area of expertise and are available to MWS through a Metro Government contracts. MWS also has in-house capability of assisting with and handling system overflow clean up at the

manhole point source. Private property clean up is always handled through third party contractors. All SSO claims are managed in-house with a MWS Claims Investigator assigned to each incident. The investigator coordinates work tasks between MWS work crews and the independent contractors while keeping the customer informed of progress.

4.3.3 Determine Whether Suspicious Substances May Be Present

The First Responder then determines if there are any possible suspicious substances in the overflow. If there is an oily sheen to the liquid or a strange odor, for example, then the First Responder will contact the MWS Environmental Compliance Officer and the Department's NPDES contact for guidance on proper action and sampling requirements.

If directed, establish an interim control zone and wait for a hazardous materials (HAZMAT) team or the fire department before proceeding. Responders will take direction from the lead authority of the team until the area is deemed safe and then shall proceed with containment and remediation.

4.3.4 Locate Disruption

To determine the total impacted area and the necessary remediation techniques, the Responder must first identify the location of the disruption to the sanitary sewer system and the configuration of the infrastructure.

The First Responder will have either a computerized or paper graphic of the sanitary sewer system to determine the infrastructure configuration and the necessary investigation points to be evaluated, such as downstream manholes, types of connections and other potential problem areas.

4.3.5 Identify Impacted Area

After locating the disruption, the next step is to identify the total impacted area. The Responder will trace the impacted area and determine what environmental impacts and potential hazards to public health are present and take the appropriate steps described in the SORP Training Component to mitigate the problem. Factors to be included in evaluating the impacted or potentially impacted area, include, but are not limited to the following:

- Streams and creeks
- Stormwater infrastructure
- Private property
- Public safety and accessibility.

4.3.6 Establish Control Zone Procedures

When the First Responder identifies the area impacted by the SSO, the next step of the initial overflow response stage is to develop and implement a control zone around the impacted area. The control zone will help prevent public access around the perimeter of the affected surface area using appropriate signs and barricading practices. The purpose of the control zone is to warn those who may enter this area of potential health hazards associated with contact with SSOs. The temporary signs and barricades will warn

passersby to avoid contact with this area.

4.3.7 Assess the Site

After the total impacted area has been identified and a control zone installed, the next step for the Responder is assessing the most appropriate response plan.

SSOs can occur anywhere in the sanitary sewer system, including along creeks and within public right-of-ways or dedicated public easements. The Responders understand that each event may require a unique plan of action. Water sampling may be necessary depending on the impacted area, the feasibility of containment during the SSO, and the potential for material to reach the waters of the state. Consistent with standard operating procedures, First Responders should contact the MWS NPDES Section if waters could become impacted base on the flow path in the area and it is a dry weather SSO event.

MWS will employ all reasonable means to remediate the site and restore service to customers. The Responder will determine what resources should be used. The Responder should request specific guidance immediately from the SM Supervisor or other designated resources for unusual situations or to ensure the proposed plan of action will meet the goals of the SORP.

4.3.8 Identify Resource and Technique Requirements

MWS will use all necessary response procedures and implement essential methods to ensure that the goals of the SORP are satisfied.

The following resources are available as needed:

- Trained personnel
- Excavation equipment
- Combination and stand alone cleaner/flusher equipment
- Closed-circuit television equipment
- By-pass pumping equipment
- Other materials, such as sand bags, silt fences, lime, signs, barricades etc.
- Regulatory Agency contact
- Police Officers for needed site security

The Responder will identify the necessary resources and techniques based on site accessibility, location of disruption of service, size of impacted area, and need to minimize the impact on the environment and the risk of hazards to public health.

Refer to Section 3.0 for additional information relating to resources available to achieve the goals of the SORP.

4.3.9 Mitigate Further Impact on the Environment and Hazards to Public Health

MWS will reduce the negative impact on the environment and hazards to public health by employing all reasonable containment activities during overflow events. Refer to the Sewer Overflow Response Plan Flowchart in Appendix E and Standard Operating Procedures for SSO in Appendix F for procedures. The timing of this will be concurrent

with mainline jetting, vactoring or televising to either eliminate the blockage or discover any system failure creating the overflow.

4.3.9.1 Isolate or Contain SSO Overflows

Containing spills is the concept of establishing a physical barrier to control the further dispersal of sewage, thus reducing the impact on downstream areas such as private property and streams. An appropriately developed and established containment plan will consolidate the escaped sewage into a defined area. The use of combination cleaners to reclaim or vacuum the overflowed sewage is now practicable. This collected volume will be estimated and included in our SORP notification process.

Containment procedures will vary on a case-by-case situation. The Responders should request specific guidance immediately from the SM Supervisor , MWS NPDES Coordinator, or other designated resources for unusual situations or to ensure that the proposed plan of action will meet the goals of the SORP.

MWS will reduce the potential negative impact on the environment and public health by employing all practicable containment activities during overflow events. Typically, the type of overflow event or the size of the overflow is the criteria for deciding if filtration or containment is the most feasible approach.

Sandbagging or other constricting methods

When site and weather conditions allow, entry points into the stormwater system may be obstructed with various methods that may include sand bags, hay bales, inflatable plugs, or simply redirecting the flow using construction equipment to "dam-up" areas with available materials.

4.3.9.2 Filtration of SSO Overflows

Filtering spills establishes a physical strainer to reduce the impact of solids, paper, etc., from the flow by stopping or reducing the spread to downstream areas, such as private property and streams.

MWS will reduce the negative impact on the environment by employing all practicable filtration activities during overflow events. Typically, the type of overflow event or the size of the overflow is the criteria for deciding if filtration or containment is the most feasible approach.

Wet Weather Overflows

During Wet Weather Overflows, the volume of the overflow can exceed the ability of the field crews to successfully contain it. For example, containment might not be practical during an intense rain event with a high volume of overflow. Filtration may be the only option until the flow subsides. Filtration will be utilized where practical.

4.3.10 Determine Whether Flow Diversion Techniques Are Practicable

When possible, flow diversion techniques provide an effective means of

conveying the overflow back into the sewer system. This procedure reduces additional potential impact on the immediate area and the possible impact downstream. The flow diversion techniques employed by MWS when practicable include, but are not limited to, the following:

- **By-passing measures**
  Portable by-pass pumps can be used in certain situations to collect overflowed sewage from the environment and conveys it back into the sanitary sewer system beyond the disruption of service. This method is most effective in bypassing a single identified problem area when the overflow can be directed to the next downstream manhole. It is not appropriate in wet weather overflows. This type of equipment can be used in conjunction with other containment measures or may be used independently.

- **Combination cleaner/flusher procedures**
  Combination cleaner/flusher equipment provides an additional resource for collecting overflowed sewage and conveying it back into the sanitary sewer system beyond the disruption of service. This equipment can be used in certain situations in conjunction with other containment measures or may be used independently. Like portable by-pass pumps, this equipment is not effective in wet weather situations.

4.3.11 Mitigation/Remediation Solutions

The timely use of flow restrictions is the most effective instrument to reduce additional negative impact on the environment. Also, this phase of field activities restores service to MWS wastewater customers.

The type of mitigation and remediation will vary depending on the cause of the SSO. Wet weather SSOs are usually caused by inflow and infiltration (I/I), not by blockages or other problems in the system. Mitigation is not possible until the overflow subsides, but when it does, MWS will implement all necessary steps to clean up and disinfect the overflow site.

Dry weather events may be addressed using several methods. The field professionals should identify the most effective method or combination of methods to return service to the system. Field crews should use television inspection to determine the most effective way to resolve any service disruption. CCTV inspection will identify the cause and location of the blockage and the necessary techniques needed to eliminate it.

The following summarizes common abatement resolution activities. These resolution techniques can be used independently or combined based on field conditions and CCTV inspection.

- **Roots/Grease**
  Combination cleaner/flusher equipment is used to remove any grease, roots, or other obstructions from the line. A root cutter attachment may be necessary to remove the obstruction. Heavy roots and related pipeline integrity problems (through CTTV inspections) are reviewed for potential replacement and/or rehabilitation.

- **Collapsed Pipe/Sewer Breaks**
  An emergency pipe repair is required to replace the defective or collapsed pipe. A work order will be initiated immediately and necessary containment and diversion procedures will be in place until the appropriate repairs are completed.

- **Mechanical Failures/Treatment Facility Malfunctions**
  By-pass pumping or pump around may be used until the mechanical repairs are completed at the pump station or treatment facility. The responding crews should notify System Services to acquire additional support from construction crews as soon as the emergency repairs are identified.

- **Remove I/I**
  MWS will evaluate systemic wet weather SSOs and implement corrective measures as part of the Overflow Abatement Program.

4.3.12 Begin Clean Up

MWS's clean up of the impacted area will be thorough and comprehensive. The extent and methods employed during clean up will vary. Methods to be used will include wet vacuuming or other removal of spillage, containment, bypass pumping to on-site tanker or nearby sanitary manhole. Private property clean-up including wiping floors with cleaning solution and disinfectant, flushing out and disinfecting plumbing fixtures, carpet cleaning and/or replacement, and other measures to disinfect and/or remove items potentially contaminated are typical with companies MWS utilizes for the clean up process.

MWS follows these general practices, depending on the individual situation:

- **Manual Practices**
  Manual clean up techniques use hand tools, such as rakes, shovels, brooms, etc., to remove all readily identifiable material (sewage solids, papers, plastics, etc.) originating from the sewer system and properly dispose of it.

Disinfection Practices
Apply lime or other disinfectant and deodorization agents.

- **Mechanical Practices**
  When warranted, MWS will take extra steps (prior to disinfection) to remove contaminated soil. Mechanical clean up techniques, for example, use specialized excavating equipment, combination cleaner/flushers, portable aerators, by-pass pumps, etc., to remove all impacted substances and properly dispose of them. This could include the removal of impacted soil if determined by SM Supervisor and/or MWS NPDES Coordinator.

The goal of the clean up practices is to restore the site to pre-event conditions. One or more of the practices may be required, depending on the size and duration of the overflow and the area impacted.

4.3.13 Conduct Follow-Up Inspections

CCTV equipment, along with other investigative tools, should be used after remediation to verify the exact cause of the disruption and the success of the applied procedure or technique. The follow-up inspection should occur within two working days of remediation. Records of these activities are kept in CMMS.

4.4 Public Advisory Procedures

This section describes actions MWS takes, with IDEC and other appropriate authorities, to temporarily limit public access to areas potentially impacted by overflows from the wastewater collection system.

4.4.1 Control Zones

The First Responder will attempt to prevent public access by establishing a control zone around the perimeter of the affected surface area using appropriate signs and barricading practices. The temporary signs and barricades will warn passersby to avoid contact with this area.

Barricading practices will include, but are not limited to, cones, warning tape, barrels, barricades, etc. The limits, duration, and most appropriate control zone plan will vary on a case-by-case situation.

The control zone does not necessarily prohibit use of recreational areas, unless posted otherwise, but provides a warning of possible public health risks from contact with sewage.

4.4.2 Location of Control Zones

Although the location of temporary signs and barricades will vary for each site, the goal will always be to warn the public to avoid contact until the clean up is complete.

When possible, the control zone will be posted:

- Just beyond the limits of the impacted surface area
- Near high pedestrian and/or vehicular traffic areas
- Other appropriate locations.

4.4.3 Duration of Control Zones

Signs and barricades will be posted as soon as the overflow is confirmed and they will remain in place until clean up activities are complete. The timeframe may vary depending on the extent of the response activities, which may include significant mitigation and clean up requirements.

4.4.4 Public Information

The Public Information Officer or their designee will answer questions from customers about MWS's response to SSOs and, when necessary, will respond to the customer

reporting the SSO to explain MWS's response. The control zone signs also include the contact number (615) 862-4600 for the public to call for additional information. In the event property damage has occurred, Metro Claims will respond. The department may also use outbound calling to affected customers through CIS.

4.4.5 Door Hangers [See Appendix B]

Where warranted, MWS may use a door hanger with blanks for the date and location of overflows that can be filled in as needed in the field and left for customers. The door hanger includes ways customers can contact MWS for more information. Follow-up information will be provided to customers concerning additional remediation and/or their responsibility if the source of the overflow is their service line (roots, grease, debris or extraneous flow).

4.4.6 News Release [See Appendix B]

MWS maintains a standard news release on SSOs that can be quickly adapted to the particular situation and issued if MWS determines there is a significant threat to public health.

4.4.7 Customer Letters [See Appendix B]

In situations where a grease, roots or debris caused blockage has been identified, MWS sends letters to residential and commercial customers in the affected area. The letters advises the customer of their service line condition and their responsibility in alleviating future SSOs by removing roots, extraneous water, disposing of grease and other materials properly and include a brochure on proper disposal.

Public Notification Decision Matrix

Event	Action
Overflow into streams	MWS will place temporary signs along the stream at public access points. Signs will remain in place for 24 hours after clean up is completed. MWS may utilize door hangers or outbound calling for homes or businesses that may be impacted by the overflow. Additional notification will be considered in conjunction with MWS NPDES and TDEC.
Overflow in a residential or high traffic area, such as a school or public park	MWS will place temporary signs in the area of the overflow. Signs will remain in place for 24 hours after clean up is completed. MWS will utilize door hangers or outbound calling for homes or businesses that may be impacted by the overflow. Additional notification will be considered in conjunction with MWS NPDES and TDEC.

4.4.8 MWS Web Site [See http://www.nashville.gov/water/]

MWS will post a monthly summary of SSOs (excluding service lateral caused building backups) on its Web site. The posting will include, at a minimum, the following information:

- Date
- Time
- Duration
- Location
- Estimated volume of the overflow
- Overflow cause
- Corrective Action

4.5 Notification Procedures for External Organizations

When an SSO occurs, MWS performs the appropriate notification procedures as specified in its NPDES permit.

Types of Notification of SSO Events:

- **Immediate Notification [See 4.2 above.]**
  SM Supervisor or designee sends TDEC an Overflow Notification within 24 hours of a confirmed SSO. MWS is also available to reply to any requests for additional information by TDEC. This contact information is included on the Notification Form.

  TDEC Contact Person: Ann Rochelle, Nashville Environmental Assistance Center, ann.rochelle@state.tn.us

- **Updated Notification (as needed)**
  SM Supervisor or designee may send TDEC an updated Overflow Notification in the event that the original notice requires follow-up. MWS will also be available to reply to any requests for additional information by TDEC.

  TDEC Contact Person: Ann Rochelle, Nashville Environmental Assistance Center, ann.rochelle@state.tn.us

- **Monthly Notification**
  MWS summarizes the SSOs for the calendar month into a report and attaches the document to its NPDES Overflow Monitoring Report. The Monthly Overflow Report summarizes information conveyed in the individual Overflow Notifications.

4.6 Required Reporting Information

The collection of necessary information by responding professionals as described in Section 4.1 is crucial to provide accurate reporting.

To facilitate accurate record keeping and notification procedures, MWS collects the following information:

- Date and estimated time of the occurrence
- Name of individual reporting occurrence
- Location and street address of SSO (include MWS manhole number)
- Cause of SSO and failed system component
- MWS response activities
- Name of MWS Responders
- An estimation of the volume recovered and not recovered
- Duration of SSO event
- Did the overflow reach "Waters of the State"
- Name of receiving water and path, if applicable
  If flow from the SSO event was determined to reach "Waters of the State," provide the name of the receiving water, if any. Also, provide the path that the flow used to reach this body of water to the extent field conditions or equipment will allow. The following is a list of typical water conveyance components.

  Potential path to Waters of the State
  - Stormwater Pipe/Catch Basin
  - Ditch or Swale
  - Detention/Retention Basin
  - Creek/River.

These basic techniques are available to determine the amount of overflow that has occurred.

- Flow monitored data where available
- Calculating spill volume based on surface area
- Calculating Overflow from PumpStation or Pressurized System

Refer to Appendix C for estimation methods for these techniques. The technique of estimating the volume overflowed based on duration and measured flow rate is not the preferred method. The most appropriate application of this technique relates to overflows occurring at pump stations. The flow rate is extremely difficult to measure outside the confinements of the pump station scenario, therefore that technique will not be used in non-pump station scenarios.

4.7 SSO and Building Backup Tracking

Information regarding SSOs and building backups captured during the SORP process is stored in

a database that is used for both record keeping and reporting purposes. MWS links this data with GIS to graphically view where overflow and backups have occurred. Monthly reports are generated from the database that illustrate the following information:

- Number of occurrences
- Overflow event by cause
- Month-by-month comparison of occurrences.

4.8 Critical Incident Review Process

In the event of a critical system component failure, such as a pump station or a breakdown in response to collection system problem or compliant, the process owner and/or his designated staff will initiate a critical incident review with the departments involved in response to perform a root-cause analysis and provide recommendations that may prevent future occurrences or improve response.

4.9 Quality Assurance

To ensure an appropriate response to collection system problems, including SSOs, members of Sewer Maintenance, Route Services, Engineering and Stormwater team will audit monthly the response to evaluate how effectively the crew implemented the requirements of the SORP. The team will compare the actual response with standards of the SORP. If opportunities for improvement are identified, the responsible work sections will initiate appropriate resolution.

Section 5

5.1 Training

SM and Route Services personnel will conduct training for the appropriate response crews and support staff to ensure their compliance with the SORP. These training sessions will be organized based on the latest SORP, as well as other reference materials. Training sessions will be supplemented with a practical hands-on field component to ensure all response personnel are prepared for all anticipated situations.

Also, SM and Route Services will conduct refresher sessions annually or when changes are made to the SORP to ensure the same results. SM will oversee the SORP to ensure that the established procedures are being followed during implementation and field operation.

5.2 Review and Update SORP

MWS will review the SORP annually and amend it as appropriate. Review shall include, at a minimum, the following activities:

- Conduct workshop with managers and key personnel to review response activities and gather suggestions for new or revised procedures
- Review all contact lists and update as necessary
- Update the SORP as needed in regard to updated regulatory requirement.

5.3 Distribution and Availability of SORP

Copies of the SORP and any amendments will be distributed to responsible personnel and will be available to all employees through shared electronic files and website.

Appendices - Supporting Information

Appendix A: Information Technology Resources and Descriptions

1.0 Geographic Information System (GIS)

1.1 View of the GIS System and Description of Components Shown

2.0 Customer Information System (CIS) and Computerized Maintenance Management System (CMMS)

3.0 Interactive Voice Response System (IVR)

4.0 System Control and Data Acquisition System (SCADA)

5.0 Mobile Workforce Management (MWM)

Appendix B: Public Advisory Procedure Example

1.0 Sanitary Sewer Overflow Alert door hanger

2.0 Sanitary Sewer Overflow News Release

3.0 Customer Notification Letters Informing of Service Lateral Problems MWS Grease Management Program Door Hanger

4.0 MWS Grease Management Program Door Hanger

Appendix C: Field Manual SORP (includes estimator tool)

Appendix D: On-call List

Appendix E: Sewer Overflow Response Plan Workflow

Appendix F: Standard Operating Procedures for SSO

Appendix A: Information Technology Resources and Descriptions

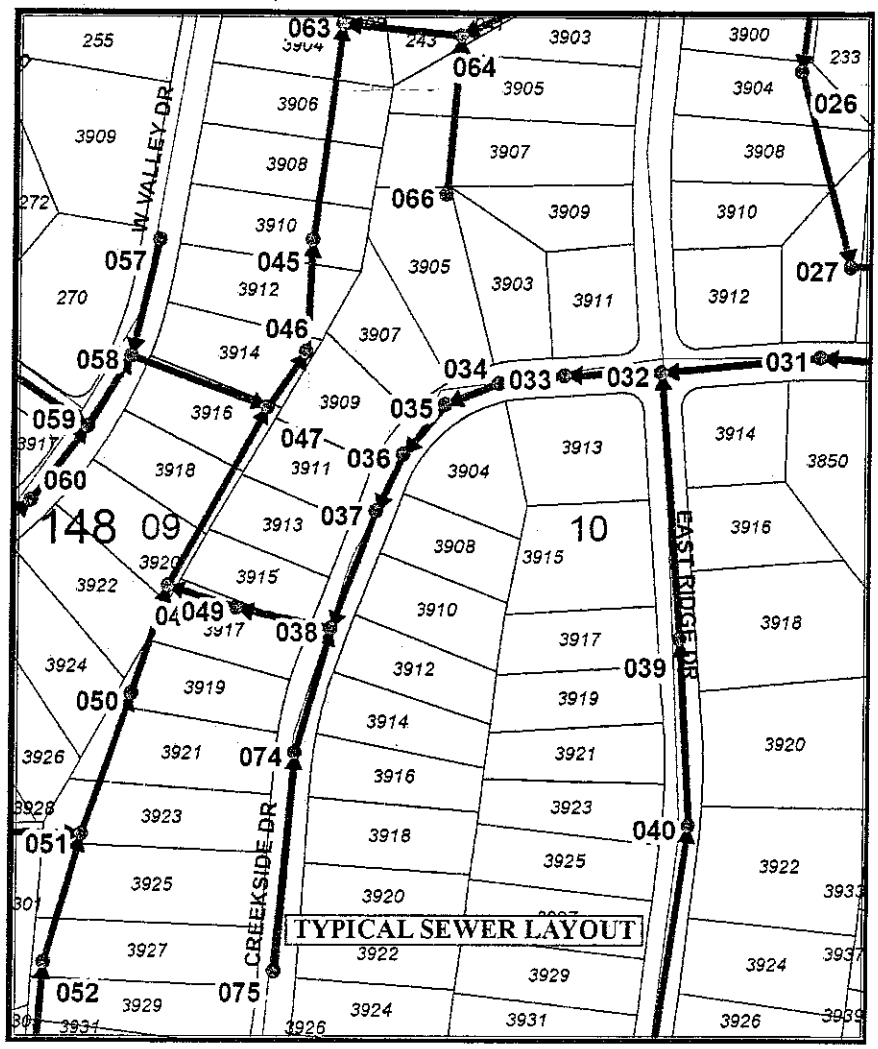
1.0 Geographic Information System (GIS)

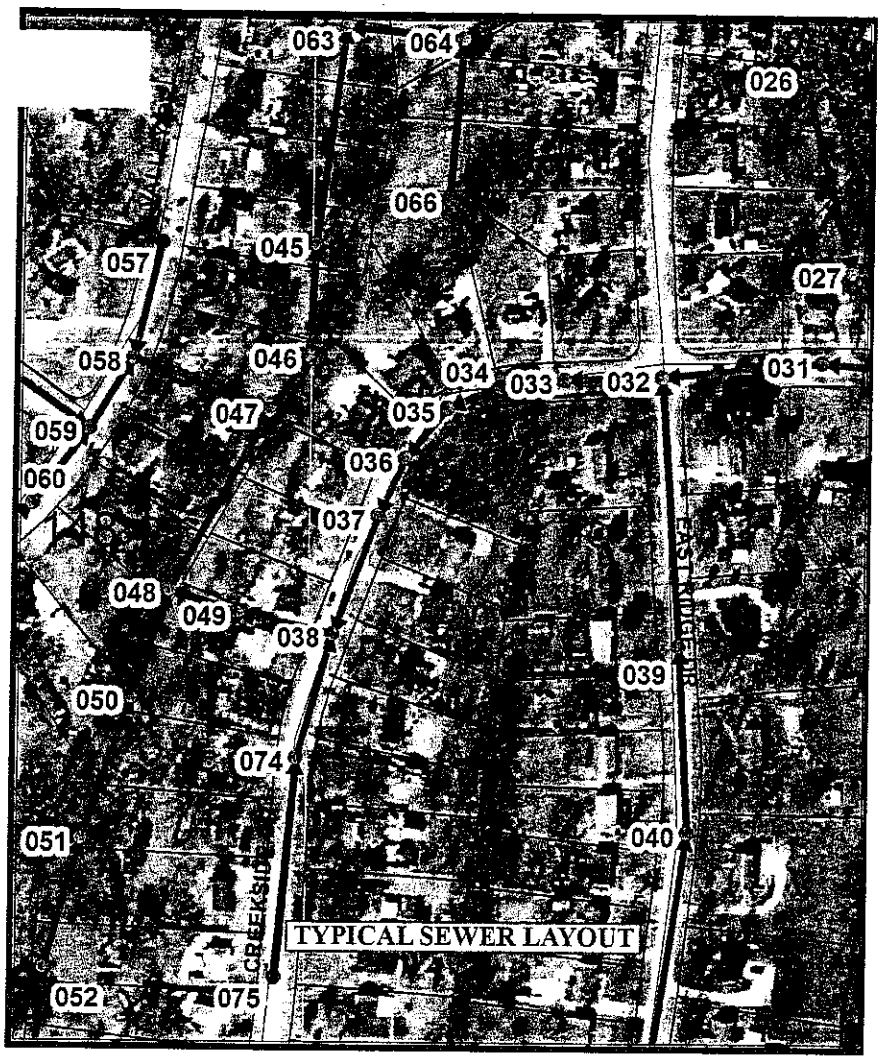
The Metro Nashville Planning Commission and MWS administers the common portions of GIS and its computer system. It also provides GIS and computer technical support and serves as a clearinghouse of GIS information and products.

The Records and Mapping Section of the MWS Engineering Division is also responsible for updating a common set of computer-based maps (for all Davidson County) that are used by all of its users. This base map data includes planimetric maps, topographic maps, and digital ortho aerial photography.

From a technical standpoint, the GIS displays the graphic (map) data as layers of information; that is, streets on one layer, parcels on another, buildings on another, etc. That allows an almost unlimited flexibility for viewing only the desired features and area.

1.1 Views of typical sewer collection system map in GIS. Information on this mapping system includes street names, manhole identification numbers, geographic configuration and topographical features. Users can also see property information including owner. This information is on Field Personnel's laptop and is updated weekly.





2.0 Customer Information System (CIS) and Computerized Maintenance Management System (CMMS)

The CIS maintains records of account numbers, premise details, and other customer information. It also generates work orders and facilitates workflow between departments while keeping a record of activities requested by a particular customer or group of customers.

The CMMS maintains records of infrastructure assets and historic repair and maintenance activity performed. It also generates service requests and work orders and facilitates workflow between departments while keeping a record of activities requested by a particular customer or group of customers.

The CIS and CMMS allows requests to be passed from the Customer Service Center to Sewer Maintenance as a field activity, which is then dispatched to the First Responder and crews as a service request or work order. Information may be received on closure, such as

steps taken for remediation, and more specific information about location, such as manhole number.

Requests received from customers as well as internal requests are entered into the CIS and the CMMS. Information including customer name (if applicable), location, specific problem, and any additional comments that would help in the swift response to the request is recorded.

3.0 Interactive Voice Response System (IVR)

The IVR is the automated system that enables customer calls to be routed to the appropriate MWS representative. This system allows MWS to shorten hold times, provide fewer call transfers to the customer, and ensure that urgent calls are answered before lower priority calls.

Callers choose from options that include reporting account inquiries, stormwater, water, or wastewater emergency. Callers may also press 0 at any time to be connected to a customer service representative.

4.0 System Control and Data Acquisition System (SCADA)

The automated SCADA system may also initiate a field order through MWS Control Room. SCADA notifies the Control Room who in turn notifies Route Services if there is a system failure in any of MWS's 101 pump stations. SCADA gives valuable information on the duration of the overflow. SCADA is also used to identify system improvements and the operability of the station and to identify potential SSO events so that measures can be taken to prevent an overflow.

5.0 Mobile Workflow Management (MWM)

MWM is under development and is scheduled to go live in July 2007. This system will enable field orders to be dispatched to First Responders and other field personnel from CIS and CMMS electronically. MWM refers to the automated dispatching system that includes laptop computers in Field Personnel's trucks. The order will be dispatched to the field through radio technology on the city's 900 MHz frequency system enabling field crews to view information on a laptop. The GIS system is also used in the field to provide a map of the area to show the location of the sewer line and of the nearest residence or manhole. Field orders will be completed by the respective Field Personnel on their laptops that in turn will immediately update the CIS and CMMS. Remote monitoring of field activity will also be possible through this technology by Managers and Supervisors.

Appendix B: Public Advisory Procedure Examples

1.0 Sanitary Sewer Overflow Alert door hanger

METRO WATER SERVICES
SYSTEM SERVICES DIVISION
1616 THIRD AVE. NORTH
NASHVILLE, TN 37208
(615) 862-4600

Sewer Overflow Notice

This notice is to advise you that Metro Water Service has responded to a sewer overflow in your area. MWS response to overflows is coordinated with Local and State Watershed Management Agencies Please avoid the affected area and note the following:

Date: _____

Address or general location of overflow:

_____

The overflow was/is:
- ☐ corrected
- ☐ in process of being corrected – you will receive further information
- ☐ continuing and will be corrected asap You will receive further information.

The overflow was/is:
- ☐ isolated to the area immediately around the manhole
- ☐ extended to a area beyond the manhole area but did not reach any stormwater system
- ☐ extended to an area beyond the manhole and did enter stormwater system

Clean-up of the overflow is:
- ☐ complete
- ☐ in process – you will receive further information.

The overflow was caused by:
- ☐ grit/debris
- ☐ grease buildup
- ☐ roots
- ☐ other _____

OTHER COMMENTS

_____
_____
_____
_____
_____
_____

If you need further assistance, please call Metro Water Services at: 862-4600 Option 1 for English, Option 3 for Emergency Service and reference the following Service Request/Work Order No.

SERVICE REQUEST/WORK ORDER NO:

_____

2.0 Sanitary Sewer Overflow news release (to be coordinated with TDEC)

MWS maintains a standard news release on SSOs that can be quickly adapted to the particular situation and issued if MWS determines there is a significant threat to public health.

NEWS RELEASE

DATE XXXXXXXXX
For Immediate Release

For More Information
Contact: Sonia Harvat
MWS Public Information officer
sonia.harvat @nashville.gov
(615) 862- 4494

MWS Alerts Customers to Sanitary Sewer Overflow

MWS issued an alert today to people in the [insert area(s)] concerning a sanitary sewer overflow.

"The overflow occurred as a result of [heavy rain/ a blockage/ or other]," said Sonia Harvat, MWS Public Information Officer. "MWS responds to overflows in a manner consistent with state and national standards. We warn passersby to avoid contact by posting signs and using barricades, and we disinfect the area after the overflow stops."

[Note: Use this paragraph if the overflow is in a park/significantly affects a stream/etc.
The signs do not necessarily prohibit use of recreational areas, unless posted otherwise. The Tennessee Department of Environment and Conservation (TDEC) determines whether to post nearby waterways that may have been affected if water quality testing indicates a need.]

Overflows pose hazards similar to those in public restrooms or even your own bathroom. If you, your family, or your pets do have contact with the overflow, wash thoroughly with soap and water. Remember: Washing your hands carefully and often is the best defense against illness carried by animal or human waste.

MWS maintains a log of recent overflows and clean up efforts and other wastewater information at http://www.nashville.gov/water/. If you have questions or need to report an overflow, please call MWS at (615) 862-4600, option 1, option 3.

######

3.0 Customer Notification Letters Informing of Service Lateral Problems

Maintenance of Sewer Service Connection

FIRST NOTIFICATION

Date:

XXXXX

Name:

XXXXXXX

Address:

XXXXXX

RE: Problems with the sewer service line for xxxxx (address)

The Code of the Metropolitan Government and Davidson County, Tennessee requires that owners maintain their service line "in such a condition as to safeguard the property, life and health of others". Specifically this means that excess ground water overloading the public system through joint leaks, sump pumps, roof drain or surface water inlets or sewer line blockages due to root intrusion, grease and/or debris from the service line is prohibited.

Through closed circuit televising and other methods of evaluation of the public sewer system, Metro Water Services (MWS) has determined that

- ☐ excess water
- ☐ roots
- ☐ grease
- ☐ debris

are present in your sewer service line impacting the operating condition of the public system. In accordance with Metro Code, you must take action to ensure that your service line is in proper operating condition.

Metro Water Services fully recognizes that you may not have been aware of problems in your service line and that you may not have experienced any service problem. Taking the necessary corrective action to restore your service line to its intended operating condition will protect your interests as well as the publics'.

In order to provide adequate time for you to address these service line problems, MWS will reinvestigate the public main serving your property on or about _____ (sixty (60) days) from the date of this letter. If there is evidence that the condition affecting the public system is not corrected, MWS will issue a thirty day notice that water service to this address will be disconnected until such time as the sewer service line problem(s) are corrected. There will also be additional charges for water service disconnection and reinstatement.

You can find a copy of the "Metro Code" at the Metro Clerk's Office or on the internet at http://www.nashville.gov/mc/. For your convenience, included are the sections that pertain to sewer service line maintenance below.

THE CODE OF THE METROPOLITAN GOVERNMENT OF NASHVILLE AND DAVIDSON COUNTY, TENNESSEE,

15.40.020 Regulation and enforcement--Authority of director.
The director is authorized and directed to promulgate and enforce such rules and regulations as he may deem necessary for the enforcement of this chapter and for the safe, economical and efficient management, control and protection of the government's public sanitary sewerage system.

15.40.050 Maintenance of service connection--Owner's and Department's responsibility.
A. The Owner will own and maintain his sewer service line from the public sewer main to the structure served.
B. If the Owner experiences sewer service interruption as a result of a sewer service line failure and has demonstrated a good faith effort to remedy the problem, the Department shall make any necessary repair on the portion of sewer service line inside the public right-of-way or easement from the main to the boundary of right-of-way or easement. Provided, however, that before the Department will make such repairs, the Owner must provide an excavated clear and open access to the sewer service line at the right-of-way or easement boundary. Residential customers will not be billed for any repair performed by the Department under this Section. Commercial customers shall pay all costs of repair incurred by the Department under this Section and such costs shall be billed on the customer's next bill.

15.40.090 Stormwater--Runoff to sanitary sewers prohibited.
The discharge of stormwater runoff to separate sanitary sewers is prohibited.

If you have questions and wish to speak to a MWS representative, please call (615) 862-4600 and select option 1, option 3.

Maintenance of Sewer Service Connection

SECOND NOTIFICATION

Date:

XXXXX

Scheduled date of water disconnect: XXXXX

Name:

XXXXXXX

Address: XXXXXX

RE: Notice of water service interruption for xxxxx (address)

The Code of the Metropolitan Government and Davidson County, Tennessee requires that owners maintain their service line "in such a condition as to safeguard the property, life and health of others". Specifically this means that excess ground water overloading the public system through joint leaks, sump pumps, roof drain or surface water inlets or sewer line blockages due to root intrusion, grease and/or debris from the service line is prohibited.

Through closed circuit televising and other methods of evaluation of the public sewer system, Metro Water Services (MWS) has determined that...

- ☐ excess water
- ☐ roots
- ☐ grease
- ☐ debris

...continue to be present in your sewer service line impacting the operating condition of the public system.

Consistent with the first notification that you were provided approximately sixty (60) days ago, MWS has no choice but to schedule a disconnection of your water service. This disconnection will occur thirty days from the date of this letter. If on a weekend, disconnection will occur on the next business day.

In order to avoid a disconnection of water service and any associated fees, you must present evidence of corrective action taken to remedy the problem with the sewer service line. This evidence could include but is not limited to a paid invoice for corrective action taken through a third party. Upon such notice, MWS will then re-televise the public system to determine sewer service line condition. There will be a charge of this activity and will appear on your next bill. Water service will be restored upon discovery of a safe and functional sewer service connection.

If you have questions and wish to speak to a MWS representative, please call (615) 862-4600 and select option 1, option 3.

4.0 MWS Grease Management Program Door Hanger

This door hanger is left for property owners if there is discovery of grease in the public line serving their property or observed through CTTV coming into the system from the service lateral.

METRO WATER SERVICES

GREASE MANAGEMENT PROGRAM

How to prevent grease from causing blockage in your sewer line and impacting the environment:

- Pour all used cooking oils and grease into a small container so it can cool and harden. When container is full, cap the container or cover it tightly, place in bag to prevent leakage and put in garbage container.
- **Do NOT pour any cooking oils or grease into your kitchen sink or other drain lines. This can cause a severe blockage in your sewer service and the downstream sewer system.**
- Dry wipe all pots pans and plates before washing in sink or dishwasher. Use paper towel and wipe contents into garbage container.
- If you have a kitchen sink garbage grinder use this as little as possible since food particles and grease will clog your sewer line or effect the downstream sewer system

Your awareness and the action you take to prevent fats, oils and grease from entering the sewer system will benefit your community by preventing sewer blockages and overflows. Thank you for helping to improve our environment.

Appendix C: Field Manual SORP

Metro Water Services

System Services and Route Services Division

Sewerage Spills and Overflow Incidents

Guidelines & Procedures
Field Manual

GOAL

To reduce or eliminate the public health risks and environmental damage associated with illicit discharges from the public collection system.

METRO WATER SERVICES - SYSTEM SERVICES AND
ROUTE SERVICES DIVISION

Collection System Sewerage Spills and Overflow Incidents Guidelines and Procedures

System Services and Route Services is available 24/7/365 to respond to any public health or environmental problem related to an illicit discharge of sanitary sewage. The following guidelines and procedures address the manner in which these incidences are to be handled by System Services' and Route Services' employees.

Definition of Discharge Point: ***Any point in the public collection system where sewage is discharged on to roadways, public and private property, or directly or indirectly into creeks or rivers.***

GUIDELINES

When notified of an overflow from the public collection system, remember the following:

1) **Containment**
2) **Contact**
3) **Cleanup**

Containment

(a) Upon arriving at the discharge site, immediately proceed with measures to stop the discharge of sewage. If discharge cannot be stopped, notify supervisor for additional equipment/resources as required. Proceed to (b).

(b) Barricade, flag, or hazard tape the affected area to minimize potential contact with the public.

Contact

(a) Contact the SSD Dispatch to report the following information:

- exact location and condition of site
- public or private collection system

- all contractors or construction work observed in area

(b) Document this information, as well as the cause of the blockage (roots, grease, etc.) on the Work Order.

(c) If the public collection or private system overflow is near or in a creek or river, contact the on-duty supervisor. The on-duty supervisor will immediately contact the MWS NPDES division for remediation advice and guidance.

(d) The responding supervisor is also responsible for ensuring that an Overflow Notification Form is completed and faxed to the Division of Water Pollution Control (TDEC) and Metro Stormwater - NPDES Division within 24 hours.

State of Tennessee Water Quality Division

Ann Rochelle

Office Number: *687-7123*

e-mail address: ..... ann.rochelle@state.tn.us

Fax: ..... Fax: 687-7078

Joey Holland 687-7020

Metro Stormwater - NPDES Division

ATT: Michael Hunt ..... Fax: 880-2425

Office Number 880-2420

Cleanup

(1) For inline sewer stoppage (grease, roots, or debris), clear blockage as soon as possible.

(Note: If stoppage cannot be cleared quickly, pump crew shall connect a by-pass line either directly into a tanker truck or into public sanitary sewer until blockage has been cleared.)

(2) Make every effort to contain surface discharge drainage. Call dispatcher for any assistance needed. Sandbag or trench away from catch basins and drainage ditches and creeks or rivers. A construction repair crew with backhoe may be needed in large spills. Make every effort to isolate discharge to the site. If the discharge is in a CSO system, sewage can be washed into the collection system.

(Note: Notify affected property owners as soon as possible of incident and corrective action being taken. See Public Notice section below for more details.)

(3) If possible, manually remove sewerage debris from discharge point and transport to compost lot for processing to landfill. This includes all solids that were discharged from our sewer system. This will decrease the aesthetic impact at the discharge point.

(4) If overflow has entered a creek or river (or has potential to) the on-duty supervisor shall consult with MWS NPDES personnel in order to collaboratively identify the scope of the cleanup effort.

Metro Stormwater - NPDES Division

Michael Hunt 880-2420
Mike Seremet .....533-0334.....Direct Talk #82
Butch Bryant.. .566-3865.... .Direct Talk# 193

(5) Do not wash down discharge that could drain into nearby catch basins, ditches or creek beds. Note: If spill is directly in creek or drainage bed, remove all sewerage debris from creek bed using a vacuum truck to recover as much as possible. Utilizing input from the TDEC and MWS NPDES Division, an on-site decision will determine if it is appropriate to flush streambed. If the damming of stream channel is required, only sandbagging for containment will be approved and complete removal of sandbags will be required. If in the event of a broken sandbag, all loose sand will be removed from stream channel.

Note: Due to Federal regulations, do not use city water to clean creek bed. Non-chlorinated water can be brought in to use in the event of a large spill. Non-chlorinated water can be obtained at Central, Dry Creek and Whites Creek Wastewater Treatment Plants. The department is in the process of securing Chlorine Diffuser's for available public water use as needed. Never use high-pressure (jet) water for creek or drainage bed cleanup due to potential soil erosion or danger to aquatic life.

(6) If a creek, river or other waterbody has been impacted by sewerage, dissolved oxygen levels should be monitored and observations made to determine if fish or other aquatic life have been killed. Death of fish and aquatic life may not result until several hours or the next day following the discharge into the stream, after oxygen depletion occurs due to breakdown of the sewage through natural process. Monitoring results and any observations made should be included in the report submitted to the Division of Water Pollution Control describing the overflow incident. In the event that fish or other aquatic life have been killed, the Tennessee Division of Water Pollution Control should be notified as soon as possible, but no later than 24 hours following discovery of the incident. Division personnel can be contacted through the **Tennessee Emergency Management Agency (TEMA) at 741-0001** if the fish kill occurs after regular business hours, on holidays, or on weekends.

NOTE: Water samples taken by Metro Water Services or other approved agencies above and below discharge point will determine whether the clean-up is complete or further action is required

(7) Lime and disinfectant may be used around discharge points in isolated grass areas and under homes, if needed, upon agreement of property owner. **Do not use lime or disinfectant in creek or drainage beds** More extensive property restoration and clean-up on private property should be performed by Metro contractors.

(8) If the discharge point is the result of a sewer segment failure by either natural causes or actions of others, start by-pass pumping to public sanitary sewer as soon as possible. If contractor on site is responsible and cannot start by-pass pumping in a timely manner, call dispatcher for MWS pump crew.

Note: If caused by others, this work can be billed back to the responsible parties. If possible have jet-vacuum truck keep sewerage confined to collection system while this by-pass pumping is being put in place. Take every possible action to confine sewer discharge to site.

(9) Public Notice

Depending on the severity and location of the overflow the following actions will be taken:

- Barricades and signage will be used to protect the public from overflow impacts. Customers with property contiguous or downstream of the overflow location will be contacted directly. This will involve either direct customer contact and/or a Notice of Overflow in the form of a door hanger (see attachment I). Outbound calling may also be used in situations involving more than ten (10) customers or when direct on-site contact is impractical. Information shared will include status of the collection system, health or safety concerns, cause of overflow, corrective action taken, MWS contact information and what the customers can do to prevent future problems (roots from service line, grease, debris, etc). These communication efforts would be coordinated with MWS NPDES Staff.

- The general public will be notified of events if the overflow impacts large common areas or if it reaches water courses with which the public could potentially come in contact. These efforts would be coordinated with MWS NPDES Staff and TDEC as needed. The form of this communication for events such as these would be through the website, outbound calling, local media, or a combination of all.

AIR-RELIEF VALVES ON SEWERAGE FORCE-MAINS DISCHARGE

If the discharge point is the result of a faulty or broken air-relief valve, contact CSC Dispatch. The SSD Maintenance Shop and Route Services assists in the maintenance and repair of these valves. Efforts should be used for:

- **Containment**
- **Contact**
- **Cleanup**

as described above.

SEWER PUMPING STATION DISCHARGE

In the event the sewerage discharge point is from a MWS sewer pumping station, contact the Control Room at Omohundro Water Plant (862-4978) or Direct Talk #200.

CSO REGULATOR MANHOLE DISCHARGE

System Services Division maintains CSO Regulators and in the event of a system failure should be handled as a collection system stoppage. Electronics at all facilities are maintained by Operations. If you are at a CSO Regulator and were not dispatched by Operations, please notify them of your presence to clarify any electronic alarms they may receive for this site.

PRIVATE SYSTEM DISCHARGE

If the sewage discharge is located on a private system, make every effort to bring it to the owner's attention. Inform responsible party of the public health and environmental concerns and that Metro Stormwater - NPDES Division and Metro Public Health will be notified of discharge. If this discharge is causing risk to public health and safety and the owner cannot be contacted, begin effort to correct the situation and notify Metro Claims.

Attachment I

METRO WATER SERVICES
SYSTEM SERVICES DIVISION
1616 THIRD AVE. NORTH
NASHVILLE, TN 37208
(615) 862-4600

Sewer Overflow Notice

This notice is to advise you that Metro Water Service has responded to a sewer overflow in your area. MWS response to overflows is coordinated with Local and State Watershed Management Agencies. Please avoid the affected area and note the following:

Date: _____

Address or general location of overflow:

_____

The overflow was/is:
- ☐ corrected
- ☐ in process of being corrected – you will receive further information
- ☐ continuing and will be corrected asap. You will receive further information.

The overflow was/is:
- ☐ isolated to the area immediately around the manhole
- ☐ extended to a area beyond the manhole area but did not reach any stormwater system
- ☐ extended to an area beyond the manhole and did enter stormwater system

Clean-up of the overflow is:
- ☐ complete
- ☐ in process – you will receive further information.

The overflow was caused by:
- ☐ grit/debris
- ☐ grease buildup
- ☐ roots
- ☐ other _____

OTHER COMMENTS

_____
_____
_____
_____
_____
_____

If you need further assistance, please call Metro Water Services at: 862-4600 Option 1 for English, Option 3 for Emergency Service and reference the following Service Request/Work Order No.

SERVICE REQUEST/WORK ORDER NO:

_____

Sewer Overflow Calculation Spreadsheet -- this information is available electronically and is used by personnel reporting overflow information to TDEC on the Overflow Notification Forms and on the Monthly Overflow Report. It calculates the volume in gallons which is then reported in million gallons.

Overflow Volume Calculation Spreadsheet

(Simply enter in the data according to the shape of the overflow. The table will calculate the volume for the Overflow Notification Form)

Shape of Overflow	Diameter (ft)	Length (ft)	Width (FT)	Depth (in)	Area (sf)	Volume (cf)	Gallons (gal)
Square or retangular	n/a				0.00	0.00	0.00
circular		n/a	n/a		0.00	0.00	0.00

Appendix D: On-call List – this list is generated weekly and represents emergency respondent personnel by shift, day and time. This information is used by Dispatch and the Control Room to contact personnel outside normal shift schedules. This list is distributed electronically to MWS personnel and Metro Emergency Management (OEM) for use in the event of emergencies including sewer overflows. (see next page)

Weekly On-Call Contacts for Metro Water Services

	Name	Direct Talk	Cell Phone	Pager	Home Phone
				Week of:	April 30, 2007
Repair					
1st Contact (On-call)					
Supervisor	Greg Nalls	113	456-9210		746-4508
Leader	Joe Dillard	298		518-9300	650-9812
Backhoe	Deric Brown	76		518-9300	731-4702
Crew	John Hashins	310		518-9300	262-5766
Crew	Bobby Wilson			518-9300	299-5799
Crew	Charles Sharp		944-1503	518-9300	589-6206
2nd Contact (Back-up)					
Supervisor	Eddie Waynick	341	566-4015		299-5752
Leader	Doug Richardson	284	566-3957	518-9898	274-6297
Backhoe	David Bourland	373	364-3470	518-9898	882-0404
Crew	Kwaku Boachie		642-6636	518-9898	361-1266
Crew	Melvin Sublett		478-6928	518-9898	355-6969
Crew				518-9898	
Sewer					
1st Contact (On-call)					
Sewer Crew (Cleaning)					
Leader	Tyrone Jolley	314		518-9888	876-8096
Crew	Charles Wright			518-8888	332-7553
2nd Contact (Back-up)					
Sewer Crew (Cleaning)					
Leader	Les Buckner	105	585-7857	518-8888	202-3371
Crew	Bill Underwood			518-8888	831-9821
CTTV (Televising) Crew	Danny Jones	394	419-4777	929-0232	730-5845
Regulator Crew:					
Primary	Alvin Humphrey	281	566-3954	518-8108	865-9555
Backup	Darryl McKibbens			518-8355	834-7382
Plumbers					
Leader	Donnell Carter		364-8581	363-1982	
Crew	Roger Johnson	425		363-1987	754-2099
Large Meter Crew					
Leader	Roscoe Jones	118	456-9226		227-7011
Crew	David Denham	426	207-9743		385-1869
Special Assistance As Needed by Utility Maintenance					
On Call	Troy Hamilton	72	456-3319	664-0183	931-582-7969
Back Up	John Ward	288	566-3961	664-0082	931-729-5053 or 931-796-4463
Weekend Repair and 1st Response	**6:00 AM -6:00 PM Sat.-Mon.**				
Leader	Billy Raines	114	456-9212	520-2488	356-7780
Engineering Inspections					

Weekly On-Call Contacts for Metro Water Services

5th Av. N. & 10th Av. N Water rehab and Temporary Water Lines					
(See Maps in dispatch)	Jon Sullivan	167	566-3831		
Contract Work	Jeff Duncan	446	335-1622		851-5972
Lay & Deed Project	Larry D "Skeeter" Barnes	256	566-3929		746-8312
Metro Claims (Legal)					
Mon 7:00am-Mon 7:00am	Balogun Cobb			518-8797	
Stores/Warehouse:	Dennis McCrary	352	566-4353		822-3294
Fire Hydrant & Valve Crew:					
Leader	Michael French	374		363-5240	931-364-5450
Crew	Gerry Stevens			363-1539	366-1136
Tennessee One Call (Utility Locations)					
M-F 3:00 PM -11:00 PM Fred will be out	1st Contact: Fred Hardison	112	456-9214		512-3940
Sun-Thurs 11:00 PM - 7:00 AM James Will Be Out Until The	1st Contact: James Caruthers	271	566-3944		258-3764
M-F 3:00 PM-6:00AM	2nd Contact: Keith Bogle	147	566-0444		889-9505
Sat-Sun 6:00AM-7:00PM	1st Contact: Charles Ferrell	300	566-3974		
Sat-M 7:00AM-7:00PM	2nd Contact: Keith Bogle	147	566-0444		889-9505
Storm Water Issues					
Storm Water Maintenance	Steve Gorham	54	456-7092		
Water Quality	Dale Binder	409	566-4263		
Back-Up	Mike Serement	82	533-0334		
Safety	Joe Estes	137	566-2143		333-2182
Lab:					
On-Call 4/27-5/3	Marty Mast	194	566-3866	518-8391	360-7217
Back-Up 5/4-5/10	Dawn Daman	393	566-5613	518-8393	557-8153
Back up	Hugh Garrison	69	456-3313	664-0656	883-8774
Health Dept. Food					
Sewer Blockage or water cut-off	Jerry Rowland		642-9787		
Fleet Maintenance:					
OFM	Dispatch	Heavy 880-1992	Light 862-5101		
Mon.-Sun Emg.Generator Equip. Fueling Emg. Pumping	Danny McCullough	362	566-4910	518-8263	213-0926
Mon.-Thrus. Emg.Generator Equip. Fueling Emg. Pumping	Willie Hargett	361	566-4909	518-8292	931-364-7121
Fri-Sun Emg. Generator Equip Fueling (Small Service Truck) Emg. Pumping	Louis Jones	360	566-4908		876-4177
	Clyde Smith	64	456-3309	664-0269	474-6954

Weekly On-Call Contacts for Metro Water Services

Public Information Officer	Sonia Harvat	80	533-3607		862-4494
Drug Testing	Ilene Cowden	190	566-3852		
	Joe Estes	137	566-2143	664-0165	
	David Tucker	135	566-2139		
State of Tennessee	Thomas Killion				824-4460
Nashville Field Office	Erich Webber				885-2121
Division of Water Supply	Sherwin Smith				883-3472
System Services Contacts					
	Greg Nalis	113	456-9210		746-4508
	Anthony Waggoner	280	566-3953		885-3875
	James Bradley	270	566-3943		734-0682
	Robby Ervin	424	207-1020		287-9018
	Hal Balthrop	107	456-9204		865-6686
	Charlie Golden	273	566-3946		331-9862
	Ronnie Russell	279	566-3952		868-4729
	Jim Blunkall	268	566-3941		773-2320
	Jim Paulus	171	566-3836		1-615-446-9702
	Lyn Fontana	187	456-9568		297-3769
	Marcus Knight	455	238-4482		501-0683

Appendix E: Sewer Overflow Response Plan Flowchart (next page)

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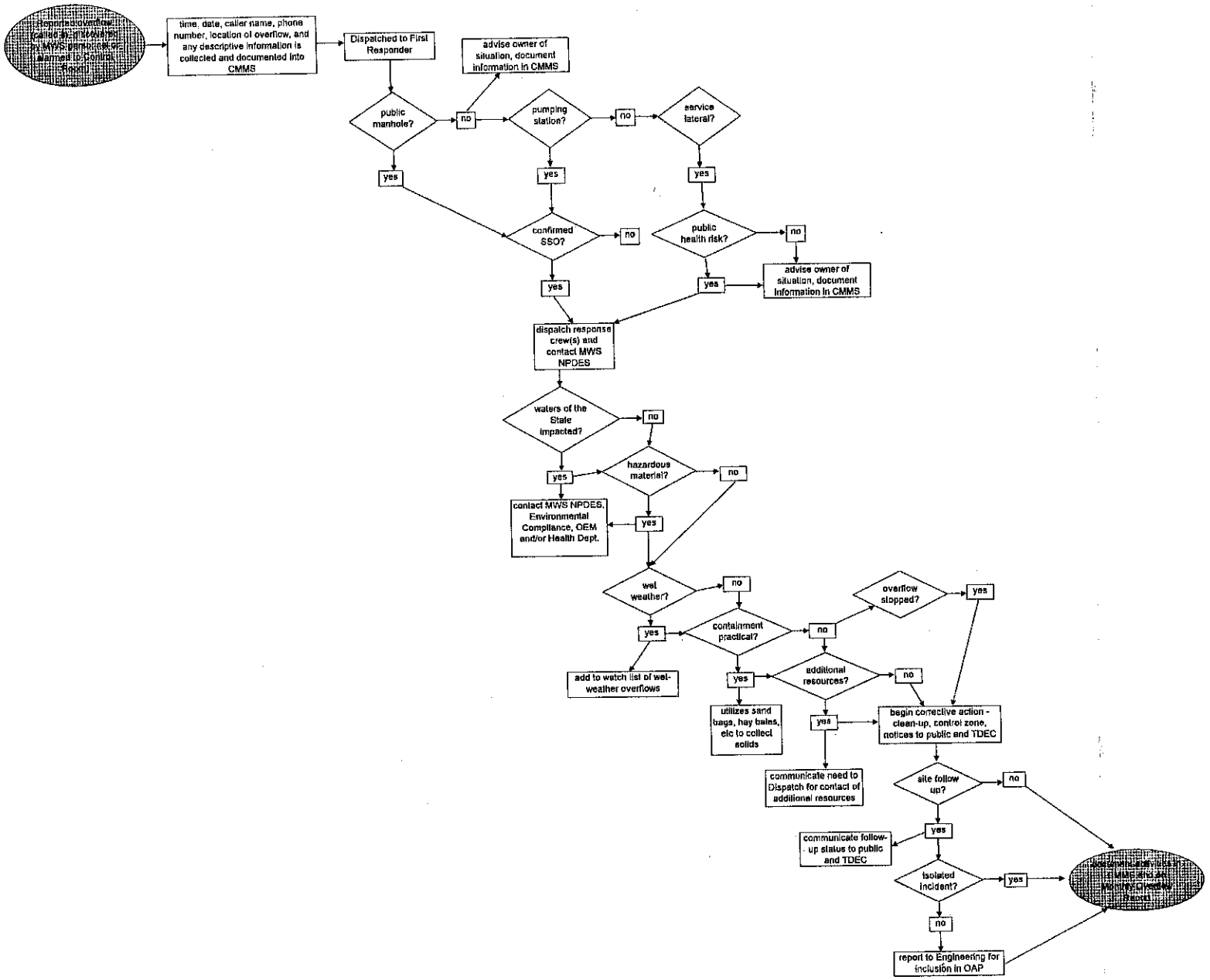
Sewer Overflor Response Plan Flowchart



Appendix F: Standard Operating Procedures for SSO

Action	Responsibilities	References
A First Responder will be dispatched by CSC Dispatch to investigate the overflow.	CSC Dispatcher	SORP Sections 4.2 & 4.3.1
Confirm the overflow is an SSO.	First Responder	SORP Sections 4.2 & 4.3.2
Complete the Sewer Overflow Notification Report to TDEC within 24 hours after confirmation of SSO.	CSCSewer Maintenance Supervisor or designee	SORP Section 4.2
If the SSO involves a force main, contact Route Services to evaluate turning off the station.	First Responder,CSCCDispatcher, Route Services	SORP Sections 3.5 & 4.1
As needed, contain any sanitary sewer overflow using a berm, mats, sandbags, etc.	First Responder/Sewer Maintenance Crew	SORP Sections 4.3.9 & 4.3.10
Block any nearby storm grates or catch basins with sandbags or berms (if necessary)	First Responder/Sewer Maintenance Crew	SORP Section 4.3.9
Install control zone and standard signage around impacted area.	First Responder/Sewer maintenance crew	SORP Sections 4.3.6 & 4.4
Contact Environmental Compliance if a suspicious substance is found.	First Responder/Sewer maintenance crew	SORP Section 4.3.3
Request additional assistance, if necessary, from CSC or radio crews directly to assist with SSO (i.e., repair broken pipe, pump station outage, etc.)	First Responder/Sewer maintenance crew	SORP Sections 4.2
Notify SM Supervisor/CSC of situation status.	First Responder/Sewer maintenance crew	SORP Section 4.3.7
Initiate appropriate repairs, cleaning, vacuuming, etc., as required.	First Responder/Sewer maintenance crew/UGC Maintenance Crew	SORP Section 4.3.11
Place SSO door hanger on residences and/or facilities where inhabitants could be affected by the SSO. If door hangers cannot be used, place a public notice posting(s) in an area notifying the public of the SSO occurrence.	First Responder/Sewer maintenance crew	SORP Section 4.4 & Appendix B
Thoroughly clean site using appropriate manual practices such as rakes, brooms, shovels, etc. and, if needed, mechanical practices such as excavating equipment, vacuums, flushers, aerators, etc.	First Responder/Sewer maintenance crew	SORP Section 4.3.12
Disinfect site by applying lime to the ground within the impacted area and apply deodorizing agents when needed. The use of chlorine must be approved by SM Supervisor.	First Responder/Sewer maintenance crew	SORP Section 4.3.12

Determine volume of SSO and complete MWS Sanitary Sewer Overflow Notification Form and forward to SM Supervisor. Include a system map copy of the area of the occurrence and a copy of the work order.	First Responder/Sewer maintenance crew	SORP Section 4.6 & Appendix C
Forward the Sanitary Sewer Overflow Report to the SM Supervisor as soon as possible or at the end of the workday.	First Responder/Sewer maintenance crew	SORP Section 4.6
If the SSO reaches a stream or body of water: 1. A public notice posting(s) will be required in the immediate area of the SSO. Place an SSO sign(s) along the creek or at location(s) where users of the body of water can be easily notified of the SSO occurrence 2. MWS NPDES will begin any necessary sampling 3. Transport sample to the Lab within 4 hours 4. Contact Lab to obtain results of testing 5. Sampling will continue until samples are determined to not contain fecal coliform bacteria, remove posted signs and notify TDEC (if required).	As assigned by the First Respondent and/or MWS NPDES	SORP Sections 4.3.7 & 4.4
If deemed necessary, contact Public Information Officer and Senior Management for initiation of public notification plan of SSO. Follow procedures as described in the SORP.	Responsible Basin Owner	SORP Section 4.4

connection point. If no bypassing is predicted in the model, the request is approved and the model database adjusted to reflect the new capacity.

Flow monitoring is essential to ensure that the information generated by the model is accurate. The network of flow monitors currently utilized by MWS is discussed in **Management Program, Section V.f.v. Flow Monitoring**.

Recommendation

MWS will review and update the Wastewater Capacity Management Plan following the completion of the conversion of the sewer model. The update will be complete by January 2009.

The Master Sewer Growth Plan will be renewed and updated every five years.

Sewer Model

Since 1990, MWS has utilized Bracewell Engineering's SWRMDL software. Starting in 2005, MWS began the upgrade to a dynamic sewer model of the collection system using the EPA SWMM model. DHI's MIKE URBAN, which uses the SWMM 5 model engine, was chosen as the new modeling software. The conversion is currently underway.

Data from the flow monitoring network is used to calibrate the sewer model annually.

The sewer model is also used for master planning. MWS updated the Master Sewer Growth Plan in December 2003 utilizing population projections for 2010 and 2025. Future projects were identified and will be placed into the capital budget at the appropriate time.

Recommendation

MWS will complete the conversion of the sewer model into the MIKE URBAN software by April 2007.

VI. Overflow Tracking

Collection system overflows are either caused by I/I, mechanical failure, or line blockage. All are corrected as soon as possible, and all are tracked for reporting. Dry weather overflows are reported to the TDEC within 24 hours of discovery in accordance with the Sewer Overflow Response Plan (Appendix I). All overflows (wet weather and dry weather) are reported to TDEC on the monthly overflow report.

VII. Financial Analyses

a. Cost Analysis Program

The purpose of the Cost Analysis Program is to regularly evaluate MWS's costs associated with operating and maintaining the infrastructure of the sanitary sewer

collection system and treatment facilities. The goal of the program is to ensure that current and future funding is adequate for:

- Cost effective performance of all operation and maintenance activities
- Funding all aspects of the annual departmental budgets for operations, debt service, and associated reserve funds
- Funding the infrastructure needs set forth in the Wastewater Capacity Management Plan

MWS maintains a monthly, running budget analysis of current year-to-date expenses against original budgeted expenses as submitted to the Metro Finance Department and approved by the Metropolitan Council. Under the supervision of the Director, MWS currently maintains 78 individual business units within the department related to management, operations, and maintenance activities. A copy of this monthly analysis is submitted to and reviewed by all management and supervisory personnel. This allows for the control and planning of future expenditures for the remainder of the fiscal budget year. The monthly cost reports are also summarized by Division to permit a general overview of each Division's financial performance. Monthly cost report summaries are also available for MWS as a whole.

Prior to submission of MWS's budget request for the upcoming fiscal year to the Metropolitan Council, an external analysis is performed of the budget request by a rate consultant to ensure the projected revenue stream meets or exceeds the minimum level of funding as required by MWS's bond covenants. As an enterprise funded department, an end of fiscal year financial report is generated annually for the prior fiscal year budget period which serves as a base financial report for the external auditor in preparation of MWS's section of the Metropolitan Government's Comprehensive Annual Financial Report (CAFR).

MWS participates in several benchmarking studies including the AWWA QualServe Benchmarking Study and the Raftelis Financial Consulting Water and Wastewater Rate Survey. A cost of services study is performed approximately every five years to ensure the existing rate structure is adequate to cover the costs of MWS. A rate study is also performed approximately every five years to analyze the current rate structure and recommend any changes necessary to meet existing obligations to capital, operations, and debt service. The most recent cost of services study was completed in 2004; the most recent rate study was issued in 2006.

MWS's website includes a copy of the cost of services study (http://www.nashville.gov/finance/audit_reports.htm). A copy of the rate study is provided in Appendix J.

b. Capital Improvement Financing Program

The Capital Improvement Financing Program (Appendix K) for MWS analyzes, projects, plans, and finances capital improvement needs established through engineering review and prioritization. Currently, capital improvement financing is planned using a rolling five year planning period.

The purpose of the Capital Improvement Financing Program is to provide MWS with information and guidance related to improving the existing treatment and collection systems in MWS's service area. The rolling five year plan is incorporated into the cost of service and rate study updates.

MWS's annual capital budget is approved by the Metropolitan Council. MWS's Asset Management Committee meets bi-weekly during the fiscal year to consider and authorize expenditures from the approved annual capital budget.

Funding for wastewater capital improvements is primarily provided by customer sewer rate revenues and loans obtained through the State of Tennessee. Two sources of State loans for wastewater capital infrastructure are utilized:

- Clean Water State Revolving Fund loan (CWSRF) program administered by TDEC
- Tennessee Local Development Authority (TLDA) loan program, which establishes a sewer surcharge on customer sewer revenues to be used to fund the debt service on these loans

When necessary, MWS has issued revenue bonds to fund large scale wastewater projects.

c. Budget and Customer Rate Program

As discussed in **Management Program, Section VII.a. Cost Analysis Plan,** an external analysis of the annual revenue and operations budget request is performed to ensure the projected revenue stream meets or exceeds the minimum level of funding as required by MWS's bond covenants. Substitute Resolution No. R85-762 addresses the covenants with the bond holders and is referenced in future issues. Section 7.8 of the resolution discusses the 110% revenue requirement and its computation.

i. Budget

MWS follows the guidelines set forth in the Metropolitan Council's annual budget ordinance. This ordinance is administered under the supervision of the Metropolitan Finance Director within the Metropolitan Finance Department.

MWS prepares a monthly budget analysis to assess current expenditures against budgeted amounts for internal management. A Budget Accountability Report (BAR) is submitted to the Metropolitan Finance Department on a monthly basis. MWS provides budget updates with budget projections to the Metropolitan Mayor,

Metropolitan Council, and Metropolitan Finance Director through annual budget hearings.

MWS conducts quarterly meetings referred to as Departmental Review of Performance (DROP) where employee groups, council members, and other Metropolitan Government representatives are invited to hear a quarterly and year-to-date review of MWS's operational and financial performance.

Budget worksheets, financial reports, and DROP presentations are stored on MWS's shared network for historical reference by employees.

ii. Customer Rates

As discussed in **Management Program, Section VII.a. Cost Analysis Program**, MWS commissioned a comprehensive cost of service study to analyze and verify the true cost of providing water and wastewater services to MWS's customer and wholesale customer base in 2004. The cost of service study was followed by a rate study in 2006 to determine the most appropriate mix of water and sewer rates necessary to cover the costs as identified in the cost of service study. The results and recommendations of both studies were presented to the Metropolitan Finance Director and Council for consideration and action.

All CMOM programs were included in the cost of service study and the rate study.

Other fees charged by MWS such as customer service fees, capacity fees, and inspection fees, are periodically reviewed for changes in their cost basis to ensure full cost recovery by MWS.

VIII. Equipment and Supplies

a. Spare Parts, Tools, and Equipment Inventory Program

The Stores Management Section of the Systems Services Division is responsible for maintaining the materials and spare parts necessary for the operation of MWS. The materials, parts, and supplies are housed in two secure warehouses and at the pipe yard. The pipe yard is contained in a secure fenced area with security cameras. Table 2 is a list of essential inventory located in these areas.

Table 4-2. Spare Parts Inventory

Pipe Yard	Warehouse
4" - 18" PVC sewer pipe	4" - 24" PVC fittings
2" - 36" Ductile iron (DI) pipe	4" - 12 " Couplings (Fernco) PVC to PVC
Ductile iron fitting (various types)	4" - 12 " Couplings (Fernco) PVC to DI
Manhole frame and covers	4" - 12 " Couplings (Fernco) DI to clay
Meter box risers	4" - 12 " Couplings (Fernco) DI to DI
Manhole adjustment rings	Hand tools (shovels, rakes, sledge hammers)
Fire hydrants	Safety supplies
Fire hydrant parts	Jet truck equipment TVI camera equipment
	Disinfectant supplies
	Cleaning supplies
	Brass & galvanized service line fittings

Equipment for cleaning and repair crews is stored on each respective truck. See **Maintenance Program, Section II.a. Routine Hydraulic Cleaning Program** for a list of the available equipment.

Work crews are required to provide a material release order form that lists the materials, parts, or supplies needed for a particular project. One member of the crew must be on an approved list to sign for materials, parts, or supplies. If no member of a crew is on the approved list, a supervisor must approve the form before items can be released from the warehouse or pipe yard.

All materials, parts, and supplies are on an inventory list and are cycle-counted each month. The inventory is maintained in the CMMS. Each employee of the Stores warehouse has a different function related to inventory to prevent any overlap among job duties. Most items procured are purchased by contract and through the use of a procurement card; this accelerates the receiving process of materials, parts and supplies by approximately four weeks. Purchase orders are used for special non-contract items and for fire hydrants. Local suppliers on contract are used whenever possible. This has allowed MWS to reduce the inventory that is onsite for items that are readily available. There are numerous local suppliers available to MWS which enables them to contact multiple suppliers until a part is located. If one supplier does not have a needed part on hand, MWS has the authority to obtain parts in an emergency without the delays sometimes associated with paperwork.

b. Fleet Management and Repair

In June 2003, Metro consolidated vehicle/equipment repairs previously performed by individual departments such as General Services, Water Services, Public Works, and Fire into the Office of Fleet Management (OFM). MWS now utilizes OFM for repairs and preventative maintenance on vehicles and equipment.

Maintaining repair and detailed preventative maintenance data is the responsibility of OFM for vehicles and equipment and is available to MWS if requested. Work performed in-house on stationary generators and pumps including inspections and preventative maintenance is also tracked in the OFM system.

OFM maintains two shops: the Heavy Equipment Shop and the Light Vehicle Repair Shop Recently a third shop, Grounds Equipment Maintenance, was relocated to the Light Vehicle Repair Shop.

MWS continues to supplement vehicle/equipment needs in-house for small items such as emergency road service, replacing light bulbs, adding oil or other fluids, and inflating tires. These services are provided to avoid unnecessary travel and downtime of vehicles/equipment, operators, and crews. Two full time employees assigned to the Fleet/Generator Services Section of the System Services Division perform these services. All service work performed on vehicles and equipment is reported to OFM for inclusion in the preventative maintenance record.

The Fleet/Generator Services Section is also responsible for quarterly inspections and annual preventative maintenance on the engines of all stationary backup generators and engine driven pumps at all MWS facilities. Minor repairs are also performed by the Fleet/Generator Services Section; more involved repairs are usually referred to a contract vendor and monitored for completion by the section's staff. These functions are coordinated with the Route Services Section of the Operations Division or the effected plant.

Additionally, the Fleet/Generator Services Section personnel provide other support functions for MWS as required. These tasks include transporting heavy equipment to job sites and to OFM for repair, operating crane trucks for special lift jobs, and operating pumps when required to assist repair work at pumping stations or in the distribution and collection system.

The Fleet/Generator Services Section utilizes the CMMS for inventory and to track vehicle and equipment assignments.

The Fleet/Generator Services Section coordinates with OFM on required repairs needed in the field as well as monitoring downtime of vehicle and equipment and coordinating with OFM Shop Supervisors to maintain an adequate number of each type of equipment in service. OFM generates a daily status report on all units in for repair or preventative maintenance. Request for priority repairs on MWS special use units, such as water and sewer repair and maintenance equipment, is normally honored by OFM.

The Fleet/Generator Services Section also coordinates a vehicle/equipment pool of varied light trucks and specialty trucks and equipment that is available as back up for down equipment or for temporary special needs.

The MWS Safety Office, as well as the Fleet/Generator Services Section, performs periodic and spot checks on vehicles and equipment for safety issues and maintenance needs. All commercial driver license drivers are required to perform "walk around" safety checks by their license. All drivers/operators are responsible for the operation and safety of the equipment they use and are required to report any deficiencies or potential problems to the Fleet/Generator Services Section or OFM for correction.

IX. Customer Service

a. Complaint Management Program

The MWS Phone Center and Dispatch are both located at the Customer Service Center. The Phone Center takes customer calls for various divisions of MWS, such as, Customer Service, System Services and Storm Water. The primary function of Dispatch is to answer all incoming emergency calls for MWS. Dispatch also answers rollover calls from the Phone Center. If a call is received from a customer pertaining to a problem with their meter, a service request (Appendix F) is initiated in the CMMS and dispatched to Customer Service Field Activities. If a call is received regarding a storm water issue, a service request is initiated in the CMMS that goes directly to the Storm Water Division. If there is an emergency call related to sewer issues or a possible main break, a service request is initiated in the CMMS and the order goes to the System Services Division.

The call center answers an average of 53,000 calls per month, including emergency calls. The majority of these calls are due to billing problems.

For after-hour calls, Dispatch contacts the appropriate MWS personnel based on the on-call list provided by the System Services Division each week. A manual with documented processes for entering the various types of service requests into the CMMS is available for Dispatch.

Dispatch opens and closes all CMMS service requests and work orders except for sewer CCTV and cleaning. In those cases, service requests are closed by the employee to whom they are assigned

b. Public Information Program

MWS has a full time Public Information Officer responsible for public outreach and education.

i. MWS website

The MWS website provides information to the general public regarding the organization's current projects and on-line seminars (www.nashville.gov/water). General information regarding the organization includes environmental compliance, historical information, rates and payment methods, residential and commercial development process, trades advisory council, water quality reports, and the wastewater treatment process. The current projects discussed are the Overflow

Abatement Program and the Biosolids Management and Odor Control Project. The seminars discussed include on-line slide presentations regarding recent issues on various watersheds, as well as the storm water permitting process and US Army Corp of Engineers regulatory program.

ii. Construction Notification Letters

Letters are sent to property owners and the respective council person regarding upcoming projects prior to the start of construction. The letter gives details such as start date and completion dates of construction, project information, and contact numbers for questions or concerns.

iii. Community Meetings

Neighborhood association meetings and community meetings are utilized to answer questions and concerns regarding ongoing projects or to address general questions regarding MWS.

iv. E-mail Newsletters

Project updates are sent to effected residents or entire neighborhood groups via email when projects extend over a long period of time or a large area.

v. Media

Radio, television, and print media are utilized when necessary to reach the public immediately concerning issues that may adversely affect them. Television and radio are utilized during construction projects to alert the public of traffic concerns or water outages that would affect a broad area. Print media is utilized to announce large projects and improvements to the system.

vi. OAP "Hot-Line"

A "Hot-Line" telephone number to call with questions or complaints was established in the first year of the OAP. The "Hot-Line" answers concerns about construction and/or other aspects of the program.

Due to a low volume of calls, it was decided that a dedicated line was no longer needed for the "Hot-Line". The phone number for the "Hot-Line" now goes to a staff member of the OAP.

c. Public Education Programs

MWS uses a variety of programs to educate current wastewater customers and other effected entities including:

- Wastewater treatment plant tours
- Wastewater brochure
- Grease management video

- Sewer cam demonstrations presented at the Tennessee State Fair and summer camp programs.
- Dyed water flooding brochures
- "Don't Dump On Us" campaign to address the difference between combined and separated sewers
- Letters sent to all Metro Nashville public and private schools describing programs and presentations offered
- Programs and presentations promoted through the Mayor's Office of Neighborhoods

OAP Community Education Program

The importance of community education and buy-in is essential to the success of the OAP. The community outreach and public education program addresses specific segments of the public that have unique interests in the decisions made to control CSOs. These segments vary from customers whose rates may be affected by CSO construction projects, to citizens and groups having concerns about cleaning up the environment, to the general public whose normal activities may be affected. It is critical to the program that all concerned parties understand the goals and importance of the OAP.

Two specific examples of education and community outreach efforts are the Bypass Review Committee and the CSO Advisory Group.

Because of the importance of having contractual, technical and financial details to answer questions, present results and to insure that presentations are prepared to truly address the concerns of the intended audience, MWS implemented a Bypass Review Committee. This committee is made up of representatives from each of the responsible divisions within MWS. The committee reviews and analyzes both SSO's and CSO's from the previous month. Recommended actions are developed and the committee continues their involvement from the initial proposal through the completion of the construction of the project. One of the tasks of the committee is to recommend and assist with media presentations and recommend the utilization of professional media companies for major projects.

The CSO Advisory Group was established several years ago and consisted of representatives from different interest groups from public and private sector organizations. This group was deemed unnecessary following the completion of the major projects within the CSO system. If warranted, the Bypass Review Committee will recommend the formation of a new group.

The MWS website, www.nashville.gov.com is updated monthly and is linked to the MWS website. This site contains complete information regarding the OAP including project listings and reports.

TDEC is responsible for assuring that the best interests of the State and its citizens are being served by the actions of the OAP. It is critical that the public understand that the work that is being done is required and that it is helping to achieve compliance at reasonable costs.

From the beginning of the OAP, the public has expressed interest in what was being planned, designed and constructed using funds collected from water and sewer bills Representatives of MWS and their consultants have spoken to community groups on several occasions. These types of meetings will continue as new OAP projects are proposed.

To keep the Metro Council informed on the OAP, letters are sent to each councilman describing forthcoming work in their district. List of citizens have been developed for each project area and separate letters are sent to them describing the project, the duration of the project and any potential construction inconveniences.

X. Legal Support

a. Inter-Jurisdictional Agreement Program

The Metropolitan Government of Nashville and Davidson County (Metro) is distinctive in that it is a consolidated city and county form of government. Several satellite municipalities and utility districts within Davidson County and the immediate vicinity have entered into inter-jurisdictional sewage transport and treatment agreements with Metro.

Metro will be renegotiating a new agreement with the existing satellite municipalities and utility districts, based on the results from a recent rate study (**Management Program, Section VII.a Cost Analysis Program and VII.b. Capital Improvement Financing Program**). The new rate study addresses the need for a capital cost recovery component to the rates, which when in effect, will expand the responsibility for MWS to provide capacity. The new agreements will dictate the volume of wastewater flow and may include peaking charges and limitations. No restrictions on the rate of growth are anticipated. Table 3 lists the satellite municipalities and utility districts and the status of MWS's current inter-jurisdictional agreements.

An example of one of the inter-jurisdictional agreements is located in Appendix L.

Table 4-3: MWS's Inter-Jurisdictional Agreements Status

Wastewater Agency	Agreement Expiration*	County
Cities:		
City of Belle Meade	Under negotiation	Davidson
City of Brentwood	Under review	Williamson
City of Goodlettsville	7/1/2008	Davidson/Sumner
City of Millersville	Under negotiation	Sumner
City of Mount Juliet	6/22/2029	Wilson
City of Ridgetop	5/20/2017	Davidson/Robertson
City of LaVergne	Under negotiation	Rutherford
Utility Districts:		
Hendersonville	3/1/2008	Sumner
Old Hickory	4/1/2008	Davidson
White House	10/1/2016	Sumner/Robertson

* For agreements that have expired, MWS is operating under the requirements of the expired agreement and is currently re-negotiating the agreements.

b. Sewer Ordinance Program

Metro's Code of Laws, Title 15 contains the provisions of the Code relative to water, sewers, and other public services. The Code is periodically revised and was amended in order to comply with current regulations of the EPA and the State of Tennessee, specifically the Clean Water Act. The Code is available to the public in Metro's Clerk's Office or on MWS government website:
http://www.nashville.gov/images/gifs/mc/code_of_laws/TITLE_15.pdf

The administration and enforcement of the Code is the responsibility of the Director and the Wastewater Hearing Authority. The Wastewater Hearing Authority, as mandated by Section 15.60.350, is a five member board appointed by the Mayor and has full enforcement authority over sewer system compliance issues. Their duties include:

- Investigative authority
- Review of submittals to State
- Adoption and approval of enforcement actions

- Assessment of fines for discharge of materials that have a detrimental effect on MWS sewer system

The Code addresses pretreatment requirements, new and existing system connections, rates and charges, and various system use regulations. MWS has enforced this ordinance against storm water discharge into its separate sewer system as a measure against sanitary sewer overflows. See **Operation Program, Section IV. Fats, Oils, and Grease Control Program** and **Operation Program, Section II. Pretreatment Program** for more details.

XI. Water Quality Monitoring

a. Routine and Investigative Monitoring

Through a series of water quality modeling studies that date back to 1975, MWS has gained considerable knowledge of the response of the Cumberland River to not only MWS discharges but also to urban, rural and natural sources of pollution.

In 1988, the Combined Sewer Overflow Study for the Cumberland River and Browns Creek was completed in accordance with an agreed order between MWS and TDEC. The goals of the study were to identify pollution sources to the Cumberland River and its tributaries.

Since the writing of the CSO study, several environmental studies have been performed at a cost of over $2 million. This solid background of investigations and resulting construction has led to the recognition of the importance of a comprehensive monitoring program. MWS currently has extensive laboratory facilities and sampling capabilities in place and will continue to maintain these investments and refine the sampling efforts.

Continuous study since 1988 has given MWS a wealth of water quality data. This data provides a detailed picture of conditions before extensive CSO remediation efforts were completed as well as a dynamic picture of the changes that have taken place as solutions have been implemented.

River Sampling Program

In the mid 1970's, MWS began to perform routine, detailed monitoring of the Cumberland River as it flows through Davidson County. Initially, laboratory personnel traveled a 50 mile segment of the Cumberland River between Old Hickory Dam and Ashland City, Tennessee. This segment comprises that portion of the river that lies within Davidson County. Situated along this segment of the river are Nashville's two water intakes and three wastewater discharge points as well as all of MWS's sanitary sewer collection system and drinking water distribution system.

The focus of sampling and monitoring changed as knowledge of the river has increased and monitoring technology has evolved. Initially, water quality samples were collected and field analyses were performed weekly at intervals of approximate

every 4 miles and at strategic locations to document the status of the river and provide water quality protection. Current efforts have narrowed the focus to 15 mile segments of the river impacted by MWS's intakes or outfalls.

The parameters monitored are dissolved oxygen, temperature, pH, total phosphorous, nitrates/nitrites, chromium, copper, nickel, zinc, fecal coliform and *E. coli*. In addition, personnel observe and document water coloration and clarity, flow rate, and depth. Unusual or illicit discharges are noted and investigated. Wildlife is observed and recorded as well as any indications of distress in aquatic animals/plants.

Data is reported to TDEC on a monthly basis. Additionally, all data is entered into a river run database located on MWS's intranet and is accessible to all MWS users. At this time, it is not available to the general public online.

Tributary Monitoring Program

As MWS's knowledge of the Cumberland River grew, it became apparent that river bacterial levels were largely determined by the major tributaries along the Davidson County segment. Tributaries such as Mill Creek, Brown's Creek, Richland Creek, White's Creek and several other smaller streams, were found to have significant bacteriological impacts on the Cumberland River.

Initially intended to provide data for the CSO program, the Tributary Pollution Source Study quickly became an important part of MWS's Watershed Protection Program. Initiated in 1995, the study was a joint project between MWS, Vanderbilt University and an engineering consultant. Extensive sampling and monitoring of ten tributary streams verified that MWS's sewer system does affect the water quality of the tributary streams in some locations. However, the majority of fecal coliform concentrations are a result of non-sewer related sources of contamination.

MWS's focus had been to identify and eliminate sewer overflows from the waters of Davidson County. This study showed that even after overflows are removed, fecal coliform concentrations in tributary streams and the river will continue to violate water quality standards when there is runoff from rainfall.

The impact of septic tank seepage on the background sources of fecal coliform concentrations was also a part of the study. It was concluded that any septic tank leachate impact on tributary bacterial loading is masked by other sources such as animal feces in surface runoff. However, the study did confirm that sources other than the sewer system have a large impact on the water quality of the streams.

In 1998, an annual water quality program called the Tributary Continuation Program was begun by MWS with the same joint venture partners as previous. The project built on the more than 10 years of water quality documentation and was an effort to discover and characterize each of the sources of pollutants. The results further documented the progress being made by the OAP and provided information

concerning the various options in identifying the sources of pollution in the environment.

Monitoring consists of quarterly sampling events within each tributary drainage basin. Samples are collected during dry periods to avoid the influence of non-point source runoff as well as during rain events for comparison. Samples are collected at various locations along each tributary and are analyzed for fecal coliform and *E. coli*. A result that exceeds half of the state bacterial water quality level triggers a resample and a field survey to attempt to identify the source. Dry weather macroinvertebrate sample collection and dry weather walking surveys of each tributary have also been conducted.

Data is reported to TDEC on a routine basis. Data is reviewed in-house to direct subsequent investigations and direct corrective actions. Data is also used to address TDEC's 305b and 303d listings.

River Modeling

EPA's CSO program compelled MWS to gain a better understanding of the hydrology of the Cumberland River and to evaluate the potential water quality with numerous conditions and discharge concentrations. Studies of the river began with a study of the wastewater assimilative capacity of the river in 1975. With the assistance of Vanderbilt University, three water quality models were examined, BETTER (Box Exchange Transport Temperature and Ecology), WASP4 and CE-QUAL-W2. The BETTER model did not predict well concentrations of biochemical oxygen demand, ammonia and other significant parameters. The WASP4 model was too complex for practical use. CE-QUAL-W2 was chosen because it was suited for long, narrow water bodies and the data collected in the BETTER model could be utilized.

Several reports and studies were completed using this modeling software. One of the final analyses conducted examined two simulated rainfall events in three scenarios. The scenarios included:

1. Expansion of Central Wastewater Treatment Plant to provide increased treatment capacity, a second tunnel and other system improvements. The estimated overflow frequency was 30 to 40 times per year.

2. Construction of detention basins to reduce overflows to eight per year.

3. Construction of facilities to eliminate overflows.

The modeling results indicated an insignificant difference in the three scenarios. This indicated that tributary streams were the significant source of coliform in the river not the CSOs. This realization led to the conclusion that the plans to construct multiple detention basins to limit CSO overflows to eight times per year would have little impact.

This significant finding had a monumental impact on the Long Term Control Plan and the OAP. As a result of these findings, the program emphasis shifted to removing SSOs and finding less expensive solutions for the CSOs.

Source Identification

As a result of the river sampling program, the tributary sampling program, and river modeling efforts, it became apparent that discharges from the combined sewer system were not significant contributors of bacterial contamination in the Cumberland River or its associated tributaries. State water quality regulations do not differentiate violations based on bacterial sources. An exceedance of the bacterial limit is a violation regardless of the source of the bacteria. Because much of MWS's sanitary sewer system is located in close proximity to many of the tributary drainage basins in Davidson County, the sewer system is subject to "guilt by association" when exceedances occur.

A joint venture between MWS, an engineering consultant, and Vanderbilt University evaluated several source tracking technologies. Multiple Antibiotic Resistance Analysis (MARA) was determined to be the best method that gives a high percentage of accuracy in efforts to identify sources of bacterial contamination. The method is based on the theory that differences in fecal bacteria resistance to certain antibiotics can be statistically related to the environmental exposure to antibiotics of the host species. The program distinguishes animal from human and can categorize the animal results. This method contributed to the identification of possible sewer system deficiencies but was equally important for the identification of other contributing sources of pollution.

The information developed from this program was transmitted to TDEC on a routine and/or as needed basis and was stored on MWS's intranet. The MARA Program was discontinued in 1994 when the contract with the engineering consultant and Vanderbilt University ended.

USGS Continuous Monitoring

MWS has entered into a 50/50 partnership with the United States Geological Survey (USGS) to provide continuous real-time water quality monitoring of the Cumberland River. The USGS provides the installation, maintenance and half the cost of two continuous water quality monitoring stations in the Davidson County segment of the Cumberland. One site is located above the downtown reach of the river and above the CSO area. The second site is located below the downtown reach of the river, and below all but one known CSO outfalls.

These monitors provide continuous real-time data on the dissolved oxygen, pH, conductivity, and temperature of the river at those locations. This data is available from the USGS on the internet to the general public.

Plant Protection Criteria Monitoring

Plant Protection Criteria (PPC) monitoring is performed quarterly on the final effluent from each of MWS's three wastewater treatment facilities that discharge into the Cumberland River. PPC sampling and analysis consist of an exhaustive list of parameters designed to demonstrate compliance with EPA's Pretreatment Program regulations and to protect water quality in the receiving stream. This data is reported to TDEC twice yearly in the Semi-Annual State Report. This is a comprehensive report on all activities undertaken as part of the pretreatment program for the previous six months.

b. Impact Monitoring

MWS may collect samples after an SSO and have analyses performed depending on the nature of the incident. If MWS determines that a specific overflow is a public health concern based on site conditions, samples are taken in areas close to residential developments and in the urban streams receiving the discharges. A formal report is not generated of these sampling events.

XII. Contingency Plan for Utility Infrastructure

a. Contingency Planning Program

MWS has developed a comprehensive Emergency Preparedness Plan that was revised in July 2006.

Depending on the nature of sewer service interruption, there are several methods incorporated to restore service and protect the environment. At pumping facilities and treatment plants, operational redundancy is present in the event of mechanical failure. The same is true for many locations in the event of power outages. Many facilities have on-site power or duplicate electrical power feed. Those without on site back-up power are restored to service with portable generators (see **Operation Program, Section I.b. Reactive Operation Program**). For the piping network, line stoppages are removed as soon as is possible once reported. For pipe failure, by-pass pumping to downstream manholes and/or vactor support is incorporated. All temporary actions of this type are maintained until full service can be restored.

More details on the plan can be found in a copy of the Emergency Preparedness Plan located in Appendix M.

b. Preparedness Training

MWS conducts various drills and emergency equipment checks to ensure all personnel are prepared in the event of an emergency. MWS has developed chemical evacuation plans for all locations. These drills are performed every six months. Security preparedness drills are performed quarterly in cooperation with the Police Department's SWAT team. Reports and debriefings are held after each exercise.

Emergency communications checks are performed every quarter. All emergency responders have direct talk and 800 MHz radios. Direct talk is used for day to day communications. All 800 MHz radios are checked by each user by contacting the Omohundro WTP control room. The users that do not check-in are contacted to determine why.

Emergency generators are tested monthly with preventive maintenance checklists.

Section 5. Operation Program

I. Pump Station Operation

a. Preventative Operation Program

MWS operates 101 pump stations within the sanitary sewer collection system. The stations operate independently based upon wastewater levels in the station wet wells. Operations are controlled by a programmable logic controller (PLC) located at each station that contains site-specific operational parameters for each pump station. All pump stations are monitored remotely at the Omohundro WTP Control Room 24 hours per day, 7 days per week, 365 days per year.

The elements that comprise pump station operations are in place to ensure pump station reliability for both dry-weather and wet-weather wastewater transmission.

i. Pump Station Monitoring

All pump stations are currently equipped with remote terminal units (RTUs) manufactured by HSQ. The system transmits all telemetry data through a 900 MHz, spread-spectrum radio network to the Omohundro WTP control room. The control room serves as a central location for the supervisory control and data acquisition (SCADA) system that monitors and manages the collection and distribution systems. The existing interface is also being improved by integrating the HSQ (Wastewater) and Intrac (Water) systems into a consolidated system manufactured by Citect.

The current operations status of all pump stations is monitored 24 hours per day for the following:

- Number of pumps in operation
- Status of pumps including operational alarms
- Pump start/stop cycles
- Power status including power failure alarms
- Wet well conditions (depth, lead/lag elevations)
- Personnel status (entry/exit alarms)

The current operations status of the major pump stations is also monitored for the following:

- Pumping flow rate
- Equipment vibration and temperature
- Equalization basin levels (where located)

The upgraded SCADA system will record monitored activities at each pump station on dual data servers. The additional data server will provide read-only operational data to other MWS sections including Engineering, System Services, and Customer Service. Data may be trended for further analysis or printed for backup documentation.

Recommendation

MWS will complete the integration of HSQ and Intrac into a consolidated system by October 2007.

ii. Pump Station Operations

Although MWS does not have a formal written Reactive Operation Program, operational guidelines dictate the manner in which pump station operations are conducted in the event of an emergency.

Pump station operations and maintenance is primarily the responsibility of the Route Services Section of the Operations Division of MWS. Currently, the Route Services Section has 33 full-time employees responsible for both water and sewer pump stations with additional assistance available from mechanics and electricians located at the five treatment plants. Route Services Section crews consist of one electrician and two mechanics; both are trained in performing operations and maintenance on wastewater pump station equipment.

Seven full-time technicians stationed at the Omohundro WTP are responsible for calibrating and maintaining all telemetry, flow meters, and level control devices for the pump stations. Employees from the Electronics and Route Services Sections coordinate daily station maintenance activities. Supervisors may also request that the respective section managers reallocate available resources as needed to ensure that all work orders can be completed efficiently.

The predictive maintenance team visits both water and sewer pump stations regularly to monitor equipment vibration and temperature and to take oil samples for laboratory analysis. The pump stations are divided into one monthly route, two quarterly routes for water pump stations, two quarterly routes for sewer pump stations, two semi-annual routes for water pump stations, and two semi-annual routes for sewer pump stations. The pump stations were placed into each route based upon the existing vibration levels and historical reliability of the equipment in the pump stations. The routes are re-evaluated and changes made on an ongoing basisto the schedules when it is noted by the maintenance team that the frequency of inspection needs to either increase or decrease. The data that is gathered enables MWS to proactively target equipment for replacement or refurbishment reducing the probability of simultaneous pump failures and reductions in station capacity.

All activities performed by these personnel are documented in CMMS. This software is used to produce regularly scheduled predictive and preventive maintenance work orders, as well as assign corrective or emergency work. Work orders are assigned to

each Route Services Section crew according to geographic area or maintenance zone. Once the work is completed, the work order information is entered into the software to allow performance tracking, labor budgeting, and to provide historical equipment information for the station equipment. The historical data is entered into the CMMS to allow the MWS management group and the predictive maintenance team to utilize it. The management group uses the data to determine operating efficiency and work volume. The predictive maintenance team uses the data to gauge the effectiveness of the predictive and preventative program and to determine if there is an increase in unscheduled maintenance.

Wet well control points (lead/lag operating elevations, etc.) for each station are set by the design engineer based upon the pump manufacturer's requirements for wet well operating levels and pump starts/stops per hour. The Electronics and Telemetry Sections employees check these operating points on a recurring basis and recalibrate the control equipment as necessary.

As-built plans for each station are maintained by the Records & Mapping Section of the Engineering Division.

iii. Operation and Maintenance (O&M) Manuals

Operation and maintenance (O&M) manuals for all equipment are located in the Route Services Section office complex. Backup copies of the manuals for most stations are located in the Administration Building library. Manuals are cataloged by pump station name and are accessible by all MWS personnel responsible for operations and maintenance of pump stations and engineering staff. When pump stations are upgraded or major equipment is replaced, new equipment manuals are received and filed with the station's O & M manual.

Recommendation

MWS will investigate the feasibility of implementing the requirement of electronic O&M manuals for all projects by December 2007. If it is determined that this is feasible, a new goal will be established to implement the requirement.

b. Reactive Operation Program

As stated in the Preventive Operations Program section, all wastewater pump stations are operated by the station's PLC and remotely monitored in the Omohundro WTP control room. The pump stations are monitored continuously with data being collected by a SCADA system located in the control room. On-duty operators monitor the SCADA system for visual and audible alarms pertaining to pump station operations.

i. Pump Station Design

TDEC design requirements establish a station's rated capacity as the station's conveyance ability with the largest pump out of service. This requirement allows a

pump station to continue to operate under design conditions should a pump experience mechanical problems.

In the event of an interruption of power at the station, power may be supplied at all of the pump stations by redundant power feed, on-site stationary emergency generator, or portable generator. As a general rule, the type of emergency power available is dictated by the size of the station. The two largest pump stations, West Park and Brown's Creek, have a redundant power feed. Stations with a rated capacity exceeding one MGD typically have an on-site stationary emergency generator. Stations with rated capacities less than one MGD typically rely on a portable emergency generator as a backup power source. MWS currently has a pool of 11 portable generators. Based on the current use of these generators, this seems to be a sufficient number. Several of the units are approaching twenty years old; the run time hours are low. Reliability has not been an issue; however, the generators are assessed as part of the inspection program to determine when replacement is necessary.

Spare pumps are available for several of the smaller stations. When costs for pump repairs are compared to the cost of a new pump, in many situations it is more cost effective to replace the pump. Many times the decision is simple to make because of the significant difference in raw cost of the new pump as compared to the repair costs In other scenarios, the repair cost versus the new pump cost with a five year warranty is evaluated.

The spare pumps are stored at the Route Services warehouse and the Old Airport Pump Station.

Recommendation

MWS will develop and implement standard operating procedures for tracking the inventory of spare pumps for the smaller pump stations. It will be determined if this can be tracked through CMMS. The implementation of these procedures will be completed by December 2007.

ii. Reactive Pump Station Operation

Reactive operations for pump stations are initiated by the SCADA system telemetry located at each pump station. The station telemetry monitors established points for power failure, high wet well, pump failure, motor failure, excessive vibration, excessive temperature, and unauthorized entry. The RTU sends the alarm to the Omohundro WTP control room. The on-duty operators have an "on-call" list of personnel to notify. The "on-call" list contains employee contact information for the following personnel:

- On-call route crew (mechanic and electrician)
- On-call Industrial Maintenance Supervisor
- Route Services Manager

- Assistant Director, Operations Division

These personnel are qualified and have the authority to exhaust all available resources necessary, including emergency contracts for back-up pumps, motor and machine shop work, to return a pump station to normal operation. Once notified, the Route Services Section crew will arrive at the pump station to take corrective action or contact and dispatch the appropriate maintenance personnel to address the situation. All maintenance personnel are equipped with cell phones with direct talk capabilities.

MWS also has a second "on-call" backup list and a third "on-call" backup list to ensure that necessary personnel are able to be contacted when needed. This protocol for responding to emergency situations has demonstrated itself to be effective for MWS.

The Maintenance Section personnel are properly equipped to handle reactive operations in a safe and efficient manner until normal operations can be re-established. Mechanical route trucks have a significant amount of storage area for hand tools, spare parts, and fittings. Four maintenance trucks are also equipped with a heavy-duty crane and an air compressor. The MWS fleet has a boom truck to pull equipment that exceeds the capacity of the cranes on the maintenance trucks. Vactor trucks are available from both the Central WWTP and the System Services Division for any pumping and/or cleaning and transport. MWS also maintains a contractual relationship with local vendors for emergency delivery of machine work and motor repairs. These contracts stipulate a two hour response time and for pump/motor emergency repair work, the workers are to utilize multiple work shifts 24 hours a day, 7 days a week until the work is completed.

MWS is prepared to handle pump station operations during a power outage as discussed in **Operation Program, Section I.b.i. Pump Station Design**. In the event of an interruption of power at the station, power may be supplied at all of the pump stations by redundant power feed, on-site stationary emergency generator, or portable emergency generator.

MWS is on a priority list for NES to respond to power outages. NES management contact information has been made available to MWS for after hours contact in the event an issue cannot be resolved quickly by NES staff.

Recommendation

MWS will develop and implement Standard Operating Procedures for critical operations programs. The SOPs will include a means for follow-up on any items noted that need attention. These SOPs will be ready for implementation by December 2008.

II. Pretreatment Program

MWS's Industrial Pretreatment Program (IPP) includes requirements for inspections, sampling, permitting, surveillance, and enforcement of non-domestic sewer users that discharge to MWS's three WWTPs. MWS's permitted non-domestic sewer users include:

Significant industrial users (SIUs)	69
Categorical industrial users (CIUs)	41
Non-categorical SIUs	28
Non-significant industrial users	78
Total permitted industrial users	147

The IPP staff includes three full time employees with an average of 18 years experience in pretreatment. The Pretreatment Manager has more than 27 years of experience in pretreatment. Two additional staff members are trained to assist in sampling when needed. The IPP staff is part of the Environmental Compliance Section within the Operations Division of MWS.

The IPP staff performs an official inspection of all SIUs at least annually. Many receive a walk-through inspection during sampling events or meetings also. At least twice a year, sampling is performed for a minimum of three consecutive days, but typically for five consecutive days, at the SIUs.

MWS currently has ten satellite municipalities that discharge into their WWTPs. There are three total SIUs in two of the municipalities. Tyson is located in the City of Goodlettsville; Specprint and Viking Products are located in the City of Mt. Juliet.

The Environmental Compliance Section and System Services Division personnel communicate with each other regarding potential sewer line damage, blockages and other interference problems related to industrial and commercial dischargers. The information that is shared includes notification of food service establishments (FSE) and fats, oils, and grease (FOG) interferences identified during FSE inspections.

The FSE inspections are conducted by MWS's FOG program contractor, Monitoring and Management Services, LLC, and by the Environmental Compliance Section staff. A request is made to the System Services Division for sewer line cleaning when FOG is identified as causing obstruction or interference to the sewer system. FSEs identified as contributing to FOG are issued a noncompliance notification that requires a corrective action response. The System Services Division provides FOG-related sewer maintenance work order information to the Environmental Compliance Section. This information initiates follow-up inspections of the area where the obstruction or interference was identified by the FOG contractor to identify FOG

dischargers. Responses are also made to SSO events that are caused by obstruction. However, the main objective of the MWS preventive measures with FSE inspections and communication with the System Services Division is to prevent any FOG related SSO (See **Operation Program, Section IV. Fats, Oils, and Grease Control Program** for more details).

When the Environmental Compliance Section sampling and analysis results indicate that a non-domestic sewer user's discharge may be causing damage to the collection system, the System Services Division is notified. Based on the sampling analysis, the System Services Division televises the sewer line and provides information about any damage identified. In turn, when the System Services Division scheduled sewer maintenance and televising of the sewer lines reveals sewer line damage, the Environmental Compliance Section responds to identify the source.

The information in Table 4 was derived from the files of the MWS's IPP and State Reports 36 and 37 (April, 2004 – March, 2005). The industrial flow percentages were calculated using the average flow for dry weather months (June, July, and August) for each treatment plant in 2004

Table 5-1. Industrial Flow Percentages during Dry Weather Months

WWTP	Central	Whites Creek	Dry Creek
WWTP Average capacity	125 MGD	37.5 MGD	24 MGD
Total industrial flow	3.08%	2.19%	5.66%
Categorical industries	0.36%	0.07%	0.32%
Surcharge industries*	2.12%	1.20%	0.64%
Compatible industries**	0.60%	0.93%	4.70%

* Industries whose discharge is excess strength

** Industries whose discharge has compatible parameters but not at a level that is surchargeable

III. Corrosion Control Program

History

MWS's Odor and Corrosion Control Program began in the early 1980's as a result of the catastrophic failure of relatively new gravity interceptors fed by sewage pump stations through long force mains. In the mid 1970's, Public Law 92-500 required the removal of heavy metals from industrial discharges which increased the production of hydrogen sulfide (H_2S) in sewer lines. As the projects in MWS's OAP program removed increasing amounts of I/I, the detention time increased in force mains, increasing the production of H_2S. Previously accepted engineering designs, such as

drop manholes, freely liberated the H_2S from liquid phase into gaseous phase, resulting in H_2S corroding the crowns and walls of the infrastructure.

MWS used a product called Odophous, an iron salt, for approximately ten years. Odophous was a benign product but had a pH of less than 2.0, making it a placarded commodity and regulated under the UST regulations. These regulations forced MWS to change to a new product, Bioxide, a nitrate salt solution. Bioxide was used from the early 1990's until 2002 when MWS began using a product called Nitrazime, another nitrate solution. With that change MWS received better vendor support in the application and management of the chemical feed systems.

The Odor and Corrosion Control Program was originally the responsibility of the Operations Division. In the mid 1990's, this responsibility was transferred to the System Services Division. In 2000, when CCTV revealed more aggressive system corrosion, the Engineering Division assumed the duty of odor and corrosion control. The Engineering Division acts as a consultant to both the Operations and System Services Divisions to solve odor and corrosion control problems. Funding for the chemicals used is part of the Route Services budget of operations.

Methodology

MWS feeds Nitrazime at 19 sewage pump stations within the collection system. Except for any unusual or special circumstances, chemicals are not fed into the gravity or combined portion of the system.

Each site is visited at least weekly by the chemical vendor. Additional monitoring of each site is conducted by the engineering staff. The vendor submits a weekly report to the Engineering Division office that includes the H_2S readings, feed rates, and gallons chemical received that week and over the past year. This information is verified by the staff to ensure its accuracy and then filed electronically for future reference.

The engineering staff monitors customer complaints, new plans submittals, work orders, news stories, and political comments for problem areas, signs of infrastructure damage, and opportunities to affect positive change. Chemical feed sites are selected based on these issues. Suspected problem areas are sampled in the wastewater and headspace for H_2S for several days to several weeks and a decision is made on corrective action.

Odor complaints are received from direct customer complaints, personal contacts, the political arena, and previous contacts and are entered into the CMMS to allow work orders to be generated to ensure an investigation is made to determine the cause of the odor problem.

The Industrial Compliance Group is notified of corrosion problems that are noted during any sewer assessment work that is suspected to be related to discharge from an industrial customer.

Satellite Municipalities and Utility Districts

The Engineering Division works with the Environmental Compliance Section to enforce ordinance limits on the satellite municipalities and utility districts that discharge to the MWS system. Satellite systems must meet a H_2S limit of 0.5 mg/L in the liquid. At MWS sampling points, a H_2S goal of less than 0.1 mg/L in the liquid and 1.0 mg/L in the air has been set by the Engineering Division. The 0.5 mg/L H_2S limit was developed after years of data was reviewed. This was determined to be a practical limit that the MWS systems could economically achieve and still have years of engineering life left in the infrastructure.

IV. Fats, Oils, and Grease Control Program

In the Fall of 2000, MWS began researching the magnitude and scope of fats, oils and grease in the collection system. A fats, oils and grease (FOG) Control Program was initiated in April 2003 with the goal of reducing FOG discharges and eliminating FOG-related SSOs. At that time, MWS contracted with Monitoring & Management Services, LLC (MMS) to assist in implementing and maintaining the FOG program. The major elements of MWS's FOG program are described below.

1. Education of food service establishments, grease waste haulers, plumbers, institutional managers, and engineers on prevention of FOG discharges including review of proper installation and maintenance of grease interceptors and grease traps and review of FOG prevention best management practices.

2. Consistent, thorough inspections of food service establishments (FSE). These inspections include providing and reviewing MWS's customized FOG brochure with the FSE owner, educating the FSE owner regarding best management practices and grease control equipment maintenance practices, conducting a visual inspection of the three manholes downstream of the FSE, documenting grease control equipment and downstream manholes with a digital camera, and identifying any storm water pollution impacts. If necessary, MWS issues noncompliance notifications to FSEs that are discharging FOG, have inadequate grease interceptor or grease trap components or maintenance, or have other deficiencies that will impact the MWS sanitary sewer or stormwater sewer system.

3. Issuing FOG permits to FSEs. The purpose is to increase awareness that FOG control is a serious issue and that the FSE must comply with MWS's sewer use ordinance requirements for non-domestic sewer users. The current total FSEs with FOG permits is 1,750. Included in the FOG permit is a requirement that all FSEs with grease control equipment (GCE) must submit an annual certification that the GCE is operating according to the manufacturer's specifications. More than 40 FSEs that had defective grease interceptors have been identified through this process.

4. Certification of grease interceptors and grease traps is an annual requirement of the FSE's FOG permit and provides a means to identify leaking or defective equipment that must be replaced. MWS established a Grease Interceptor and Grease

Trap Certification Program in July 2005. MWS has demonstrated that education and testing of grease waste haulers, plumbers and engineers to be able to properly conduct grease control equipment certifications can provide tremendous benefits. Grease waste haulers, plumbers, and engineers attend a training class and are tested to be qualified to conduct certifications on grease interceptors and grease traps. The training classes have been conducted quarterly in the past but will begin to be offered semi-annually after September 2006. When an inspector passes the required test following the class, he receives a card indicating he is qualified to conduct inspections of GCE. The qualification card is valid for 2 years.

5. FOG Database for FSE tracking. MMS developed a database referred to as SOFT (Sewer Maintenance, Overflows, FOG Tracking) for MWS. Over 2,200 facilities have been entered into the SOFT database; 1,750 FSEs are permitted. The SOFT database allows for inspection and enforcement tracking of FSEs and includes the ability to load/download pictures, issue FOG permits, and develop customized reports. Currently, MMS is working to convert the Access 2003 based SOFT database to a web-based database. The web-based database will provide a more convenient exchange of information within the department and provide information in real-time for all MWS staff to reference. MMS recently began beta testing the web-based SOFT database.

6. Sewer Maintenance and SSO response to FOG-related problems. As mentioned in **Operation Program, Section II. Pretreatment Program**, communication with the Environmental Compliance Section and System Services Division is critical to be able to identify the specific cause of the SSO and provide the appropriate response as quickly as possible. Enforcement of FOG regulations and targeted cleaning as a result of this communication has been successful in preventing many FOG-related SSOs. Since the initiation of MWS's FOG Program, MMS has prepared 63 special reports regarding FOG "hotspot" areas, responses to sewer maintenance issues and FOG-related SSOs. The number of special reports does not include the numerous email and phone call correspondences that have been initiated for other "high FOG risk" FSEs and for the installation of new grease interceptors.

7. Residential FOG. In some areas, residential sewer users discharge FOG to the sewer system which could cause an obstruction and/or a SSO event. MWS produced a 10 minute FOG educational video that is shown on the community access channel and at various meetings with FSE managers. Also, the System Services Division distributes door hangers to residences in the areas where residential FOG is identified in the sewer system. Inserts have been included with residential customers' monthly sewer bills to inform them of FOG best management practices that will help to prevent FOG discharges from their residence. In addition, MWS plans to initiate a mailing system that will distribute a notification to all residential customers in a specific area where FOG interference has been a problem.

8. Performance Indicators. MWS tracks the number of FSE inspections and FSE FOG permits issued, noncompliance notifications, notices of violation, new grease

interceptor installations, SSO events related to FOG, sewer maintenance costs, and FOG volume pumped from FSEs. These performance indicators demonstrate that the MWS FOG Program is headed in the right direction. The number of SSO events related to FOG has decreased from 46 events in 2003, to 21 events in 2004, and further to 12 events in 2005. There have been 3,983 FSE FOG inspections since 2003.

The MWS' Central WWTP receives and treats FOG waste. There are also private facilities that receive and treat FOG waste. All grease waste hauler FOG volume pumped from FSEs is tracked each month. Table 5 is a summary of the FOG volume pumped from FSEs in MWS's jurisdiction.

Table 5-2. FOG Volume from FSEs in MWSs Jurisdiction

	Central WWTP FOG	**Total FOG (Private Facilities and Central WWTP)**
Prior to FOG Program (March 2002-Feb 2003)	71,430 gallons per month	182,270 gallons per month
After FOG Program (Nov 2005-April 2006)	155,132 gallons per month	305,997 gallons per month
Increase of	117 %	68 %

Since the initiation of the MWS' FOG Program, 578 FSEs have been issued noncompliance notifications for 985 deficiencies. The noncompliance notification deficiencies include:

1. Grease Interceptor (GI) effluent tee not attached or not acceptable
2. GI effluent tee not visible or accessible creating a FOG discharge potential
3. GI walls indicate deterioration
4. GI FOG layer and food solids layer estimated at >25%
5. FOG in downstream manhole from FSE
6. FSE has no GCE installed
7. No records of GI or trap maintenance
8. Sewer cleanout covers need to be replaced
9. FOG on ground/storm water impact

Appendix N includes the following detailed information regarding the MWS's FOG program:

- Example FOG Permit
- Noncompliance notification form
- Grease interceptor certification form
- Grease trap certification form
- Example special FOG Report
- FOG database example
- FOG pump volume graphs
- Environmental compliance website
- MWS fats, oils, and grease management policy
- Food service establishment enforcement response guide

Recommendation

MWS will complete the implementation of a mailing system to distribute a notification to all residential customers in a specific area where FOG interference has been a problem. An English/Spanish notification is being developed. The notification will be ready for implementation in February 2007.

V. Service Connection/Disconnection Program

MWS has a written procedure for new service connections and for service disconnections. The procedure for tapping into the collection system is outlined in "Guide to New Construction," available on the website: http://www.nashville.gov/water/permits_handbooks.htm. MWS will perform the tap or a licensed municipal utility contractor or licensed master plumber may follow the "Tap Policy" as described in the guide. MWS also has standard requirements and construction details available on their website: http://www.nashville.gov/water/technicalspecifications.htm.

After the installation of a new service connection, MWS performs a pressure test on the service line and main. As-built plans for the new connection must be submitted to MWS in digital and hard copy form so that the new service line may be added to the GIS mapping program.

Recommendation

MWS will review the current procedures for new service connection and for service disconnections to determine if the procedures need to be updated. This review will be completed by May 2007.

VI. Private Haulers Program

In 1989 and 1995, MWS collected numerous samples from each truck hauling waste from septic tanks, FOGs, and portable toilets to determine BOD_5, TSS, FOG, and metals loading to the WWTP. To develop the fee structure for waste haulers, random samples were collected and screened for pH, metals, BOD_5, TSS, and FOG. The results of the hauled waste sample program are provided in Appendix O.

Currently, MWS's Environmental Compliance Section inspects and permits septic tanks, portable toilet, and FOG waste haulers. Septic tanks, portable toilet wastes, and FOGs are the only hauled wastes accepted for treatment. Central WWTP has a designated receiving station and is the only MWS WWTP that accepts hauled waste. The Environmental Compliance Section personnel inspect the hauled waste vehicle and issue a permit to the waste hauler to discharge to the Central WWTP.

The manifests and "dump tickets" are collected by security and reviewed by Environmental Compliance Section personnel. The data is logged and maintained for operational and predictive trending. In addition, FOG waste haulers are routinely audited to review manifests and invoices and to compare volume records with FSEs they service. Upon completion of the Biosolids facility that is currently under construction, grease waste haulers will use an automated system to log in, discharge restaurant grease waste that is metered, and pay by monthly invoice.

VII. Line Location Program

MWS is a member of the Tennessee One-Call (TOC) system which includes all underground utilities (www.tnonecall.com). In accordance with State statute, persons performing any excavation in public areas are to contact the Tennessee One Call agency. MWS complies with Chapter 31, "Underground Utility Damage Prevention Act," of Tennessee state law as it relates to the demarcation of underground public infrastructure. For the collection system, infrastructure includes all public sewer mains.

MWS currently performs all field locates in-house with a staff of eight locating/planning teams. Each crew has a laptop to receive all TOC requests. Annually MWS responds to approximately 42,000 Tennessee One-Call tickets. Of those, approximately 10,000 result in physical marking in the field. Daily emergency locates are dispatched through the call center. All tickets must be evaluated for type of response and communicated back to the Tennessee One-Call call center. Routine marking requests are processed within three days of receipt; emergency requests within two hours. In the last several years, MWS has successfully responded to all such requests within the prescribed response time.

Site visits are performed by MWS during and after excavation to ensure no damage was sustained to the sewer system infrastructure. Hard-copy documentation of requests and responses are maintained for five years.

Section 6. Maintenance Program

I. Pump Station Preventative Maintenance

a. Pump Station Repair Program

All equipment repairs, predictive maintenance checks, electrical preventative maintenance activities, and mechanical preventative maintenance work for MWS pump stations are logged into the CMMS to allow all work performed on the pump station equipment to be tracked.

These repairs are entered into the CMMS in one of three ways: upon completion of the work by Route Services Section personnel (work found and corrected in the same station visit), as a service request (SR) generated as part of the performance of weekly inspections, or as a SR issued due to a SCADA system alarm. Once a SR is entered into the maintenance system, a Route Services Section supervisor generates a work order for the defective equipment. Repair work orders are entered in the CMMS as top priority and take precedence over weekly preventative maintenance work orders.

The Route Services Section currently has six crews in designated pump station maintenance zones that are responsible for making the necessary repairs and performing maintenance based on work orders. These crews are made up of two mechanics and one electrician. These crews are also responsible for the repair and maintenance of approximately 400 residential grinder pumps that are maintained by MWS.

Operation and maintenance (O&M) manuals for equipment are located in the Route Services Section office complex. These manuals allow the maintenance crews to review information to accurately order replacement parts, review electrical line diagrams, and locate other essential information needed to perform repairs. Most O&M manuals contain warranty information; however the CMMS is updated with the most recent warranty information based on recent equipment refurbishments or replacements.

For equipment no longer under warranty, maintenance crews perform most minor mechanical repairs which are within the capabilities of MWS personnel. Most of the large equipment is repaired under contract with local vendors. This work typically includes rebuilding pumps, rewinding motors, and HVAC repair. Repairs to motor control centers, flow meters, remote monitoring equipment, and valves are typically repaired by MWS maintenance crews.

Some equipment parts have a long lead time or have been determined as critical to the operation of a pump station. These parts are kept at the Route Services warehouses. Parts that are readily available are obtained through local vendors or at the equipment manufacturer's local service center. Spare pumps are also kept on-hand for several of the smaller stations. It has proven to be cost-effective to replace this equipment versus making equipment repairs.

Repairs are logged into the CMMS under the appropriate pump station asset ID. This procedure allows the maintenance supervisor to track the service life of pump station equipment to determine if repairing or replacing the equipment is the most cost effective solution.

b. Electrical Preventative Maintenance Program

As previously discussed, work performed at a pump station is logged into the CMMS, including the weekly electrical preventative maintenance (PM). The CMMS automatically generates work orders for weekly electrical PM actions. These work orders are considered "open" until maintenance crews perform the work order.

The Maintenance Division has six electricians responsible for performing electrical PM at pump stations.

A copy of the Route Service PM Activities for Electrical Components is in Appendix P.

c. Mechanical Preventative Maintenance Program

As previously discussed, work performed at a pump station is logged into the CMMS system, including the weekly mechanical PM. The CMMS automatically generates work orders for weekly required PM actions. These work orders are considered "open" until maintenance crews perform the work order.

The Maintenance Division has 12 industrial mechanics responsible for performing mechanical PM on pump stations.

A copy of the Route Services Mechanical PM for Sewer Pumping Stations is in Appendix Q.

d. Physical Maintenance Program

The Route Services Section of the Operations Division is responsible for the physical maintenance of pump stations. Each Route Services Section crew is responsible for performing the following tasks for all stations located in their maintenance zone:

- General housekeeping and cleanliness
- Inspect safety equipment (handrails, signs, hoist, etc.)
- Inspect security components (doors, fencing, etc.)
- Inspect HVAC filter for replacement
- Wash down equipment (hose bibs, hoses)

Grass cutting is currently outsourced as part of a contract maintained by the Safety and Security Section of the Operations Division. Roof repair and facility painting are

addressed by the Real Property Division of Metro. These activities are coordinated through MWS by the Administrative Services Officer in the Engineering Division. Not all of these tasks are logged and tracked in the CMMS. Tasks undertaken by the Route Services Section crews are covered under the performance of weekly PM duties and are logged into the system. Work performed by the grass cutting contractor and Real Property Services is not tracked in CMMS.

All of the above preventative maintenance performed on pump stations is periodically checked to ensure weekly and bi-annual maintenance is being performed adequately. These periodic checks are performed by the Maintenance Supervisor and the Manager of Route Services.

II. Gravity Line Preventative Maintenance

Sewer maintenance personnel in the System Services Division include six cleaning crews, five CCTV (televising) crews, one combined sewer overflow (CSO)/regulator crew, and one crew for trunk line inspection and manhole maintenance. These crews are managed by the Industrial Maintenance Supervisor. The night and weekend crews both consist of a sewer maintenance crew and water and sewer repair crews. Other day crews include repair crews and crews responsible for planning and locating water and sewer facilities, investigating sewer complaints, and investigating leaks.

a. Routine Hydraulic Cleaning and CCTV Program

CCTV crews record the condition of a sewer after a sewer line blockage is cleared, when a service locate is needed, during wet-weather events to detect leaks and identify segments for lining or point repairs, to identify candidates for rehabilitation, and for general television work. CCTV crews also assist with the identification of causes of sewer overflows or restrictions. The cleaning and CCTV crews assist each other as needed.

Jet cleaning equipment is used to clean the majority of the sewer lines. The standard attachment used is a spinning jet nozzle. Root saws are stocked on each truck and are easily attached to the jetting equipment and used on an as-needed basis.

Field Equipment used for cleaning sewer lines includes:

- 4 Combination jet/Vactor trucks
- 3 Jet trucks
- 5 CCTV (televising) units
- 3 large diameter sewer cameras
- 1 easement unit

Maintenance crews are assigned according to several regular work schedules that provide coverage 7 days per week; 19 hours per day on Monday through Friday and 13 hours per day on Saturday and Sunday. As discussed in **Management Program, Section IX.a. Complaint Management Program**, personnel are also on a rotation "on-call" list to provide emergency 24 hour coverage.

Records are logged in the CMMS that track date, time, and location of routine cleaning activities, specific lines cleaned, equipment used, identity of cleaning crew, number of passes needed to clean the line, presence of root, grease, or debris problems, any problems or other actions necessary, and pertinent asset information such as size, material, length, and manhole status. Each crew submits a log for each day of work completed which is then verified for accuracy by office personnel and entered into the CMMS. An example of a CCTV inspection log can be found in Appendix R. CCTV logs are also scanned into the system.

Crew assignments are by geographical area in specific zones. Generally, crews clean and do television inspection of their entire geographical area and then repeat the cleaning and televising cycle with the exception of areas determined to be a problem for grease or roots. These problem areas may require more frequent cleaning visits.

Goals for cleaning crews and CCTV crews are set and progress is monitored by the Sewer Maintenance Supervisor and Manager. There are 2,676 miles or 14,129,280 feet of separate sanitary sewers and 224 miles of combined system.

Sewer Cleaning Goals and Performance

Each cleaning crew has a goal to clean 40,000 feet per month and 2,000 feet per day of sanitary sewers. These goals were met in fiscal years 2005 and 2006 and are shown in Table 1 below. With six crews, the average for each crew was 41,719 feet per month and 2,085 per day for 20 work days per month.

Some line segments may require more than one pass to complete the cleaning. Multiple cleaning of a line segment is counted toward daily or monthly goals to reflect the effort required. Actual footage of sewers cleaned has not been tracked in the past.

Recommendation

MWS will develop a method to track the actual footage cleaned from manhole to manhole that does not include footage from multiple passes. This will provide a more accurate measure of the actual footage of the system being cleaned each year. The implementation deadline for this recommendation is October 2007.

MWS will develop goals of the actual footage to be cleaned that reflect an analysis of past CMMS cleaning data to determine the actual footage of sewers cleaned by November 2007.

MWS will evaluate daily goals based on 210 working days per year or 17.5 days/month, which includes estimates for the many reasons crew members would not be available. Goals will be reviewed to reflect potential improvements in planning, scheduling and record keeping, along with fundamentals of continuous improvement. Also, goals will consider that there are certain segments that require more frequent cleaning. Evaluation of the goals will be established by January 2008.

Table 6-1: Sewer Cleaning Performance Goals

Sewer Cleaning (LF)	Current Goals	FY 2005 Actual	FY 2006 Actual	FY 2008 Goals including Multiple Runs	FY 2008 Goals of Actual Feet
Sewer cleaned per year	2,880,000	2,675,996	3,003,827	TBD	TBD
% sanitary sewers cleaned	20.4%	18.9%	21.3%	TBD	TBD
Sewer cleaned/ month/crew (with 6 crews)	40,000	37,166	41,719	TBD	TBD
Sewer cleaned/ day/crew (with 6 crews) @20 days/mo.	2,000	1,858	2,085	TBD	TBD
Sewer cleaned/ day/crew (with 6 crews) @17.5days/mo.	Not established	2,124	2,383	TBD	TBD

Sewer Televising Goals and Performance

The CCTV crews have goals to complete television inspection of 30,000 feet per month and 1,500 feet per day of sanitary sewers. These goals were met in fiscal years 2005 and 2006 are shown in Table 2 below. With five crews, the average for each crew was 31,742 feet per month and 1,587 per day for 20 work days per month.

Recommendation

MWS will evaluate ways to set priority on how often various groupings of sewer categories should be inspected with television. Examples, new PVC or recently lined sewers may not be inspected for another 5 to 10 years. However, clay or sewers older than 20 years or large diameter brick sewers would have priority to inspect them within the next five years. This evaluation will be completed by December 2007. MWS will purchase software for TV units that will allow priorities to be entered into the CMMS. This enhancement process will be in operation by June 2007.

MWS has recently purchased three new CCTV cameras to inspect and to televise the 224 miles of CSO lines and the other large diameter sewers. Three crews began using the cameras in August 2006. As experience is gained and the process refined of using these cameras, MWS will develop a plan and standard operating procedures (SOP) to inspect a certain amount of large diameter sewers over a projected period of time by January 2008.

The CSO and large diameter sewer televising will be incorporated into the goals for sewer televising for the entire system.

Table 2: Sewer Televising Performance Goals

Sewer Televising (LF)	Current Goals	FY 2005 Actual	FY 2006 Actual	FY 2008 Goals
Sewer TVed per year	1,800,000	2,063,619	1,904,574	TBD
% sanitary sewers TVed	12.7%	14.6%	13.5%	TBD
Sewer TVed/month/ crew (with 5 crews)	30,000	34,393	31,742	TBD
sewer TVed/day/crew (with 5 crews) @20 days/mo.	1,500	1,719	1,587	TBD
Sewer TVed /day/crew (with 5 crews) @ 17.5 days/mo.	Not established	1,965	1,814	TBD

b. Root Control Program

The current method of root control is mechanical removal and pipeline rehabilitation. Each cleaning crew carries root saw attachments on their trucks. When a crew encounters roots during routine cleaning, they attach a saw and cut through and remove the roots. The severity of the problem is recorded on the daily log. These

areas are also televised to determine the defects that are allowing root intrusion. In most cases, roots enter the main line through service laterals, although there are cases where the main line is the source of a root problem. Lines determined to be in need of corrective action are evaluated to determine if replacement or lining (**Management Program, Section V.g. Infrastucture Rehabilitation Program (Overflow Abatement Program, OAP)**) is the best option.

Chemical root control programs have been evaluated in the past and were not deemed to be advantageous over the mechanical removal and pipeline rehabilitation efforts.

Recommendation

MWS will consider development of a policy for resolving root intrusion in service lines with a customer by October 2007.

c. Manhole Preventative Maintenance Program

Manhole conditions are a part of the inspection by cleaning crews, the manhole and trunk line inspection crew, and a contract manhole crew. As routine cleaning is performed, the cleaning crews observe and note any manhole deficiencies on their cleaning logs. When a basin is targeted for rehabilitation, the manhole crew or the contract crew inspects each manhole in the basin and recommends repairs. The resulting information is used to develop work orders for the manhole rehabilitation crew, to correct or to assign to a contract manhole rehabilitation crew, or to include in a rehabilitation project with point repairs and lining of the sewers. The contract manhole crew is employed to perform rehabilitation of manhole cones and risers when needed.

The repair crews are responsible for structural repairs to manholes. Repairs include frame and cover grade adjustment, frame and cover replacement, and invert reconditioning. As noted in **Management Program, Section VIII.a. Spare Parts, Tools and Equipment Inventory Program**, MWS maintains an inventory of frame and covers to facilitate these repairs. A cementitious grout or epoxy is applied to the inside of manholes; chemical grout is used to stop specific leaks.

Work orders are created and entered into the CMMS and repairs are made based on the OAP priority matrix or as decided by the Sewer Maintenance Supervisor.

III. Air Valve Preventative Maintenance Program

Air/vacuum valves on sewer force mains are in the process of being checked and maintained or replaced on an annual basis. Replacement units are of the latest model and material for long-term reliability. MWS is performing a portion of these checks and is also pursuing contract services for the remaining valves to be accomplished within a year of assignment. There are approximately 500 such valves in the system.

An inspection program on all valves is being established. As-builts are being obtained to allow each valve to be added to CMMS as an asset.

Recommendation

MWS will develop standard operating procedures for inspection and replacement of air/vacuum valves by December 2007.

IV. Maintenance of Rights-of-Way

a. Maintenance of Rights-of-Way and Easements Program

It is estimated that 90% of the easements in which sewers are located are on record. All easements acquired since the early 1980's are easily accessible; for projects from the mid-1960's to the early 1980's, approximately 90% of the easement documents are easily accessible; for projects prior to the mid-1960's, 50% of the documents can be located without extensive research.

MWS recognizes the need to have access to their assets within easements. While MWS does not have an active surface easement maintenance program, access is provided on an as-need basis.

b. Property Rights Protection Program

Property rights are necessary for the installation, operation, and maintenance of all MWS facilities. Records of property rights for MWS facilities are maintained to assist in the review and evaluation of proposed work that might impact MWS's ability to access, operate, and maintain existing facilities.

Property rights may exist in several different forms. For example, sewer lines may be installed in public rights-of-way, where the right-of-way itself provides an easement or in easements obtained and recorded from privately held property, in which case there will be a document recording the easement either on a property or subdivision plat or a unique easement document. The easement may be specific for only water, wastewater, storm water and drainage, or access purposes, or it may allow for all utility purposes. The property rights for facilities may also exist "in fee simple," meaning that the actual property ownership has been acquired in the name of MWS or the Metropolitan Government for public purposes.

Property rights for MWS's facilities are made permanent public records by being recorded in the Registrar of Deeds Office, either in Davidson County or in other counties when property in MWS's service area is located outside the boundary of the Metropolitan Government. Property rights that have been obtained in recent years are readily available for inspection in the offices of the Registrar or in the case of Davidson County and some other counties, via the internet. Older documents dating from the 1800's up to the late 1950's are also available at these locations; however, research is often required to determine the actual purpose of the document of record.

Requests for encroachment upon MWS's property rights may include street and alley closures, property redevelopment plans, and requests from individual property owners. In each situation, the location and nature of MWS's facilities, both existing and planned, are compared with the requested encroachment. The approval or denial

of the request is dependant on the impact of the proposed encroachment, the nature of the facility, and options available to those making the request.

- If the encroachment is of a minor nature and will not significantly reduce MWS's ability to operate and maintain the facility, a letter of encroachment will be granted to the property owner. This letter, which is recorded in the Registrar of Deeds office, confirms MWS's agreement to allow the minor encroachment.

- Encroachments of a serious nature which significantly impact MWS's ability to operate and maintain existing facilities or construct planned facilities are denied, unless the requesting property owner agrees to pay for relocation of the facility and related property rights in order to eliminate the conflict.

- Encroachments of a serious nature which may impact MWS's ability to operate and maintain the facility may be allowed with the execution and recording of an Exception to Easement agreement. This document specifically states additional obligations to be assumed by the property owner in exchange for approval by MWS, relieving MWS of risk for property damage that might be incurred should the facility require maintenance activities which will damage the approved improvements within the area where MWS holds property rights. These agreements are considered actions of last resort and are used where no reasonable alternative solution exists and the property owner is willing to accept the significant risks associated with executing their planned improvements.

Existing encroachments to the property rights of MWS may be discovered in the course of normal operation and maintenance of the MWS system. In such situations MWS will pursue correction of the encroachment in a manner similar to that outlined above. In addition, there are situations where existing encroachments were approved or allowable by the rules of operation of utility districts which have been acquired by the Metropolitan Government. In these situations the conditions under which the encroachment was initially allowed is taken into account when determining the resolution of the property rights issue.

Documentation of MWS's property rights is maintained in the Engineering Tracking System under project number for the facility for which the property rights were required and maintained. Documents which approve encroachments are also recorded in the Engineering Tracking System and the appropriate Registrar's office.

c. Street Paving Monitoring Program

Casting Adjustments

The Casting Adjustments Unit has the responsibility of removing all existing manholes, valve boxes, curb inlets and area drain castings prior to any asphalt milling on roadways. It is also the responsibility of the Castings Adjustment Unit to remove all broken and damaged castings and to place existing or replacement castings at the new roadway elevation before any asphalt is placed.

Patch Paving

The Patch Paving Unit has the responsibility of restoring existing public streets, alleyways, State highways and roadways to a safe condition that meet State and local paving specifications. The Patch Paving Unit acts in a timely manner to correct or rebuild the portion of roadway that was removed due to a sewer repair or water repair.

V. Reactive Maintenance Program

All work is tracked in the CMMS by various qualifiers (preventive maintenance, repair, asset, location, staff, etc). Preventative maintenance constitutes approximately 98% of work effort in the collection system. Reactive maintenance is performed when defects are discovered during the televising of sewers to eliminate potential system failure and in response to emergency calls related to sewer issues or a possible sewer main break. The emergency calls are answered by the MWS Dispatch. When the call is received, a service request is entered into the CMMS and the request is sent to the System Services Division for action. Any reactive maintenance or repair work performed is documented and entered into CMMS. This information, as well as other CMMS documented activity, is used for reporting, planning, and resource allocation. It is also used by Metro Legal in the investigation of claims.

Section 7. Combined Sewer Overflow Program

I. Nine Minimum Controls

On June 28 and 29, 2006, a presentation was given at MWS's offices to EPA representatives on the Nine Minimum Controls. Plans are in place that address each control area and MWS staff has been assigned to specific tasks.

A digital copy of the presentation that was presented to EPA is provided in Appendix S.

II. Long-term Control Plan

In March 2002, a draft of the Long Term Control Plan was completed. In May 2005, MWS submitted a revision to the plan to TDEC for review and approval. This plan was developed as a result of EPA's "Combined Sewer Overflow Control Policy" that was established in 1997. This policy required operators of wastewater systems with CSSs to meet the established nine minimum controls. A copy of MWS's draft plan was also submitted to Region 4 EPA in April 2006 as requested in a 308 Request for Information letter. The goal of the plan is to protect water quality through system enhancements to mitigate CSO events.

MWS has prepared several reports over the years that discussed the detailed analysis of several alternative solutions to address CSOs. As recommended solutions were identified for an individual basin, further study was performed. Since the initial plan was developed, there has been minimal exploration into additional alternative solutions.

Prohibitive costs restrict the ability to eliminate the CSOs quickly, therefore defined projects and schedules to achieve the goal in a reasonable timeframe were established. The present schedule of proposed capital improvements for both the SSS and CSS is typically within a range of 20 to 25 million dollars per year. The financing of the work to date has been by two revenue bond issues, which required water and sewer rate increases.

Table 7-1 summarizes the progress that has been made by MWS in resolving the CSO/SSO problems in the sewer system.

Table 7-1. CSO/SSO Progress from 1990 to 2005

	1990	2005
Number of CSO locations	30	9
Number of SSO locations	157	55
CSO volume (MG)	10,079 (1989)	1,015
Number of SSO events	512	Rainfall Induced - 263 Power Out - 12 Mechanical - 32 Maintenance - 76 **Total - 383**
Pump Station overflow volume (MG)	1,355	35
Cumulative Annual I/I removed (MG)	0	~3,000 (2003)*

*Analysis of cumulative annual I/I ceased in 2003.

Of the nine remaining CSO's, two have received correction action to prevent overflows from occurring for a statistical eight times per year from rain events. In addition, two of the remaining CSO's are to provide emergency storm water relief points for downtown Nashville and are designed to overflow only during 10-year rainfall events. Projects for the remaining sites have been identified and an implementation schedule developed. Table 7-2 provides details of those projects.

Table 7-2. Schedule of Future CSO Projects

Location	Design Date	Construction Date	Estimated Capital (in million dollars)
Benedict and Crutcher	2009	2010	$9
Kerrigan	2013	2014	$1 - $10
Schrader Lane	2012	2013	$10
Washington DC	2006	2007	$19
Village Court	2006	2007	$1.5

Additional detail of the projects for each location can be found in the Long Term Control Plan.

Recommendation

MWS will update the Long Term Control Plan on an as needed basis.

III. Wet Weather Treatment Plant Capacity

MWS has developed wet weather flow management plans for each of the WWTPs in the system. It is the policy of each plant to treat the highest rate of flow possible during wet weather events to minimize overflows from the SSS and in the case of the Central WWTP, from the CSS.

The plans for each WWTP are summarized below.

Central WWTP

The Central WWTP serves both the separated and combined sewer systems. Before placing the Excess Flow Treatment Unit (EFTU) in service, the capacity of the available secondary treatment units must be maximized.

The Central WWTP was designed with the following parameters:

A. Average Design Flow	125 MGD
B. Peak Design Secondary Flow	250 MGD
C. Peak Design EFTU Flow	80 MGD
D. Peak Hydraulic Flow	330 MGD

For extreme wet weather events, the Central plant should expect as much as 187 5 MGD from the separate sewer system as follows:

Browns Creek Pump Station	140 MGD
Shelby Park Pump Station	15 MGD
Cowan Street Pump Station	12.5 MGD
28th Avenue Pump Station	20 MGD
Total	187.5 MGD

Flow from then combined sewer system enters the Central plant through the Central Pumping Station (CPS), rated at a firm capacity of 160 MGD.

During rainfall events flow from the combined sewer system will begin to raise the water level in the wet well of the CPS. From the time the wet well rises from the normal level of 17 feet until the level approaches the overflow level of 44 feet, the plant determines what additional treatment units, if any, should be placed into service to maximize flow through the plant. Use of meteorological data from various internet sites has proven to be useful in forecasting whether or not sufficient flow will be received to necessitate use of the EFTU. In general, hydraulic modeling has indicated that the collection system may be capable of receiving runoff from a storm event with a recurrence interval of 12 times per year without overflowing at the Kerrigan CSO. This statistical rainfall event corresponds to just over 1 inch in 24 hours, and a one hour maximum intensity of 0.4 inches per hour. If at all possible,

plant flow through secondary treatment units should be maximized and the EFTU should be placed into service before the CPS wet well level reaches overflow elevation

As the influent flow rate increases during wet weather events the operator needs to insure sufficient units are on-line and in service.

In an effort to meet the capacity of the treatment units of the plant and treat the highest rate of flow possible during wet weather, operations personnel have developed an excess flow standard operating procedure, based on experience and data from past storm (excessive flow) events. This SOP was revised in June 2006. The steps are based on maximizing flow through secondary treatment while maintaining a high quality effluent that meets or exceeds MWS's NPDES permitted criteria. The ultimate objective of the SOPs is to maximize the flow to the available treatment units before opening the EFTU gate.

Dry Creek WWTP

The Dry Creek WWTP was designed with the following parameters:

A. Average Design Flow	24 MGD
B. Peak Design Secondary Flow (1995)	46 MGD
C. Peak Modified Secondary Flow	63 MGD

The plant was expanded in 1995 with a peak secondary capacity of 46 MGD, capable of receiving flows up to 54 MGD and diverting the excess to the equalization basins. The flow optimization project (See Appendix T for a copy of the Capacity Analysis Report.), completed in two phases from 2003 through 2007, increased the peak secondary capacity to 63 MGD with the ability to accept flow rates of up to 95 MGD into the facility.

The Dry Creek WWTP treats flow from the separated sanitary sewer systems serving portions of northern Davidson County, Goodlettsville, Hendersonville, White House and Ridgetop.

Peak flows into the three separate Parshall flumes at the plant headworks are as follows:

Dry Creek	65 MGD
Old Hickory	5 MGD
Hendersonville F/M	25 MGD
Total	95 MGD

During rainfall events, flow enters the two pumping stations and begins to raise the water level in the wet wells. From the time the wet well rises from the normal level of 386 feet until the level approaches the level of 394 feet for the wet weather pumping station to begin service, the plant operators should determine what additional treatment units, if any, should be placed into service to maximize flow through the plant. Use of meteorological data from various internet sites may be useful in forecasting whether or not sufficient flow will be

received to necessitate use of additional treatment units. If a wet weather event is imminent, the plant may bring additional treatment units online before the flow from the Dry Creek pump station increases to the point that these units are needed. If at all possible, plant flow through secondary treatment units should be maximized before flow is diverted to the on-site equalization basins in order to preserve the available equalization volume for large storms.

The Dry Creek WWTP contains two on-site equalization basins totaling 14 MG. Flow may enter the equalization basins from the plant headworks, either before or after the grit tanks, or flow may be pumped directly into the basins from the wet weather pumping station. The maximum flow rate into the basins from the headworks occurs when the basins are empty and is approximately 30 MGD; the flow rate diminishes as the basins fill. However, there is still sufficient capacity to convey over 20 MGD even if the basins are two-thirds full. In order to minimize the chance of a sanitary sewer overflow from very large storms, it is imperative to preserve the capacity of the equalization basins for influent flow rates that exceed 63 MGD.

As the influent flow rate increases during wet weather events, the operator needs to ensure sufficient units are on-line and in service.

There are four tanks in the grit area. The amount of flow treated by the plant should not be limited by the number of grit tanks available for service. If fewer grit tanks are available, then it is better to hydraulically overload the grit tanks than to reduce flow through the plant.

As in the case of grit tanks, the amount of flow treated by the plant should not be limited by the number of primary clarifiers available for service. If fewer primary clarifiers are available for service, then it is better to overload the available primary clarifiers than to reduce flow through the plant. In general, during an intense rain event the influent wastewater will be dilute and contain fewer settleable solids, thus overloading the primary clarifiers will not adversely impact the activated sludge treatment process.

There are six aeration basins with a volume of 1.0 MG each. If one aeration basin is out of service, the corresponding maximum flow rate to provide the same 2.3 hours of detention is 52 MGD. It is desirable to have all 6 aeration basins in service to treat peak flows. However, the treatment plant can still provide adequate treatment for flows in excess of 50 MGD with one basin out of service.

There are a total of nine secondary clarifiers at the plant. The plant can provide treatment to approximately 63 MGD with all clarifiers in service. Losing one of the newer clarifiers, which treat 13.5 MGD each, has a substantial impact on treatment capacity, with peak capacity dropping to 50 MGD. One of the older clarifiers, which treat 3.7 MGD each, being out of service, only reduces peak capacity to about 60 MGD. The treatment capacity of the secondary clarifiers depends greatly on the sludge volume index (SVI) of the mixed liquor in the aeration tanks. The design capacities are based on an SVI of 150. It is possible to treat flows greater than the design capacity if the SVI is less than 150. Consequently, an SVI greater than 150 will likely reduce treatment capacity below the design values. SVI values

will vary greatly during the wet weather event. The average of the SVI values observed before the wet weather event is a good indicator of the settleability that will be experienced during the wet weather event. The plant staff should continually monitor secondary clarifier sludge blankets during wet weather events. If blanket rising is occurring, then the recycle flow rate should be increased to bring the blankets down to near zero. Even during a rain event, it is best to keep a near zero blanket in the secondary clarifiers.

There are 3 chlorine contacts tanks. During peak events, the plant has the capability to disinfect at a dosing rate of 102 mg/L-min of up to 63 MGD. During rain events, the fecal colonies in the secondary effluent will be significantly lower than what would be experienced during average daily flow conditions and thus, the plant is capable of realistically treating more than 63 MGD of wet weather flow. The plant should not be concerned with its disinfection capabilities until the flow reaches approximately 70 MGD.

Chlorine contact effluent weirs are good locations to visually monitor final effluent for suspended solids concentration before it enters the Cumberland River. During wet weather events, the effluent solids concentration is often higher than it would be during average daily flow. Determining the effluent solids concentration visually is often deceiving as the concentration may look higher than it actually is. The actual effluent solids concentration can be determined accurately by performing a total suspended solids (TSS) test on a sample taken from the chlorine contact tank weirs. During wet weather events, increased monitoring of the effluent TSS should be performed. During peak wet weather conditions, more foaming may occur at the chlorine contact chambers and care should be taken when taking effluent samples to prevent collection of the foam in the sample as it will cause erroneous sample results (especially concerning fecal colonies) not representative of what is leaving the plant.

White Creek WWTP

The Whites Creek WWTP was designed with the following parameters:

A. Average Design Flow	37.5 MGD
B. Peak Design Secondary Flow (1991)	75 MGD
C. Peak Modified Secondary Flow	75+ MGD

The plant was expanded in 1991 with a peak secondary capacity of 75 MGD, capable of receiving flows up to 100 MGD and diverting the excess to the equalization basins. The flow optimization project (See Appendix U for a copy of the Technical Memorandum), with the first phase completed in 2006, removed hydraulic restrictions within the plant and increased the peak secondary capacity in excess of 75 MGD. Improvements have not been completed yet for disinfection improvements to maximize the amount of flow that can be treated.

The Whites Creek WWTP treats flow from the separated sanitary sewer systems serving portions of western and southwestern Davidson County, and portions of northern Williamson County. Flow is pumped directly to the plant by several pump stations. A summary of the capacities of the pumping stations is as follows:

Rated Pumping Station Capacity

West Park	60.0 MGD
Whites Creek	11.5 MGD
Bordeaux Hills	2.3 MGD
Bordeaux Hospital	0.7 MGD
Total	74.5 MGD

Peak Pumping Station Capacity

West Park	80 MGD
Whites Creek	16 MGD
Bordeaux Hills	3 MGD
Bordeaux Hospital	1 MGD
Total	100 MGD

The Whites Creek WWTP contains two on-site equalization basins totaling 10.7 MG. Flow rates in excess of the treatment plant capacity may be diverted to the equalization basins following primary clarification. In order to minimize the chance of a sanitary sewer overflow during very large storms, it is imperative to preserve the capacity of the equalization basins for influent flow rates that exceed the secondary treatment capacity.

The West Park pumping station contains four pumps discharging into three force mains which discharge directly to the Whites Creek WWTP. The rated capacity of the West Park station with three pumps in service is 60 MGD. Under extreme wet weather events all four pumps, if available, will operate and may discharge in excess of 80 MGD to the Whites Creek plant. Once the on-site equalization basins have been filled it may be necessary to reduce the output of the West Park pumping station to match the treatment capacity of the plant. Plans are underway to add an equalization basin in the vicinity of the West Park site to further reduce overflows.

Use of meteorological data from various internet sites may be useful in forecasting whether or not sufficient flow will be received to necessitate use of treatment units. If at all possible, plant flow through secondary treatment units should be maximized before flow is diverted to the equalization basins in order to preserve the available volume for large storms.

As the influent flow rate increases during wet weather events the operator needs to insure sufficient units are on-line and in service.

There are four tanks in the grit area. The amount of flow treated by the plant should not be limited by the number of grit tanks available for service. If fewer grit tanks are available, then it is better to hydraulically overload the grit tanks than to reduce flow through the plant.

As in the case of grit tanks, the amount of flow treated by the plant should not be limited by the number of primary clarifiers available for service. If fewer primary clarifiers are available

for service, then it is better to overload the available primary clarifiers than to reduce flow through the plant. In general, during an intense rain event the influent wastewater will be dilute and contain fewer settleable solids, thus overloading the primary clarifiers will not adversely impact the activated sludge treatment process.

There is more than adequate capacity to treat 75 MGD with one aeration basin out of service, as there is still 3.6 hours of detention time available.

There are a total of ten secondary clarifiers at the plant. The plant can easily provide secondary treatment to 75 MGD during wet weather events, even with one clarifier out of service. There is sufficient secondary clarifier capacity to treat in excess of 75 MGD with all units in service.

Section 8

8.0 Program Recommendations

I. Goals

The completion of the EPA CMOM Self-Assessment has been beneficial to MWS by assessing the means and methods utilized to perform management, operations and maintenance pertaining to the wastewater collection and treatment system. With this new tool, MWS can better assign the various duties of the division.

This Self-Assessment achieved two goals:

1) To provide EPA/TDEC with pertinent information regarding CMOM programs for MWS's wastewater collection and treatment system;

2) Clearly define the duties of all of MWS personnel and the roles each of those duties play in supporting the efforts of the MWS in maintaining the wastewater collection and treatment system. The MWS has identified action items that should provide improvements in the overall operations of the system.

II. Recommendations

The following list identifies these action items and their scheduled implementation dates. Beyond these specific items, MWS is also committed to regular review of each of the CMOM elements to confirm (or establish) program goals and objectives and the methodologies used to determine success.

Recommendations

Report Section	Program	Recommendation	Implementation Deadline
Section 4, II.b.	Skills Training	MWS will conduct periodic testing, drills and demonstrations of competency of skills	July 2008
Section 4, IV.	Information Management System	MWS will develop and implement a process for reviewing all inspection, maintenance, operations and customer complaint records to identify reoccurring problems. A corrective action plan to address reoccurring problems that develop will be included.	January 2008
Section 4, V.d.	New Construction and Rehabilitation Inspection	MWS will develop standard operating procedures for conducting construction inspections that include methods for documenting inspections and maintaining the documentation. Include training requirements for all inspectors. Other means for managing data to closeout projects will be evaluated.	June 2008
Section 4, V.e.	Acquisition Considerations	MWS will develop and implement standard policy for acquisition of existing sewer systems. This policy will include a plan for bringing sewer systems to MWS's requirements and standards that must be met of the design of the existing sewer before acceptance by MWS and the criteria that will be used for the determination of the financial aspects of the acquisition.	January 2008
Section 4, V.f.vi.	Continuous Sewer System Assessment	MWS will develop and implement standard line condition codes (1 to 5) for use when televising sewer lines. These codes will be manually recorded on TV Inspection Reports.	November 2006
		MWS will implement modified data entry into CMMS to allow entry of the standard sewer line condition codes from the TV Inspection Reports.	January 2007
		MWS will evaluate the software to enter standard defect codes from guidelines in to CMMS.	April 2007

Section 4, V.f.x.	Continuous Sewer System Assessment	MWS will develop and implement standard operating procedures for all assessment practices including technical procedures for carrying out each practice and a means to ensure follow-up on information that is documented during any of the assessment practices. All current forms will be reviewed that are used to determine if the appropriate information is obtained and develop new forms as necessary. A written standard method of prioritization of all assessment practices will be developed.	January 2008
Section 4, V.g.	Infrastructure Rehabilitation Program (OAP)	MWS will develop and implement a management plan to address wet weather conditions once the sewer model is completed.	December 2008
Section 4, V.h.	System Capacity Assurance	MWS will review and update the Wastewater Capacity Management Plan following completion of the conversion of the sewer model.	December 2008
		MWS will complete the conversion of the sewer model into MIKE URBAN software .	April 2007
		The Master Sewer Growth Plan will be renewed and updated every five years.	December 2008
Section 5	Operations	MWS will develop and implement Standard Operating Procedures for critical operations programs. The SOPs shall include a means for follow-up on any items noted.	December 2008
Section 5, I.a.i.	Pump Station Monitoring	The intergration of HSQ and Intrac into a consolidated system will be completed.	October 2007
Section 5, I.a.iii.	Operation and Maintenance Manuals	The feasibility of implementing electronic O & M manuals will be investigated. If it is determined that this is feasible, a new goal will be established for implementation.	December 2007
Section 5, I.b.i.	Reactive Operations	MWS will develop and implement an SOP for tracking the inventory of spare pumps for the smaller pump stations. It will be determined if tracking through CMMS is possible.	December 2007

Report Section	Program	Recommendation	Implementation Deadline
Section 5, IV.	Fats, Oils and Grease Control	A mailing system will be implemented to distribute a notification to all residential customers in a specific area where FOG interference has been a problem. An English/Spanish notification is being developed currently.	February 2007
Section 5, V.	Service Connection/Disconnection	MWS will review current procedures for new service connections and for service disconnections to determine if the procedures need to be updated.	May 2007
Section 6, II.a.	Gravity Line Preventative Maintenance	MWS will develop a method to track the actual footage cleaned from manhole to manhole that does not include footage from multiple passes. This will provide a more accurate measure of the actual footage of the system being cleaned each year.	October 2007
		MWS will develop goals of the actual footage to be cleaned that reflect an analysis of past CMMS cleaning data to determine the actual footage of sewers cleaned.	November 2007
		MWS will evaluate daily goals based on 210 working days per year or 17.5 days/month, which includes estimates for the many reasons crew members would not be available. Goals will be reviewed to reflect potential improvements in planning, scheduling and record keeping, along with fundamentals of continuous improvement. Also, goals will consider that there are certain segments that require more frequent cleaning.	January 2008
		MWS will evaluate ways to set priority on how often various groupings of sewer categories should be inspected with television. Examples, new PVC or recently lined sewers may not be inspected for another 5 to 10 years. However, clay or sewers older than 20 years or large diameter brick sewers would have priority to inspect them within the next five years.	December 2007

Report Section	Program	Recommendation	Implementation Deadline
Section 6, II.a.	Gravity Line Preventative Maintenance	MWS will purchase software for TV units that will allow priorities to be entered into the CMMS.	June 2007
		MWS has recently purchased three new CCTV cameras to inspect and to televise the 224 miles of CSO lines and the other large diameter sewers. Three crews began using the cameras in August 2006. As experience is gained and the process refined of using these cameras, MWS will develop a plan and standard operating procedures (SOP) to inspect a certain amount of large diameter sewers over a projected period of time. The CSO and large diameter sewer televising will be incorporated into the goals for sewer televising for the entire system.	January 2008
Section 6, II.b.	Root Control	MWS will consider development of a policy for resolving root intrusion in service lines with a customer	October 2007
Section 6, III.	Air Valve Preventative Maintenance	MWS will develop standard operating procedures for inspection and replacement of air/vacuum valves.	December 2007
Section 7, II.	Long-Term Control Plan	MWS will update the Long Term Control Plan on an as needed basis.	As needed.
General	All	MWS will develop performance measures for all programs that do not have current measures in place.	December 2007

BILL PURCELL
MAYOR

METROPOLITAN GOVERNMENT OF NASHVILLE AND DAVIDSON COUNTY

DEPARTMENT OF WATER AND SEWERAGE SERVICES
1600 SECOND AVENUE, NORTH
NASHVILLE TENNESSEE 37208-2206

April 27, 2007

Mr. Humberto Guzman
U.S. EPA Region 4
61 Forsyth Street, SW
Atlanta, Georgia 30303

RE: Status of CMOM Self-Assessment
Metropolitan Government of Nashville and Davidson County, Tennessee (MWS)

Dear Mr. Guzman:

As follow-up to the meeting conducted on April 3, 2007, with your office and Department of Justice, MWS is pleased to provide an update on the status of the implementation of the action items identified in the recommendations of the CMOM Self Assessment Report submitted in September 2006.

A copy of the recommendations that were included in the self-assessment report submitted to EPA in October 2006 is provided as an attachment for your convenience when reviewing the information provided in this letter.

In addition to a summary of the status of each recommendation, the attachments to this letter also include examples of several of the programs that are being implemented or that are in draft form.

Summary of Status of Recommendations:

Skills Training

A summary of the classes that are offered to MWS staff is provided as an attachment to this letter. In addition to these classes, MWS has established target training requirements for the skills necessary for promotion in several job classifications. In order to demonstrate competency in these skills, an employee is evaluated by a supervisor to establish his/her ability to perform the necessary tasks in a specific job classification. Examples of the Requirements/Curriculum Check Sheets that are utilized for these evaluations are included as attachments to this letter. Also attached is a complete list of the job classifications that have target training requirements established.

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Information Management Systems
MWS has completed the development of a document of customer complaint calls to provide a method for tracking these calls to help identify reoccurring problems. A copy of a recent log is provided as an attachment to this letter.

The next step in completing this recommendation is to develop a corrective action plan of how the reoccurring problems will be addressed. This step is on schedule to be completed by the implementation deadline of January 2008.

New Construction and Rehabilitation Inspection
The first step in completing this recommendation is to review and update the existing inspector handbook. This review is underway; once the review is completed, the handbook will be revised and updated.

The completion of this recommendation is on schedule for completion by the implementation deadline of June 2008.

Acquisition Considerations
A draft of an Acquisition of Existing Sewer Systems Policy has been written and is under review by management, legal and finance at MWS. This policy will be ready for implementation by the deadline of January 2008. This draft policy is provided as an attachment to this letter.

Continuous Sewer System Assessment
MWS tracks the actual footage televised monthly for each employee. The information in the sewer televised spreadsheet is recorded according to whether the work was scheduled or unscheduled. An example of this spreadsheet is provided as an attachment to this letter.

To date, in FY 2007, MWS crews have televised an average of 91,928 LF of sewer lines each month for a total of 1,103,141 LF since July 2006.

MWS has completed the development of standard line condition codes that will be used when televising sewer lines. The definitions for each of these codes are attached to this letter. These codes are entered into a work order in the Information Management Systems (CMMS) to provide a better explanation to the maintenance crews of the repair needed and to the Overflow Abatement Program Managers for system remediation.

Since August 2006, approximately 4,000 mains have had structural condition codes recorded in CMMS.

MWS is evaluating software to enter standard defect codes with the current Mobile Dispatch Program to determine if similar results can be obtained.

Several SOPs have been developed or are currently under development for all assessment practices. These SOPs include:

- Prioritization Matrix
- Dyed Water Flooding
- Corrosion Defect Identification
- Chemical Corrosion Control
- Manhole Inspections
- Flow Monitoring
- Closed Circuit Television
- Gravity System Defect Analysis
- Smoke Testing
- Service Lateral Investigations
- Pump Station Performance and Adequacy

Infrastructure Rehabilitation Program (OAP)
A fully dynamic hydraulic model of the MWS sewer system was completed and delivered to MWS in February 2007. Preliminary work has begun on a corrective action plan/engineering report (CAP/ER). This document will be completed in accordance with the schedule developed in the final agreement with EPA.

System Capacity Assurance
As stated previously, the sewer model was completed in February 2007. The Wastewater Capacity Management Plan is on schedule to be completed by the implementation deadline of December 2008. The Master Sewer Growth Plan is planned to be renewed and updated by December 2008 also.

Operations
MWS is in the process of developing Standard Operating Procedures (SOPs) for each of its critical operations programs. These procedures will be ready for implementation by the deadline of December 2008.

One of the SOPs that have been developed addresses the procedures to be used when reporting and investigating potential sanitary sewer overflows (SSOs) from a SCADA alarm. The SCADA alarms are from various past rainfall events that indicate the amount of rainfall expected may be sufficient to cause a potential sewer overflow. A copy of this draft procedure is attached to this letter as information.

The Sewer Overflow Response Plan (SORP) has recently been updated.

Pump Station Monitoring
The software integration to consolidate the HSQ and Intrac systems has been completed and new radios and RTUs are in the process of being installed now. The system will be operationally complete by July 1, 2007.

Operation and Maintenance Manuals
Electronic O & M (EOM) manuals are being development for the Odor Control and Biosolids projects that are under construction at this time. These manuals will serve as guidelines for structuring EOM manuals for the other treatment plants and pump stations in the future. When Route Services lead personnel are provided with laptops, EOM manuals will be phased in for the sewer pump stations.

Reactive Operations
The development and implementation of an SOP for tracking the inventory of spare pumps for the smaller pump stations is on schedule to be completed by the implementation deadline of December 2007.

Fats, Oils and Grease Control
As described in the CMOM self-assessment, MWS has developed and implemented several programs to assist with the elimination of fats, oils and grease in its sewer system. An SSO Event Tracker is a document that summarizes all locations where there has been an SSO event and lists the primary cause of the overflow. Department guidelines are under development to determine when notifications will be sent to the residences in an area identified as causing obstructions to the sewer system due to fats, oils and grease. This notification will be provided in both English and Spanish. A bill stuffer and door hanger have been developed that explain how to prevent grease from causing blockage in sewer lines. Examples of these are included in the attachments to this letter.

MWS provides grease control equipment (GCE) certification training to grease waste haulers, plumbers, engineers and others interested in receiving this certification to ensure structural and operational capability. GCE training is obtained by attending a no cost class offered by MWS. Since April 2006, 176 certifications have been given.

MWS also has an extensive public and commercial FOG education program. Information is available through various MWS web sites on residential grease recycling. A grease management video and a residential grease recycling video are periodically shown on a local cable access channel.

Service Connections/Disconnections
MWS recently completed the development of a new service connection policy. A copy of this policy is attached to this letter.

Gravity Line Preventive Maintenance
MWS tracks the actual footage cleaned monthly for each employee. The information entered into the sewer cleaning spreadsheet includes both the actual footage and the footage as a result of multiple passes in a section of sewer line. This information is also recorded according to whether the cleaning was scheduled or unscheduled. An example of this spreadsheet is provided as an attachment to this letter.

From the information in these spreadsheets, a daily total for each employee and a monthly daily average is calculated. The downtime for each employee is also recorded. A grand total of sewer line cleaned is recorded for each day.

An average of 163,427 LF of sewer line has been cleaned each month for a total of 1,470,846 LF since July 2006.

The information that is currently being recorded will be utilized to develop goals for each employee for actual footage cleaned that considers the various reasons an employee would not be available for this task and reflects that some segments of sewer will require multiple passes. These goals are on schedule to be developed by the implementation deadline of January 2008.

A priority system for when a segment of sewer needs to be inspected with television that will consider the age of the segment and the type of materials is in the development stage. This priority system will be completed by the implementation deadline of December 2007.

Gravity Line Preventive Maintenance
MWS is evaluating software to enter standard defect codes with the current Mobile Dispatch Program to determine if similar results can be obtained

Three CCTV cameras were purchased and began to be used in August 2006 to televise the 224 miles of CSO lines and other large diameter sewers. MWS is developing SOPs for the inspection of these large diameter sewers including a schedule for the inspections. This schedule will be incorporated into the goals and priorities for the entire system as discussed above. The implementation deadline of January 2008 will be met for completion of these SOPs.

Root Control
Two form letters have been drafted by MWS for use when a property owner has failed to maintain the service lines to his property and there is root intrusion into the service line. These letters are currently under review. The review and implementation of this letter will be completed by the implementation deadline on October 2007. An example of each letter is attached to this letter.

Air Valve Preventative Maintenance
MWS is compiling a list of all air release valves in the sewer system. The list includes the following:

- MWS ID number
- If the manhole for the valve needs to be pumped out
- If the valve is leaking
- If the piping is galvanized
- Depth to the top of the pipe
- If an isolation valve and main line valve are installed
- If the valve is installed on a tee or if it is direct tap
- If a flagger would be needed or is the valve located on private property

A list of the size and type of valve and the size forcemain on which it is installed at each pump station is in the process of being completed. This information will be used as SOPs are developed for inspection and replacement of the valves. These SOPs will be completed by the implementation deadline of December 2007. A copy of these lists is provided with this letter as information.

An Invitation to Bid (ITB) was recently drafted to replace 18 sewage air release valves in various locations in the MWS system. A copy of the ITB is attached to this letter.

Long-Term Control Plan
The Long-Term Control Plan is currently up-to-date.

Preliminary work has begun on a CAP/ER. This document will be completed in accordance with the scheduled developed in the final agreement with EPA.

MWS is confident the above summary demonstrates the significant effort being made across our organization to complete each of the recommendations identified during the CMOM self-assessment. We are currently meeting the schedule outlined in the report and are ahead of schedule for many of the recommendations. The self-assessment has been beneficial to MWS by evaluating the means and methods utilized to perform management, operations and maintenance pertaining to the wastewater collection and treatment system. The timely completion of the recommendations identified should improve the overall operations of the MWS system and therefore are recognized as being of primary importance.

If you have any questions regarding the information in this letter or additional questions about any aspect of the operation of the MWS system, please do not hesitate to contact me at (615) 862-4505.

Sincerely,

Scott A. Potter, P.E.
Director

Whites Creek WWTP Performance History

Per capita wastewater flow for the maximum month	1,692 gallons per capita per month (occurred in January 2006)
Per capita wastewater flow for the maximum day	95 gallons per capita per day (occurred in January 2006)
Average annual influent BOD (08/05-07/06)	87 mg/L
Average annual effluent BOD (08/05-07/06)	2 0 mg/L

Month (08/05-07/06)	Monthly Peak Daily Wet Weather Flow (MGD)	Monthly Average Daily Flow (MGD)	Ratio of Monthly Peak Daily Wet Weather Flow to Monthly Average Daily Flow
August 2005	54.7	18.0	3.0
September 2005	46.1	21.2	2.2
October 2005	22.2	13.3	1.7
November 2005	30.3	20.2	1.5
December 2005	42.0	25.5	1.6
January 2006	62.9	36.0	1.7
February 2006	48.2	35.6	1.4
March 2006	47.3	30.9	1.5
April 2006	46.3	32.1	1.4
May 2006	37.0	28.1	1.3
June 2006	28.7	20.4	1.4
July 2006	33.2	19.6	1.7

Section 3. SSO/CSO History and Summary of Rehabilitation Projects

I. SSO/CSO History

Figure 3-1 provides the annual volume of SSOs per 100 miles of separate sewer for 1990, 1995, 2000 and rolling 12-month annual volumes beginning in January 2005 through the present. Figure 3-2 provides the SSO events per 100 miles of separate sewer for 2006. The data provided is based on rolling 12-month annual events. Information presented by EPA Region 4 included a similar analysis for MOM participants. According to the EPA information, the average SSO events per 100 miles of SSS is 11 annually and the median is 8.5. As can be seen on Figure 3-2, MWS is below the EPA average for the past calendar year.

Appendix A provides more detail for the past five years of the overflow events of all available information regarding event durations, rainfall, overflow volume, type of overflow and overflow cause.

A 36-month summary of the CSO and SSO events is presented in Appendix A. These tables provide the event start and stop date, the amount of rainfall, the rainfall duration, the overflow volume, the overflow cause for each event, the location, and the receiving stream.

II. Rehabilitation Projects

A summary of the rehabilitation projects completed to date, projects that are in design or under construction, and planned projects is provided on the OAP website (www.nashville.gov.com) under the link on reports. A copy of the summary is provided digitally in Appendix B.

Figure 3-1
MWS SSO Events
(Rolling 12-month Events)

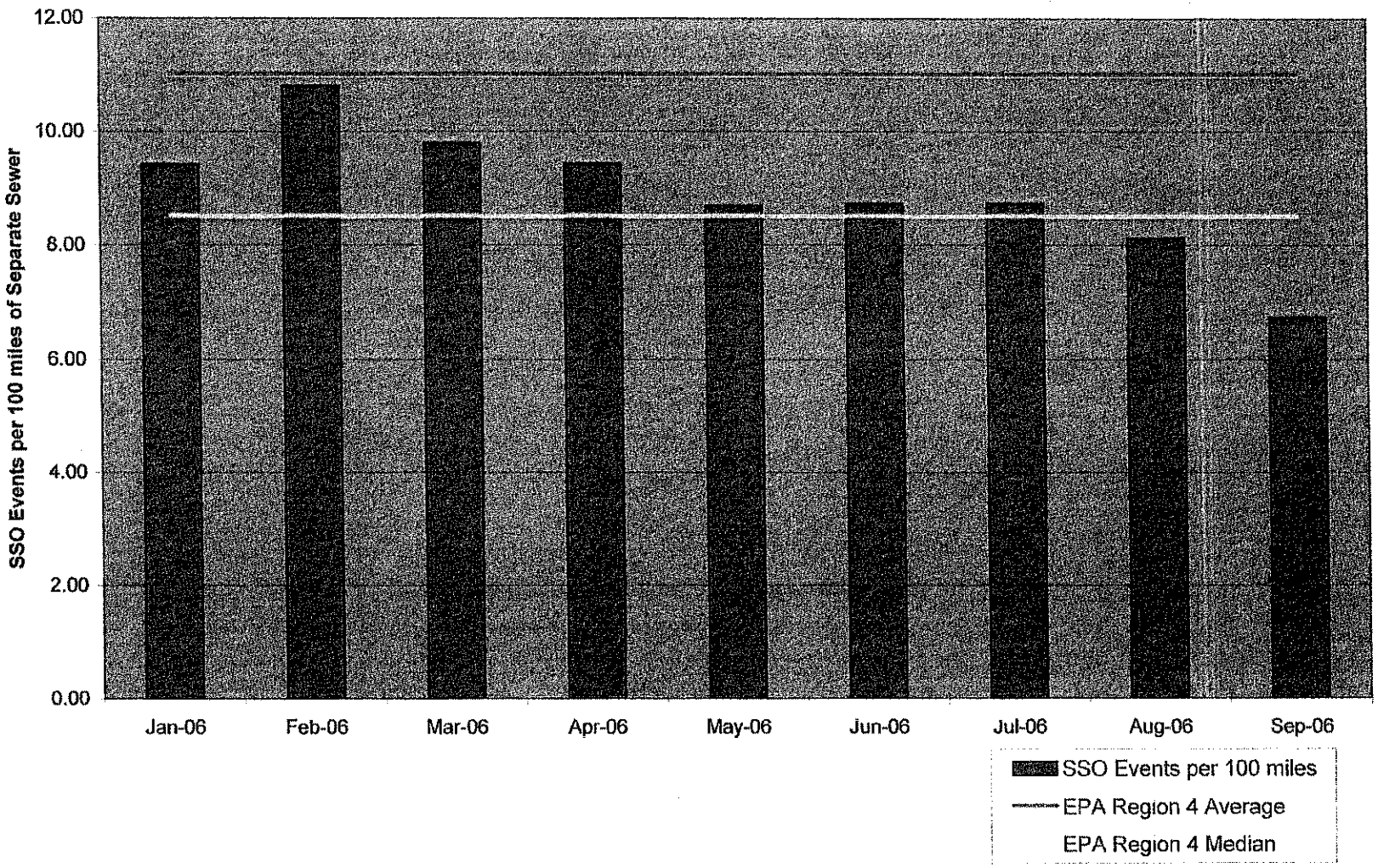
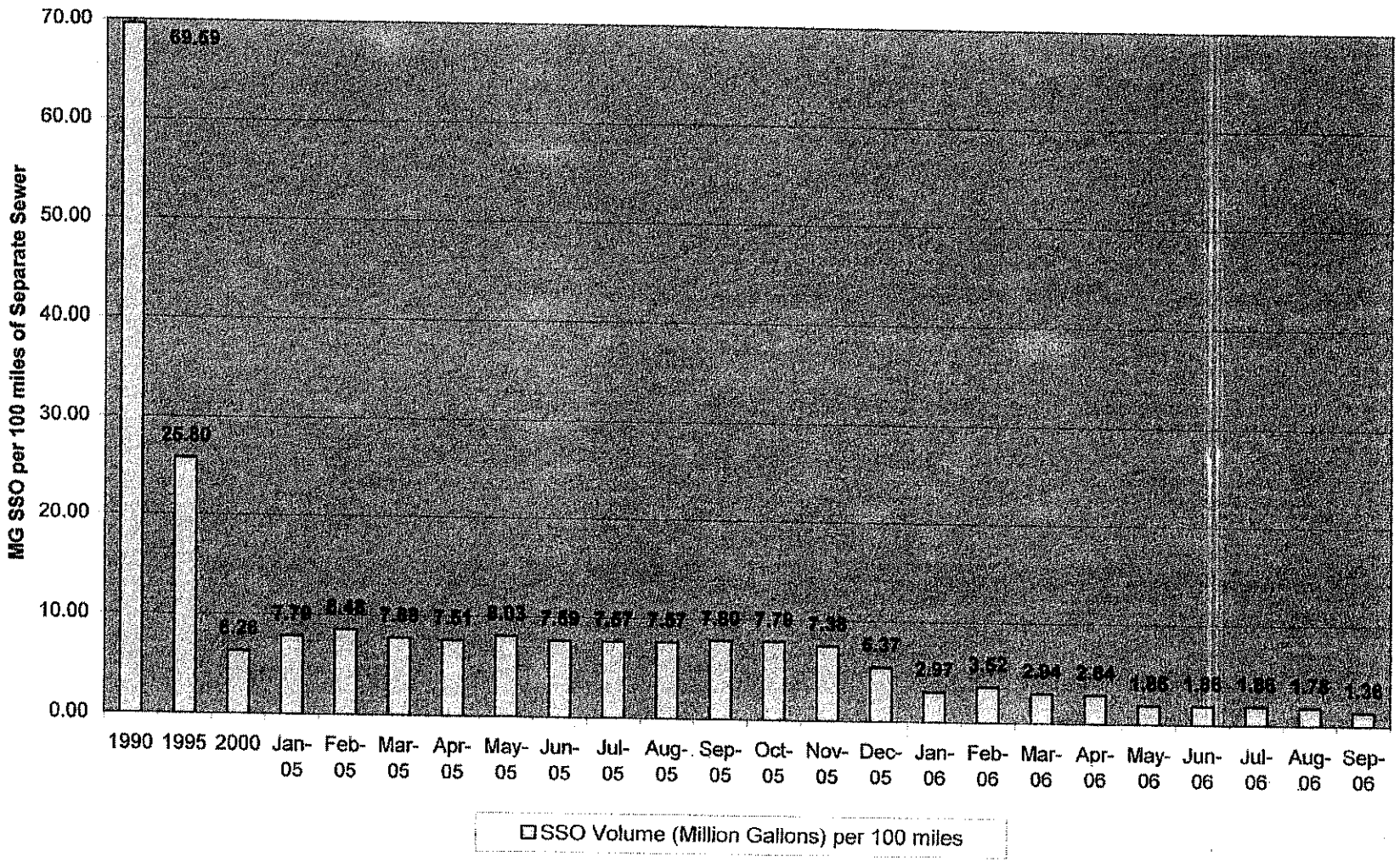


Figure 3-2
MWS SSO Volumes
(Rolling 12-month Totals)



Section 4. Management Program

I. Organization

a. Organizational Chart

Metro Water Services (MWS) is a stand-alone department within the Metropolitan Government of Nashville and Davidson County (Metro). It is solely responsible for management, operations, and maintenance of the water treatment and distribution system, wastewater collection system and treatment facilities, and storm water management. MWS provides water supply and wastewater treatment to other satellite municipalities and utilities both inside Davidson County and in neighboring counties. This service is provided to others on a contractual basis.

The MWS Department includes eight divisions; each responsible for performing work in various areas to support the overall department.

MWS Divisions

Operations

The Operations Division (Ops) of MWS consists of 264 employees performing work in the areas of water and wastewater treatment, pumpage and laboratory services. This division's contribution to MWS's CMOM objectives specifically includes operational responsibility for FOG management, industrial compliance, route services (pump station O & M), laboratory (water quality), water and wastewater treatment, and all associated operational and regulatory documentation.

System Services

The System Services Division (SSD) of MWS consists of 172 employees performing work in the areas of sewer collection and water distribution, material inventory and fleet. This division's contribution to MWS's CMOM objectives specifically includes cleaning and televising of the sewer collection systems (SSS and CSS), sewer service complaint investigations and resolutions, maintaining available and serviceable fleet, maintaining and delivering needed materials for collection system O & M, and all associated operational and regulatory documentation.

Customer Service

The Customer Services Center (CSC) of MWS consists of 111 employees performing work in the areas of meter reading, billing, receivables, permitting and accounts for service and information technologies. This division's contribution to MWS's CMOM objectives specifically includes Computerized Maintenance and Management Systems (CMMS) support, Customer Information Systems (CIS) support, billing and receivables for financial support, and all associated operational and regulatory documentation.

Stormwater

The Stormwater Division of MWS consists of 74 employees performing work in the areas of storm water management and maintenance. This division's contribution to

MWS's CMOM objectives includes watershed water quality management, storm system maintenance, combined sewer inlet and culvert cleaning, and all associated operational and regulatory documentation.

Engineering

The Engineering Division of MWS consists of 67 employees performing work in the areas of capital planning, design, and construction for both water and wastewater including water and sewer capacity management. This division's contribution to MWS's CMOM objectives includes collection system service availability, collection system modeling, capital rehabilitation and construction on the collection system, and associated operational and regulatory documentation.

The Overflow Abatement Program (OAP) is managed by this division.

Accounting

The Accounting Division of MWS consists of 17 employees performing work in the processing of operational and capital budgets. This division's contribution to MWS's CMOM objectives includes payroll for employees, requisition and voucher processing for goods and services, general utility financial processing for day-to-day operation, and all associated operational and regulatory documentation.

Human Resources

The Human Resources (HR) Division of MWS consists of 7 employees performing work in the areas of position control (hiring, disciplinary and attrition) and training. This division's contribution to MWS's CMOM objectives includes fulfilling requested staffing plans, coordinating safety and operational training, succession planning for continuity, and all associated operational and regulatory documentation.

Administration

The Administration Division of MWS consists of 7 employees performing work in the areas of legal services, public information, legislative interface and departmental direction. This division's contribution to MWS's CMOM objectives includes review and advisement of regulatory statutes, providing information to customers and media of activities, programs and events, grants and loan application and processing for funding, and all associated operational and regulatory documentation.

A copy of the Organizational Chart is in Appendix C.

b. Relation to Other Municipal Functions

As part of the larger overall County organization, other Metro departments provide certain support for MWS. This support includes human resources, financial, procurement and legal among others. MWS pays for these services through transfers to Metro via a Local Cost Allocation Plan (LOCAP). MWS also provides an annual transfer to Metro's General Fund as Payment in Lieu of Taxes (PILOT). No MWS

personnel are utilized for the benefit of other city functions or other utilities above what is required in the performance of work consistent with MWS's function.

The following is an overview of how other department's responsibilities assist in supporting MWS.

Human Resources

In addition to the HR Division of MWS, the Metro HR Department provides many support and personnel functions on a Metro-wide level. The support functions include personnel policy development, administration, consulting, and guidance to the organization. The personnel functions include human resource administration, employee selection and placement, employee compensation and benefits, job classification, worker compensation administration, management and employee development, and employee relations.

Finance

The Metro Finance Department provides additional support to the Accounting Division of MWS including

- procurement services for a variety of commodities and services necessary to insure prompt and efficient operations of MWS;
- guidance and assistance in the development and administration of the operating and capital budgets for MWS;
- Treasury Office of Finance manages the investment of MWS funds and handles fund disbursement;
- Surplus Property Division handles disposition of surplus MWS assets and remits the proceeds back to MWS.

Legal

The Metro Legal Department provides legal services and advisory opinions to MWS on departmental issues and contracts and agreements, and is responsible for handling all claims against MWS. They represent MWS in Environmental Court when necessary for prosecuting violations of all water, sewer, and storm water ordinances.

Health

The Metro Health Department oversees sewage disposal systems such as septic tanks that are not connected to the public sewer collection system. They are also responsible for enforcing connections to the sewer system when problems, such as failed septic systems, emerge and public sewer service is available. MWS coordinates with them to resolve problems that arise when septic tanks fail.

The Health Department also assists as needed with water quality issues with the public drinking water supply and distribution.

General Services

Metro General Services provides support to MWS in three areas.

- Fleet Management is responsible for providing MWS with properly maintained vehicles and equipment to aid MWS in performing daily job duties.

- Real Property Services assists in building design, reconstruction, and major repairs by providing technical guidance and management support. They also recommend and procure office furniture and equipment.

- The Radio Shop maintains and operates an 800 MHz radio system for emergency communications. The system includes more than fifty radios strategically located to serve as a back-up system for internal and inter-agency communication should the primary systems fail.

Information Technology Service (ITS)

ITS provides information technology and telephony, develops and implements recommended standards for information technology, develops and maintains security policies and systems, and coordinates the acquisition of information technology for MWS. ITS operates and maintains the network and hardware.

The Information Services Division of MWS, currently residing within the Customer Service Division, maintains software used specifically within MWS.

Planning

The Metro Planning Department provides support, policy recommendations, and advice concerning the City's future growth and development.

Public Works

MWS pays for pavement repair when excavation is necessary due to water, sewer, or storm water repairs or for system upgrades in a roadway. Occasionally MWS will participate with the Public Works Department on capital paving projects where Public Works covers the expense of paving restoration. MWS coordinates any utility relocation and/or upgrades with these types of projects when possible. The same relationship exists between MWS and the Tennessee Department of Transportation (TDOT) for similar projects. Casting adjustments to an existing infrastructure are also accomplished through Public Works and/or TDOT contracts and is reimbursed through financial transfer of funds.

City Clerk

The City Clerk maintains copies of resolutions and ordinances passed by the City Council related to the operation of MWS. This office also maintains copies of any contract that is entered into by MWS on behalf of Metro.

II. Training

a. Technical Training Program

Training of the employees at MWS is overseen by the Training Section of the MWS HR Division. This section is responsible for ensuring that employees receive mandatory and professional development classes. Educational and development opportunities are provided through training services and counseling in three key areas: mandatory training and professional development, targeting (advancement), and educational reimbursement.

MWS employees are required to participate in a number of mandatory training classes by the Mayor's office, the Civil Service Commission, and the Federal Government. These mandatory courses are vital to an employee's development as a civil servant and are necessary for them to become familiar with established Federal, State, and local laws and department guidelines. Mandatory training classes often deal with issues consistent with the Federal Labor Standards Act (FLSA) such as workplace violence, sexual harassment, and safety related issues.

A request for a new employee to attend mandatory training is initiated by the section supervisor. This allows the supervisor to account for the employee's absence from assigned duties due to participation in the training class and potentially altered work assignments.

Mandatory training classes are held continually throughout the year on-site or at a location designated by Metro's HR Department. The mandatory classes are taught or overseen in-house by the Training Coordinator or the Safety Coordinator. When an employee is not able to take a training class taught by MWS, they have the option of attending a class taught by Metro's HR Department since the classes have the same content. At the conclusion of class, the roster is collected and entered into tracking software at both MWS's and Metro's HR Department. Metro's HR Department maintains the official employee training record. An example of an employee's training record is shown in Appendix D.

Employees are also able to take professional development classes to further develop existing skills or gain knowledge on new technologies and workplace innovations.

The flowchart in Figure 1 depicts the processes for enrollment in these classes.

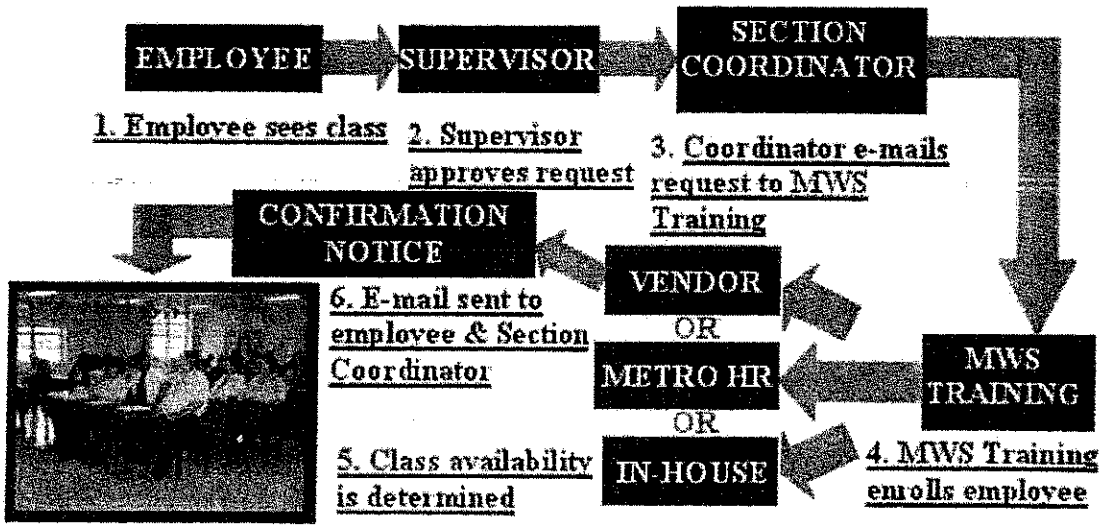


Figure 4-1. Enrollment Flowchart through Technical Training Program

Some employees of MWS are able to automatically target (advance) to the next level in their job classification once they have completed a specified training curriculum. The MWS Training Section oversees this targeting process and guides employees to the classes necessary for a job classification upgrade to occur.

MWS employees are given the opportunity to further their education through educational reimbursement. This is beneficial for employees interested in completing their high school education, as well as those seeking a college degree. Employees interested in taking advantage of this opportunity receive counseling from the MWS Training Section regarding program guidelines and requirements.

b. Skills Training Program

Training on the use of specific equipment to be used and procedures to be followed to carry out job-specific duties are coordinated by the specific division or section within MWS. Typically this includes vendor training workshops, manufacturer training workshops, conferences, or on the job training. Some skill training courses also provide certified operators continuing education hours.

Recommendation

MWS will conduct periodic testing, drills and demonstrations of competency training. This will be implemented by July 2008.

c. Safety Training Program

All employees are required to participate in OSHA required training classes; however, not every employee will participate in all of the mandatory safety training. Safety training is dependent on the type of job an employee performs. Classes such as First Aid and CPR are provided to all employees, but other safety classes such as rigging and lifting or lock-out/tag-out are exclusive to employees that perform safety sensitive duties.

Many safety classes are video driven instead of instructor-led. Each division is responsible for conducting the necessary training specific to their work when an instructor is not required.

The Safety Coordinator, with assistance from the Training Coordinator, conducts instructor-led safety training for the divisions. The Safety Coordinator must ensure that annual safety training is conducted in each required division.

The Metro HR Department does not oversee the safety training that is conducted at MWS since that training is regulated by OSHA and other occupational safety organizations. Consequently, MWS is solely responsible for tracking these safety training records.

Table 1 lists the different safety training requirements, who must receive the training, and the frequency at which the training classes must be taken.

Table 4-1. Safety Training Requirements

Safety Training Requirements	Who Receives	How Often
Employee Emergency Plans and Fire Prevention Plans 29 CFR 1910.38	All Employees	Annual
Process Safety Management 29 CFR 1910.119	All Employees where relevant	Annual
Personal Protective Equipment 29 CFR 1910.132	All Employees where relevant	At Time Of Initial Employment
Respiratory Protection 29 CFR 1910.134	All Employees where relevant	Annual
Permit Confined Spaces Entry 29 CFR 1910.146	All Employees where relevant	Annual
Lockout/Tagout 29 CFR 1910.147	All Employees where relevant	Annual
Fire Protection 29 CFR 1910.155	Designated Employees	Annual
Portable Fire Extinguishers 29 CFR 1910.157	Designated Employees	Annual
Powered Industrial Trucks 29 CFR 1910.178	Designated Employees	Biannual
Bloodborne Pathogens. 29 CFR 1910.1030	All Employees where relevant	Annual
Hazard Communication CFR 1910.1200	All Employees where relevant	Annual
Laboratory Safety 29 CFR 1910.1450	Designated Employees	Annual

III. Safety Program

It is the goal of MWS to conduct its operations in a safe and efficient manner with the utmost regard for the safety of both employees and the public. It is the policy of MWS to develop and administer a comprehensive safety program to eliminate and/or limit the exposure of MWS employees to hazards that may cause physical harm and loss of MWS property. Every effort is made by all levels of management to prevent injury and loss to employees.

The MWS Safety Program complies with the safety policies of OSHA of 1970 and the Tennessee Occupational Safety and Health Act (TOSHA) of 1972, and all Federal, State, and local safety codes and legislation. The Program also adheres to the requirements of the OSHA 200 Log and Summary of Occupational Injuries and Illnesses.

The key points of the MWS Safety Program are:

- Designating a Safety Coordinator to represent the Director and Assistant Directors in all matters of safety.
- Identifying and eliminating unnecessary hazards.
- Providing employees with the necessary training and, where required, specialized equipment so the necessary tasks to operate and maintain essential water and wastewater services can be safely performed when a recognized hazard cannot be eliminated.
- Minimizing the undesirable effects of an accident by providing rescue equipment and training.
- Establishing and maintaining records to identify, analyze, and evaluate health and safety problems.
- Requiring all MWS employees to follow all appropriate safety standards, rules, and regulations in the performance of their duties.

A safety checklist is utilized to document all site visits conducted by the Safety Officier.

a. Safety Authority

MWS has 14 individual safety committees throughout its department and a MWS Safety Council made up of safety chairpersons from each committee. Each committee and the council meets monthly.

The Safety Officer is responsible for implementing the MWS safety program and for coordinating and meeting with the safety committees and Safety Council.

b. General Safety Procedures Program

The Safety Programs followed by MWS are listed below and are included in Appendix E.

Safety Office Policy Statement

S-1	American Red Cross First Aid, CPR and AED Program
S-2	Americans with Disabilities Act Program
S-3	At Fault Vehicle Accident Review Team (Safety)
S-4	AWWA Safe Handling of Water Treatment Chemicals
S-5	Bloodborne Pathogens Program
S-6	Cave-In Protection During Excavation and Trenching Program
S-7	Metro Water Services (MWS) CMOM Program
S-8	Coaching the Backhoe Operator Program
S-9	Commercial Drivers License (CDL) Program
S-10	Confined Space Entry Program
S-11	Defensive Driving Course Program(s) (6 and 4 hour)
S-12	Emergency/Evacuation and Notification Plan
S-13	FEMA's Domestic Preparedness Awareness Training Program
S-14	Hazard Communication (Right-To-Know)
S-15	Hazardous Waste Management Program
S-16	Hearing Conservation Program
S-17	Incident Command System (ICS) Training Program (Through Terrorism or Natural Disaster)
S-18	Lead/Lead Paint Removal and Abatement Program
S-19	One on One Coaching Program
S-20	Recordkeeping Guidelines for Occupational Injuries and Illnesses
S-21	Personal Protection Equipment (PPE) Program
S-22	Powered Industrial Trucks and Forklift Training Program
S-23	Process Safety Management (PSM)
S-24	Protecting Your Safety and Health in the Plant Programs
S-25	Radiological Health and State License Program
S-26	Respiratory Protection Program
S-27	EPA's Risk Management Program (RMP)
S-28	Safe Operation of Heavy Equipment
S-29	Safety Shoe Voucher Program
S-30	Substance Abuse Policy

c. Traffic Management Procedures Program

MWS follows all traffic management procedures as required by TOSHA and TDOT.

d. Lock-Out/Tag-Out Program

MWS has a written lock-out/tag-out procedure included in Appendix E.

e. Safety Equipment Program

Appropriate safety equipment is provided for every MWS employee. Specific safety equipment programs listed in **Management Program, Section III.b. General Safety Procedures Programs** and included in Appendix E are:

- Personal Protection Equipment (PPE) Program
- Respiratory Protection Program
- Safety Shoe Voucher Program

Additional equipment maintained by MWS includes harnesses, tripods, hoists, and fire extinguishers as required in other general safety programs.

f. Safety Performance Program

MWS records occupational injuries and illnesses (Safety Office Policy Statement S-20 Recordkeeping Guidelines for Occupational Injuries and Illnesses) according to OSHA's guidelines. The Safety Council (**Management Program, Section III.a. Safety Authority**) reviews records regularly and implements corrective actions as necessary.

Each Safety Office Policy Statement (**Management Program, Section III.b. General Safety Procedures Program and Appendix E**) includes performance measures and program evaluation.

IV. Information Management System (IMS)

The Information Services (IS) Section within the Customer Services Division of MWS provides application support for the software applications used by MWS to track operations, system maintenance, and customer service. Computer server, network, and desktop PC support for MWS is provided by the Information Technology Services Department of Metro.

The applications supported are utilized by various divisions of the department in support of their day-to-day operations.

The following is a list of systems supported by MWS IS:

- Peoplesoft is used for time reporting, training records, leave reporting, and maintaining employee job history and information.
- HANSEN is used to support the Computer Maintenance Management System (CMMS), which is used to track work orders. An example work order is provided in Appendix F.
- Wonderware/System 6 is used for treatment plant process control.
- HSQ is used for SCADA systems for the wastewater system.

- Cityworks is used by the Stormwater Division to track service request and work orders. It is comparable to CMMS.

- HTE's Customer Information System is used for customer and location status, account history, utility billing, and accounting.

- LABWORKS ES LIMS is used to manage laboratory data.

- Engineering Project Tracking System is used to track the status of construction projects

- ESRI's Geographic Information System is used to store and display spatial information for water, wastewater, and stormwater systems.

The following list is of systems supported by Metro ITS.

- KIVA - Permitting system used by MWS as well as other departments.

- EBS - PeopleSoft financial system used by all departments of the government.

- Imaging - MWS has implemented document imaging systems for service locations, backflow inspection reports, Engineering files, and video inspection logs.

New Information Management Systems are continually being considered and tested. The FOG database SOFT has recently undergone beta testing (**Operation Program, Section IV. Fats, Oils, and Grease Control Program**), and an Asset Management Program is being developed. Customer Service and Systems Service are in the process of implementing a mobile dispatching system to improve response time to system problems and customer request for service.

Recommendation

MWS will develop and implement a process for reviewing all inspection, maintenance, operation and customer complaint records to identify reoccurring problems. This process will include a corrective action plan to address reoccurring problems that develop. This process will be ready for implementation in January 2008.

V. Engineering

a. Collection and Transmission System Plans Program

MWS requires as-built drawings in both hard copy and digital formats for all new construction in the collection system. Plan submittal requirements are included in the Guide to New Construction, accessible at the website: http://www.nashville.gov/water/permits_handbooks.htm.

Acceptance of a new facility and final payment to the contractor is contingent on receipt of all required documents. The inspection staff maintains a file of all

documents pertaining to the project until a complete set of required documents is received. Once the file is complete with all final documents, the as-builts are sent to the GIS/Records Unit to be entered into the GIS.

b. System Inventory and Mapping Program

Several years ago, MWS recognized the need to accurately maintain detailed records for the sewer collection system. Prior to implementation of the current Geographic Information System (GIS), historical information was stored on paper maps and in multiple notebooks maintained by the GIS/Records Unit. MWS invested in a multi-million dollar project to create a digital format that could be easily accessible to office and field personnel. The current GIS utilizes ArcView® software manufactured by ESRI.

To convert the information to the GIS environment, all existing paper plats were imported into the GIS along with select as-built attributes including invert elevations, rim elevations, pipe diameter, line segment lengths, pump station location, and force main information.

The MWS sanitary sewer system records are managed by the GIS/Records Unit of the Design and Development Review Section. The GIS/Records Unit of the Engineering Division is responsible for maintaining and updating maps of all existing sewer infrastructure. The goal of the GIS/Records Unit is to provide the department with the latest detailed collection system information for performing daily operation and maintenance on the collection system. Current information is also used to guide future development within the MWS service area.

All projects received by the GIS/Records Unit from the inspections staff are entered into the system. A log is maintained of the project as-builts that are received and that are mapped. The Supervisor of this unit checks the log to verify the progress on projects.

The GIS is accessible to all employees of MWS. MWS uses the GIS to investigate customer complaints, locate utilities, and generate work orders related to maintenance, repairs, relocations, and extensions of the collection system.

In early 2006, MWS contracted with an engineering consultant to convert a large backlog of projects into GIS. A backlog of projects is not a common occurrence. The backlog was a result of the need to enter past projects into the system. MWS has the resources to enter current and future projects. Previously, MWS's staff was involved in QA/QC during the data conversion of past projects.

The GIS/Records Unit updates the sanitary sewer maps as they receive the converted files. Continual quality assurance/quality control evaluations on the sewer atlas to ensure accuracy and user confidence is conducted by the GIS/Records Unit. Field personnel from all divisions of MWS assist by noting data discrepancies and submitting to the GIS/Records Unit for correction.

The GIS with the computerized maintenance management system (CMMS), which is used by the System Services Division and Operation Division of MWS to track work requests and maintain historical data on repairs to the system, is maintained and updated.

In addition to sanitary sewer collection system data, the GIS also contains additional information pertaining to the City of Nashville which is maintained by the Metropolitan Planning Department. This information can be displayed when necessary. The data available includes other utilities, water topography, map and parcels, zoning, land use, wetlands, and floodplain data.

c. Sewer System Design Program

The Design and Development Review Section of MWS manages the design of all collection system capital projects of the department and reviews collection system design plans for extensions of the sewer serving new development. Construction documents are prepared by both in-house staff and outside consultants.

Standard technical specification and construction details are included in the Guide to New Construction. This document is located on the following website: http://www.nashville.gov/water/permits_handbooks.htm.

As-built drawings are required in the Guide in both hard copy and digital form upon the completion of a sanitary sewer project. This requirement is part of the "lay and deed" process (see **Management Program, Section V.d. New Construction and Rehabilitation Inspection Program**) and must be completed before final acceptance of the project.

Technical requirements that apply to all aspects of collection system construction are included in the Guide. The following are types of projects addressed.

- New Gravity Line Construction
- New Pump Station and Force Main Construction
- Existing Gravity Sewer Relocations
- Pump Station Upgrades
- Force Main Relocations

The Guide to New Construction is reviewed and updated periodically to reflect changes in TDEC requirements, MWS preferences, and feedback from MWS inspectors, MWS engineers, and consulting firms that are using the Guide on a daily basis. The most recent update to the Guide was completed in March 2004.

The Guide incorporates the TDEC Division of Water Pollution Control *Design Criteria for Sewage Works* as the standard document for designing all sanitary sewer collection

systems. The TDEC document is supplemented by the *Recommended Standards for Wastewater Facilities*. MWS has delegated authority from TDEC which allows MWS to approve plans without submitting the plans to TDEC.

The purpose of the Guide is to ensure that all new sanitary sewer system construction is adequately designed and constructed using specifications that ensure the integrity of the new infrastructure. For design issues not addressed in the guide, design engineers are required to provide technically supported design procedures that must be approved by MWS.

d. New Construction and Rehabilitation Inspection Program

The Construction Inspection Section is responsible for the construction administration and inspection of all new sanitary sewer lines and public water mains extensions in Davidson County and of connections to the MWS system from the five adjoining counties. Within this section, there are six independent units whose role is to assist and support each other and internal and external customers. The units are Casting Adjustments, Patch Paving, Overflow Abatement Program, Lay and Deed Projects, Contract Projects, and Deeds and Bonds. The Casting Adjustments Unit and Patch Paving Units are discussed in **Maintenance Program, Section IV.c. Street Paving Monitoring Program**.

All inspectors are required to ensure the project meets the MWS specifications while under construction. The inspector completes daily reports documenting construction activities for each day he is on-site. These reports are maintained as a part of the project file.

MWS augments the inspection staff with inspectors from engineering consultants when necessary. These consulting inspectors are responsible for all aspects of the project required for MWS inspector.

Depending on the nature of the project, the inspector is responsible for:

- Pre- and post-televising of sewer lines that are rehabilitated
- Confirming air tests on sewer lines
- Confirming vacuum tests on manholes
- Taking samples of liners to the lab
- Ensuring that yards and driveways are restored in a timely manner
- Maintaining an up-to-date record of construction activities
- Reviewing all pay requests before payment is made to the contractor
- Ensuring plans and specifications are followed

- Ensuring a set of red-line and as-built drawings are maintained by the contractor
- Answering and following-up on complaints from the property owners
- Overseeing any testing related to water distribution systems
- Documenting run-to-curb measurements
- Coordinating with contractors to ensure the impact of project activities on the general public is minimized
- Ensuring projects are installed in the most cost-effective manner
- Ensuring all required changes have the appropriate documents prepared per the "Regulations to the 1992 Procurement Code- Revised 17 June 2004"
- Ensuring all contract requirements are met (i.e. insurance, bonds, releases, etc.)

Overflow Abatement Program

When a contractor is awarded an OAP project, an inspector is assigned to that project. If MWS does not have available staff to inspect the project, an inspector from an engineering consulting firm will be utilized, often from the design engineering firm.

Lay and Deed Projects

The Lay and Deed Unit has the responsibility of overseeing new water mains and new sewer lines built by a private utility contractor hired by a private developer or engineer. MWS assigns an inspector to each project because these projects will become a part of MWS's infrastructure upon completion of the project.

After completion, the construction project and the utilities are deeded to MWS to become part of the MWS's Infrastructure Assets.

Contract Projects

MWS also provides inspection services for contract projects. Bi-weekly meetings are held with the project team on each project. On large scale projects, the public is invited to attend to provide input on behalf of the community.

Deeds and Bonds

The Deeds and Bonds Unit prepares all the paperwork dealing with the legal transfer of privately-built mains between a developer and MWS and sets and tracks the performance bond amounts. The Deeds and Bonds Unit is the bond holder in all cases except where Planning Commission approval is required.

MWS assigns an inspector to each of these projects because these projects will become a part of MWS's infrastructure upon completion of the project. After the project is complete, this unit prepares a deed of conveyance to transfer the property from the developer to MWS.

Recommendation

MWS will develop standard operating procedures for conducting construction inspections that include methods for documenting inspections and maintaining the documentation. Training requirements for all inspectors will be included. Other means for managing data to closeout projects will be evaluated. The SOPs will be ready for implementation by January 2008.

e. Acquisition Considerations Program

New Construction (Private Developments)

New private sewer lines that connect to the MWS system are inspected during construction. In Davidson County, the codes enforcement department performs the inspection.

Existing Sewer

MWS does not have a written policy on acquiring existing sewerage service areas. In the past, Metro has been approached and has accepted the ownership, operation, and maintenance responsibilities of several smaller sewer systems. Any sewers incorporated into MWS' system are required to comply with MWS' standards or have a plan to bring the sewer system to standards before it was accepted. The plans are finalized detailing needed system maintenance once the sewer systems were transferred to MWS.

The Engineering Division and independent consultant assisted with evaluation and recommendations on acquisition of these systems. The Administration Division is responsible for all other aspects of the transfer of these systems to MWS.

Recommendation

MWS will develop and implement a standard policy for acquisition of existing sewer systems. This policy will include a plan for bringing sewer systems up to MWS's requirements and standards if the existing system doesn't meet them and the criteria that will be used for the determination of the financial aspects of the acquisition. This policy will be completed by January 2008.

Easements

Property rights are necessary for the installation, operation, and maintenance of both water and wastewater facilities. Property rights are obtained for specific projects under the authority granted to Metro by the State of Tennessee

As work progresses during the planning and design on a specific project, a request for approval to acquire property rights for that project is submitted to the Metropolitan Planning Commission (MPC). The MPC reviews the project for compliance with the Capital Improvement Budget (CIB) and acts to approve or disapprove the project moving forward.

With the approval of the MPC, an ordinance is submitted to the Metropolitan Council for the acquisition of property rights for the planned project. This document identifies the specific parcel(s) of land from which property rights will be sought. Upon passage of three readings by the Metropolitan Council, approval by the Mayor, and certification by the Metropolitan Clerk, MWS may pursue acquisition of the necessary property rights.

Engineering drawings and descriptions of the property rights to be acquired are prepared and an independent public appraiser makes a determination of value for the rights to be acquired. The property owner is contacted by MWS staff and negotiations to obtain the property rights are pursued. If a negotiated settlement with the property owner cannot be reached, and a reasonable alternative to avoid the need for the property rights cannot be identified, MWS will turn the acquisition process over to the Department of Law. That Department will seek acquisition by either negotiation or condemnation in order to provide the required property rights for the project.

Once the property rights have been acquired, the documentation of those rights is filed with the Registrar's Office of Davidson County to ensure the rights become a permanent record with the property deed. Property rights obtained for projects located in the MWS's service area which are outside of Davidson County are made permanent record in the Registrar's office for the county in which the land is located. Recording property rights documents is crucial to the long term protection of MWS facilities.

MWS maintains files on the active projects for which property rights acquisition activities are underway and reports the status of the activities on an as-needed basis. In addition, MWS's Engineering Tracking System is updated to reflect property rights acquisitions as they are completed. These records include the instrument number for the documents as they are recorded in the Registrar's Office to facilitate future reviews of information.

f. Continuous Sewer System Assessment Program

MWS does not use the term "Continuous Sewer System Assessment Program" (CSSAP). However, MWS conducts many activities that meet the intent of a CSSAP.

i. Prioritization

The prioritization matrix is discussed below in **Section V. g., Infrastructure Rehabilitation Program (Overflow Abatement Program (OAP))**.

ii. Dyed Water Flooding

Dyed water flooding is used on a limited basis in situations where there is a significant amount of I/I but site conditions necessitate the use of a point repair rather than relining or replacement, such as removal of a direct storm sewer connection. These instances are very rare; however, all sewer crews carry dye tablets and use the tablets as needed to confirm flow sources.

iii. Corrosion Defect Identification

Corrosion defect identification is an integral part of MWS's OAP. Corrosion defect identification is accomplished by routine pump station inspection and manhole inspections. Chemical corrosion control is used at 19 pump stations located throughout the system. See **Operation Program, Section III. Corrosion Control Program** for more details on the program.

iv. Manhole Inspection

Manhole conditions are assessed by cleaning crews, the manhole rehabilitation crew, or a contract crew. As routine cleaning is performed, the cleaning crews observe and note any manhole deficiencies on their cleaning or TV logs. When a basin is targeted for rehabilitation, the manhole crew or the contract crew inspects each manhole in the basin. The resulting information is used to develop work orders for the manhole crew to correct, to assign to a contract manhole rehabilitation crew, or to include in a rehabilitation project. (See **Maintenance Program, Section II.c. Manhole Preventative Maintenance Program** for more detail.)

In addition, $250,000 is designated in the annual capital budget to conduct additional manhole inspections outside of those completed during rehabilitation projects.

An example manhole inspection form is in Appendix G.

v. Flow Monitoring

MWS has 61 permanent flow monitors installed in sewer lines ranging in size from eight inches to 84 inches in diameter. These flow monitors are installed at the outlet of the intermediate drainage units (IDU) in the collection system. The data from these flow monitors are used for model calibration, flow trending, and to direct the efforts of the OAP. The effectiveness of the OAP rehabilitation efforts is determined utilizing flow data from the permanent network of flow monitors as well as additional temporary flow monitors that are installed as needed. For each basin identified for rehabilitation, the basin is divided into smaller units and temporary flow monitors installed for more intense study. Typically, after rehabilitation efforts are complete, the temporary monitors are reinstalled during wet weather events to monitor the effectiveness of the project and to determine if any additional work is needed.

In addition to the permanent flow monitor locations, MWS also has 22 flow monitors installed in overflow lines from bleeders and sewer pumping stations. (A bleeder is a pipe added to an existing manhole to convey overflows from the manhole to a designated location. The main purposes are to allow overflows to be monitored and to prevent property damage and public health concerns from overflows occurring in streets or into a home.) There are 19 tipping bucket rain gauges installed across the service area. These flow monitors and rain gauges are used for monthly reporting to TDEC to comply with MWS's NPDES permits.

Operation and maintenance and data analysis for the flow monitoring network is performed by a national consulting firm. The contract stipulates that each monitor

must be operational 95% of the time for the contractor to be paid for that monitor that month. A report is submitted by the consulting firm with data from the monitors to confirm the operations.

When the contractor observes grease or debris in the sewer, System Services Division personnel are contacted to investigate and clean the sewer lines. If any significant change in flow is noted when evaluating the flow data, the System Services Division is also notified to investigate and corrective action is identified. Figure 2 shows the flow monitoring locations.

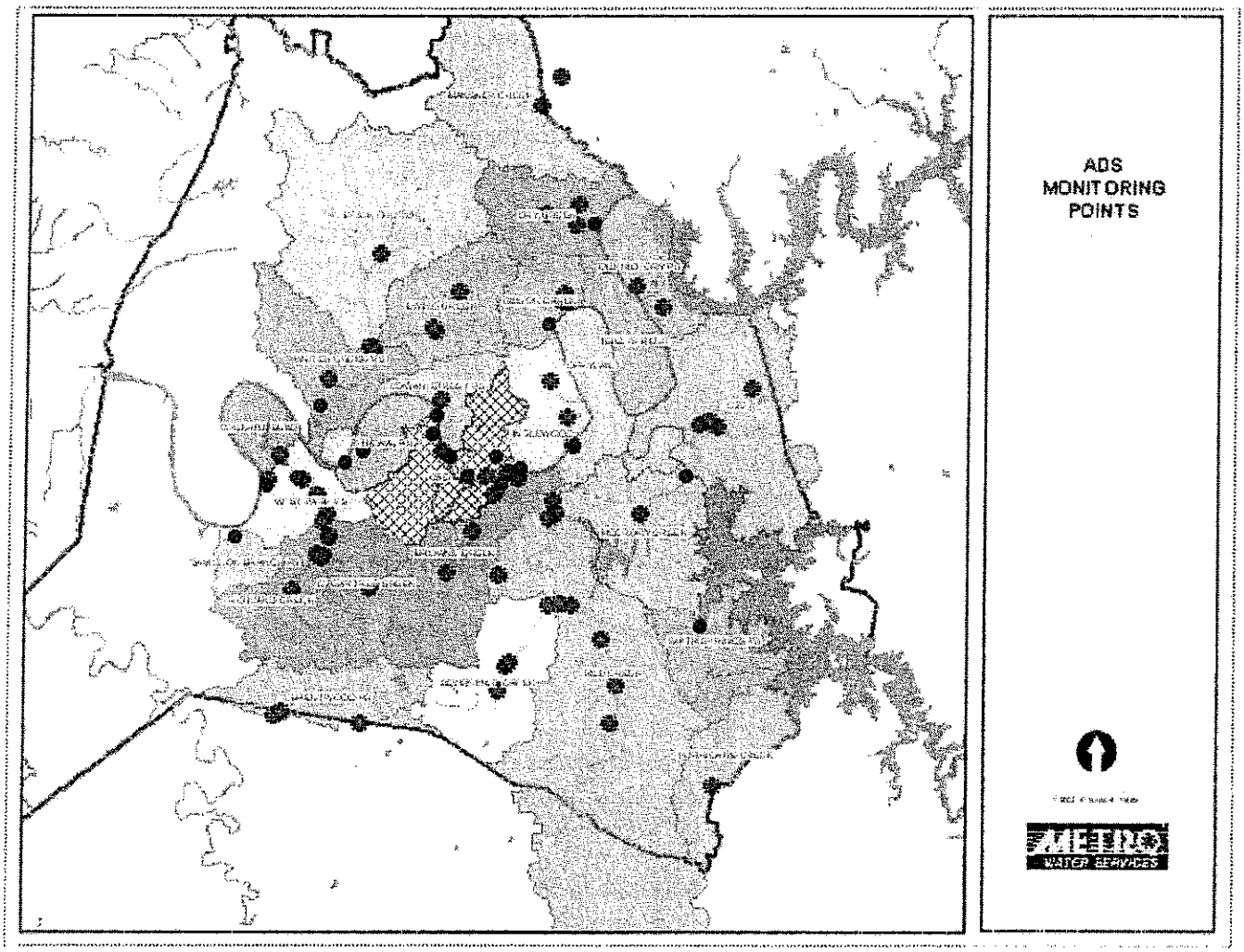


Figure 4-2. Flow Monitoring Locations

vi. Closed Circuit Television (CCTV)

Daily closed circuit television (CCTV) and cleaning are performed by MWS's System Services TV and cleaning crews (See **Maintenance Program, Section V.c. Gravity Line Preventative Maintenance**). The TV and cleaning crews plan their work, but also adjust priorities to respond to customer complaints, sewer blockages, sewer

overflows, requests to locate new services, etc. Other factors involved in scheduling the work are:

- Meeting the goal to inspect and clean all sewer lines within the next 3-5 years
- Need for documentation of sewer system condition downstream from industrial customers who may discharge materials that could harm the sewers
- Inspection and cleaning of grease generators
- Assistance with televising lines during wet-weather events to identify I/I for the OAP
- Inspection of sewers to define areas for rehabilitation. TV information is used by engineering consultants or System Services to develop bid packages with line segments and manholes to be rehabilitated.

During cleaning or CCTV work, if a problem is observed that requires correction, the crew leader prepares a work request to correct the problem or report to the OAP. Daily work is entered in the CMMS. The Sewer Maintenance Supervisor also maintains daily records of the footage of sewers cleaned and televised and accumulates the monthly totals. The monthly totals are used to monitor progress versus the goals and objectives for the CCTV and cleaning work.

Recommendation

MWS will develop and implement standard line condition codes (1 to 5) for use when televising sewer lines. These codes will be manually recorded on TV Inspection Reports. Implementation of this recommendation will be completed by November 2006.

MWS will implement modified data entry into CMMS to allow entry of the standard sewer line condition codes from the TV Inspection Reports by January 2007.

MWS will evaluate the software to enter standard defect codes from guidelines in to CMMS by April 2007.

vii. Gravity System Defect Analysis

Gravity system defect analysis is an integral part of MWS's OAP, as discussed in **Section V.g Infrastructure Rehabilitation Program (Overflow Abatement Program, OAP)**. The purpose of the gravity system defect analysis program is to establish consistent standard procedures and guidelines for defect identification. Under the direction of the recently implemented Asset Management Program, MWS is in the process of implementing criteria to observe and document the condition of a sewer line on a scale of one to five and provide consistent guidelines for defect identification. This allows different crews and/or subcontractors to use the same

standard terminology for categorizing defects, which allows the reviewer to better prioritize defects in respect to future rehabilitation.

viii. Smoke Testing

The purpose of smoke testing is to identify sources of direct surface water runoff into the sanitary sewer collection system during periods of wet weather. Smoke testing is generally performed during dry-weather and conducted as a supplement to CCTV inspection as needed.

ix. Service Lateral Investigations

Service laterals are the responsibility of the property owner from the dwelling to MWS's main sewer line. Service lines are televised on a case-by-case basis when a licensed plumber has determined that there is a problem under a street or sidewalk. MWS will televise the service line inside the right-of-way or easement to confirm the presence of the problem and its location, and make repairs as necessary. Proposed legislation is in process to further clarify ownership of service lines and enable MWS to perform necessary repairs inside rights-of-ways or easements.

x. Pump Station Performance and Adequacy

The purpose of the pump station performance plan is to ensure that the pump stations are performing as designed. MWS follows the State's requirement that pumping design capacities must be met in the event that the largest pump at a given station is not operational.

All of MWS's 101 pump stations are continually monitored in the central control room at MWS's Omohundro WTP. Records of each pump station's performance are maintained in order to determine if a pump station is in need of repair or upgrade.

A copy of a pump station's inspection form is located in Appendix G.

Recommendation

MWS will develop and implement standard operating procedures for all assessment practices including technical procedures for carrying out each practice and a means to ensure follow-up is completed on information that is documented during any assessment practice. All current forms will be reviewed to determine if the appropriate information is being obtained and new forms will be developed as necessary. A written standard method of prioritization of all assessment practices will be included. This work will be completed by October 2007.

g. Infrastructure Rehabilitation Program (Overflow Abatement Program, OAP)

Representatives from Region 4 EPA made site visits to MWS in December 2005 and June 2006. Both site visits consisted of formal presentations by MWS staff on specific topics, followed by tours of both CSS and SSS facilities.

On December 5 & 6, 2005, a presentation was made at TDEC's offices to both EPA and TDEC staff members. The presentation included an update on the status of MWS's OAP, the Wastewater Capacity Management Plan, the Master Wastewater Growth Plan, Flow Monitoring, Modeling, and SCADA capabilities, the Fats, Oils, and Grease Program, operation of the three wastewater treatment plants, and the Watershed Management Plan for Water Quality in local streams and rivers. A tour of some of the CSS facilities and other active SSS construction project sites was conducted for the attendees.

In January 2006, MWS received an information request from EPA under Section 308 of the Clean Water Act. The requested information was assembled and delivered to EPA as required on February 3, 2006.

On June 28 & 29, 2006, presentations were given at MWS's offices to EPA representatives on the Nine Minimum Controls efforts for CSO discharges, the Long Term Control Plan for the Combined Sewer System, and the status of the OAP. Tours were conducted of a number of SSS facilities and projects, including the recently completed equalization basin at the Smith Springs pump station and the new equalization basin under construction at the Dodson Chapel pump station. The attendees also toured each of the CSO points in the MWS CSO.

History

Two reports were prepared addressing the SSS and CSS. The *Wastewater Facilities Plan* for the expansion of the SSS tributary to the three wastewater plants was prepared in 1987; in 1988, the *Combined Sewer Overflow Study for the Cumberland River and Browns Creek* was published addressing the problems of the CSS. This report considered sewer separation, offline storage in detention basins and inline storage in conveyance tunnels as possible options for resolving CSOs. In 1988, TDEC requested an addendum to the 1988 report. The addendum was submitted in 1990 with the directive from TDEC that the OAP either eliminate the bypasses to Browns Creek or reduce the overflow frequency to an average of once every 14 months. TDEC also requested that the priority ranking mechanism consider not only the least cost per million gallons stored but also include a consideration of the type of wastewater likely to enter the CSS. Basins with hospitals or industrial wastewater were to be given a higher priority than those with predominately commercial/residential wastewater sources.

MWS and TDEC conducted ongoing discussions before and after the publishing of the reports to assure that the plans being developed addressed TDEC's concerns and to ensure that TDEC was aware of the costs of the improvements to the sewer system.

On March 31, 1990, MWS received a Commissioner's Order from the State of Tennessee Department of Health and Environment (now TDEC) that directed MWS to eliminate CSOs to Richland Creek by July 1, 1991, to Browns Creek by July 1, 1996 and to eliminate all unpermitted bypasses and overflows from both the combined and separate sewers to the Cumberland River by July 1, 2001. Bypasses at 31 of 38 sites

were to be eliminated by December 31, 1992; the remaining seven sites were to be eliminated by December 1, 1993. MWS was directed to eliminate bypassing at a total of 45 locations including two treatment plants, 27 pumping stations and 16 regulators.

MWS moved forward with an ambitious and costly plan to rehabilitate the wastewater collection system under the Overflow Abatement Program (OAP). The program's goals included the elimination of overflows of wastewater from the separated sewer system (SSS) attributed to rainfall events and the application of best management practices to the combined sewer system (CSS) to minimize public health impacts caused by rainfall induced overflows.

MWS embarked on an aggressive program in 1990 to address the Order and resolve environmental issues associated with CSO and SSO discharges. The first few years were project oriented to comply with the supplement project milestone listing of the Order. All 3 WWTP's, 6 major pumping stations, 2 major trunk sewer parallels and numerous other pump stations and line work in the system were upgraded. Some SSS rehabilitation was begun in the early OAP years. A comprehensive water quality and modeling effort was begun to assess the impact of discharges to the Cumberland River. After data collection and modeling a shift in the CSS from a storage/equalization approach to demonstrative CSO control was proposed. The CSO impact on the Cumberland River with proposed improvements was determined to be short term and near field. TDEC accepted this approach, and the OAP shifted effort to address SSO's more aggressively.

MWS received an additional Commissioner's Order on September 17, 1999. This Order addressed continued overflows occurring during both wet and dry weather. Following discussions between MWS and TDEC, supplemental TDEC correspondence extended the compliance schedule for MWS to December 31, 2007 to reflect the magnitude of the requirements for the environmental issues faced.

It has become apparent that the 2007 deadline will not be met. MWS recognizes the importance of this issue and is currently developing a plan that will be implemented by the 2007 deadline. MWS is committed to resolving the SSOs and CSOs in a manner that is mutually agreed to by TDEC and MWS.

Execution of the OAP

The concentrated efforts of the 16-year OAP are addressing design, construction, maintenance, and improper building connections of the past 85 years. Projects have been conceptualized, planned, designed, and constructed to remove sources of I/I resulting in overflows. In addition, projects have been performed to increase capacities of sewer lines to transmit higher wastewater flows to and improve/optimize treatment capacities at the three WWTPs. Other projects have improved the mechanical and electrical reliability of sewer pumping stations and provided peak flow equalization for wet weather events in both the CSS and SSS. Separation of smaller basins in the CSS smaller basins, where economically feasible

and practical, has also been performed or proposed in order to eliminate a CSO discharge instead of screening the discharged flows.

As overflow locations have been identified, an overflow point number is assigned for tracking purposes. An initial assessment is performed to identify any obvious defects or potential "quick fixes" that could mitigate overflows in that location. After internal implementation of these short term items, monitoring of the point continues. If the issue persists, then projects are formulated to address the overflows focusing generally on SSO's and a long-term approach of I/I removal. The projects are conceptualized and entered into the OAP project listings for funding and implementation.

A priority matrix for prioritization was developed to rank the projects for study, project planning, design, and construction for implementation of abatement action and overflow point resolution. This was necessary in order to direct funding to the most immediate need, and to recognize the reality of budget constraints and the availability of resources. This process is administered by a diverse MWS committee and presented to MWS senior management for incorporation into the overall MWS capital budgeting process.

The matrix includes the following factors:

1. CSS or SSS - 5 points for SSS overflows
   2 points for CSS overflows

2. Overflow type - 5 points for overtopping manholes
   3 points for pumping station or constructed bleeders
   1 point for overflows directly to the Cumberland River

3. Design storm - 5 points for a 5 year return frequency
   2 points or a 2 year return frequency in the SSS

4. Multiple overflows - If a project will impact more than one overflow point an additional point is assigned to the project

5. Maintenance issues - 3 points for high frequency return requirements
   2 points for lower frequency return requirements
   0 points for no documented maintenance issues

6. Regulatory/basin issues - 1 to 5 points are assigned based on degree of sensitivity of the receiving creek/stream or river -
   5 points to Richland, Gibson, and Percy Priest
   4 points to Browns, Dry, and Stoners
   3 points to Mill and Whites
   2 points to other streams
   1 point to Cumberland River

7. Payback/cost effectiveness - 5 points for 0-5 years
4 points for 6-10 years
3 points for 10-15 years
2 points for 16-20 years
0 points for greater than 20 years

8. Data collection status - Up to 3 points assigned based on available smoke testing, flow monitoring, and TV inspection data

9. Overflow frequency based on 2002 – 2003 event count -
5 points assigned for 50+ events
4 points for 26 - 50 events
3 points for 11 - 25 events
2 points for 6 - 10 events
1 point for 1 - 5 events

10. Overflow duration based on 2002 - 2003 data -
5 points for greater than 500 hours
4 points for 101 - 500 hours
3 points for 51 - 100 hours
2 points for 11 - 50 hours
1 point for 1 - 10 hours

11. Overflow volume based on 2002 – 2003 data -
5 points for 500+ MG
4 points for 101 - 500 MG
3 points for 26 - 100 MG
2 points for 11 - 25 MG
1 point for 1 - 10 MG

12. Peaking factor - 5 points for 12.1:1 or higher peak ratio
4 points for 10.1-12:1
3 points for 8.1 to 10:1
2 points for 5.1 to 8:1
1 point for up to 5:1
2 points for CSSs

The matrix is updated periodically to reflect changes in the scores as a result of system improvements and the most current data. Once the prioritization has been performed or updated, the project list is organized by point value, with the higher point totals being assigned greater priority. This is the basis for the annual capital program projections for the OAP and resultant projects to be undertaken.

Other factors may impact the prioritization of projects beyond the priority matrix scores. These factors include integration into other department, government agency, or developer-based project schedules and availability of funds from the MWS's

Capital Improvement Budget and other funding sources. Current projects or related projects also impact the final project selection as with multiyear efforts for scheduling.

As each overflow point is studied, flow monitoring data and CCTV inspection data is gathered. This information is utilized to accurately focus rehabilitation and/or replacement efforts to those areas where defects allowing I/I are known to exist. This results in a conservation of project funds and improves effectiveness of the individual project. Intermediate segment rehabilitation between identified defect segments is incorporated based on engineering judgment of potential for the migration of I/I. Standard protocols include the rehabilitation of all manholes, service connection points, and service laterals to the right of way/easement line as a part of all rehabilitation projects.

Upon completion of each project, assessment of the effectiveness of the project is performed by post-project flow monitoring and/or observation of the frequency, duration, and volume of subsequent overflow events. Based on this assessment, the need for additional work to address the overflow point is determined and supplemental projects formulated.

Overflow points which are no longer active are placed on a watch list to further verify elimination of the overflow before the overflow is considered eliminated.

A summary of the progress that has been made by MWS in resolving the CSO/SSO problems in the sewer system is located in **Section 7. Combined Sewer Overflow Program**. The MWS website www.nashville.gov/water, provides a detailed list of CSO/SSO projects that have been completed, are under design, in construction or are planned for an abatement action.

A monthly report of OAP activities is prepared and issued to TDEC. In addition, a presentation of the program activities and planned projects is given to TDEC annually. All overflow events, regardless of cause, are reported to TDEC monthly in accordance with NPDES permits and the DMR reporting system.

Cost of the OAP

Approximately $799 million has been committed to the OAP to date. A total of over $179 million in projects are either underway or planned for the future. There are $28 million of projects in design or advertised. Of that total, $26.3 million addresses SSOs; $1.4 million addresses CSOs. Over $24 million is earmarked for projects that are in the planning stage; $734,000 is to address WWTP improvements, $12 million is to address SSOs and $12 million for CSOs. Future projects totaling over $112 million have been identified. Of that total, over $68 million addresses SSOs and over $43 million, CSOs.

Recommendation

MWS will develop and implement a Wet Weather Management Plan to address wet weather conditions once the sewer model conversion is completed. The plan will be completed by December 2008.

h. System Capacity Assurance Program

Wastewater Capacity Management Plan

The Wastewater Capacity Management Plan (WCMP) (Appendix H) was developed in August 1990 to comply with the Commissioner's Order issued March 30, 1990. This is a comprehensive plan describing all the essential elements to effectively execute the OAP and addresses how to allocate sewer capacity to accommodate growth and not allow future conditions to develop which could cause bypass or overflow of the system. Specifically, it provided the basis for lifting the hook-up restrictions imposed by the Order.

All proposed developments within MWS's service areas require a determination of the availability of sewer and/or water services. Developers and property owners or their representatives submit a request form to the Development Services Section of the Engineering Division.

The following information must be included with the request:

- Location of the property with tax map and parcel number
- Total acreage of the site
- Intended type of development or use of the property, including total square footage of proposed building
- Projected wastewater flow in gallons per day
- Subdivision development plan with finished floor elevations

Details of the request procedures for the residential and commercial permits can be found in the handbooks on the website: http://www.nashville.org/water.

As required by the WCMP, MWS can allocate 70% of the sewer lines for peak dry weather flow before capacity improvements must be made. At 70% the basin is evaluated and improvements are planned. By the time peak dry weather flow reaches 85%, the identified capacity improvement must be operational. Small improvements are constructed by the developer and deeded back to MWS. If the improvement is to a major trunk or facility, the improvement is funded by MWS utilizing capacity fees.

When a request for sewer availability is received by MWS, the sewer model is run from the point of connection into the closest 10" diameter or greater sewer line to the wastewater treatment plant using the increased peak flow from the requested

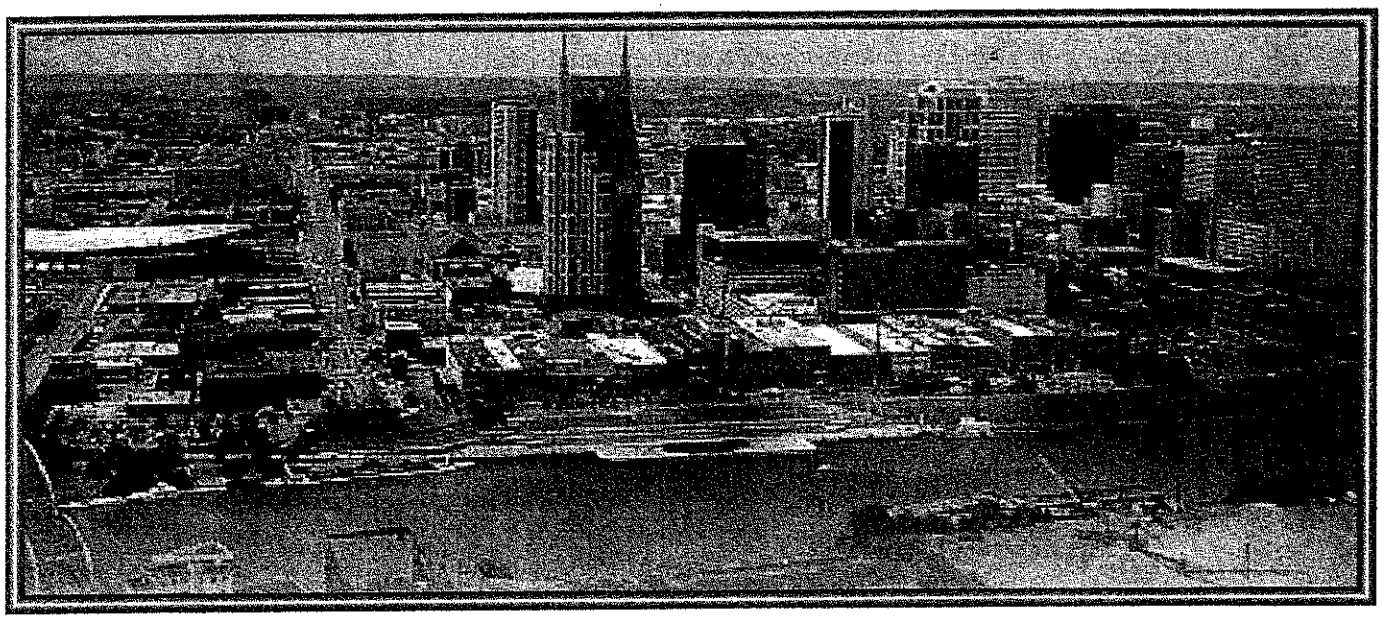
APPENDIX B

CMOM SELF-ASSESSMENT

Metropolitan Government of Nashville and Davidson County, Tennessee

EPA CMOM Self-Assessment Report

September 2006



Report

Executive Summary

Introduction

In February 2006, the Metropolitan Government of Nashville and Davidson County Tennessee (Metro) and several other municipalities/utilities in Central Tennessee were invited by the United States Environmental Protection Agency (EPA) Region IV to conduct a self audit of their respective wastewater collection systems as part of EPA Region IV's Capacity, Management, Operations, and Maintenance (CMOM) Program. The EPA conducted an informational meeting in March 2006 during which the EPA explained the CMOM self assessment program. Metro decided to participate in the program and notified the EPA of that decision.

This document is a result of Metro's self audit and contains information requested by the EPA and represents Metro's assessment of how the wastewater system is managed, operated and maintained. The information is organized according to the format outlined in the September 2003 *EPA Region 4 Guide to Collection and Transmission System Management, Operation and Maintenance, Version 1.0* Every effort has been made to include data that is pertinent to this audit, however, if it is determined that additional information important to the reviewer is required, Metro will make every effort to provide the needed information in a timely manner.

Regulatory Framework

Tennessee Department of Environment and Conservation (TDEC) and the EPA believe that inadequate management, operation, and maintenance of wastewater collection systems are the greatest causes of SSOs. These are referred to as "avoidable" SSOs, which can result from a variety of causes including, but not limited to, excessive infiltration and inflow, pumping station failures, insufficient system capacity, and hydraulic restrictions caused by tree roots, debris accumulation, collapsed pipes, and excessive grease. In an attempt to reduce the number and volume of "avoidable" SSOs, the EPA has implemented the EPA Region IV CMOM program.

The purpose of a CMOM program is to optimize labor, materials, money, and equipment to manage a system's human and material resources as effectively as possible while achieving regulatory compliance by reducing the number of SSOs. Some of the benefits of a CMOM program are:

- Ensuring the availability of facilities and equipment as designed.
- Maintaining the reliability of the equipment and facilities to ensure 24 hour a day, 7 days per week, 365 days per year operation as the system was designed.

- Maintaining the value of the capital investment.

The premise of the CMOM program is that when a utility incorporates good business principles into its organization, its wastewater collection system will meet the intended performance standards and result in fewer SSOs. In general, the CMOM program places the burden of proof on the system owner to demonstrate that by using pipes, pumps and infrastructure with adequate capacity, and properly managing, operating and maintaining the system, SSOs are being prevented to the maximum extent practical.

A comprehensive CMOM program is comprised of individual management, operation, and maintenance programs, each of which:

- is specific to, and tailored for, the utility's infrastructure;
- has a written purpose explaining why the program is needed;
- has specific written goal(s) establishing the accomplishments desired for the current fiscal year;
- has the details of activities and procedures that are followed to implement the program written down in the form of Standard Management Procedures (SP), Standard Operating Procedures (SOP), and/or Standard Maintenance Procedures (SMP) that are used by the utility's personnel;
- is implemented by well-trained personnel;
- has established appropriate performance measures which are tracked by management; and,
- has a written procedure requiring periodic review, evaluation, and any necessary revision.

The purpose of this CMOM Self Assessment is to allow Metro Water Services (MWS) to evaluate the performance of existing management, operations and maintenance procedures relevant to existing sewer collection and transmission systems and to identify deficiencies and establish corrective action items.

System Background

Beginning in 1823, brick and clay sewers were constructed and conveyed both storm water and sanitary sewer for discharge into the Cumberland River. The cholera epidemic of 1884 brought on a flurry of sewer construction. The first major trunk sewer in Nashville was the Wilson Spring Branch, which extends from Lafayette and 7th Avenue, South, to the river at the foot of Broadway.

By 1950, as Davidson County's population grew to more than 300,000, the discharge of untreated wastewater and failure of septic systems represented a significant threat to the environment and a challenge for a growing community. The sewer system had evolved to nearly 400 miles of sanitary sewer lines that emptied into a network of combined sewers, which

discharged directly into streams and the river. The need was recognized for a system that would capture and treat the sewage.

The Central Wastewater Treatment Plant was built just north of downtown and began operation in 1958. The Dry Creek Wastewater Treatment Plant was built in the Rivergate area 20 miles north of downtown Nashville and began operation in 1961. The Whites Creek Wastewater Treatment Plant in West Nashville was placed in service in 1975.

The 1980s marked the beginning of an aggressive sewer expansion program to help eliminate more septic systems in Davidson County. Even with three treatment plants, this aggressive expansion resulted in a need for additional improvements to control overflows that resulted from the amount of excess water entering the sewer system during rain events.

Through a series of water quality modeling studies that began in 1975, MWS gained considerable knowledge of the response of the Cumberland River to not only MWS's discharges but also to urban, rural and natural sources of pollution.

In 1990, the Overflow Abatement Program (OAP) began as an aggressive program with the goals of eliminating sanitary sewer system overflows attributed to rainfall and the application of best management practices to the combined sewer system to minimize public health impacts caused by rainfall induced overflows. MWS has spent more than $620 million on OAP projects to date; more than $179 million is planned for projects that are either in planning or design stages.

Tremendous progress has been made toward improving water quality in the Cumberland River watershed as a result of the OAP. Continuous study since 1988 has given MWS a wealth of water quality data. This data provides a detailed picture of the conditions before extensive CSO remediation efforts were completed as well as the dynamic changes that have taken place as solutions have been implemented.

MWS's sewer system now serves an area of approximately 472,700 acres with a population of 659,923. The system has approximately 2,750 miles of gravity sewer lines and 150 miles of force main in the ground ranging in sizes from less than 8" to over 24" in diameter, over 74,000 manholes, 101 pump stations and three wastewater treatment plants. The system serves 171,341 customers; of which 12,732 are commercial and 599 are industrial. There are also 21,688 customers in satellite municipalities or utility districts.

The average daily flow of wastewater for the past year (August 2005 - July 2006) transmitted to the three wastewater treatment plants was 120.7 MGD. MWS operates with a staff of 666 full-time employees for both water and wastewater operations. The annual operating budget is approximately $82.0 million with $50.1 million allocated for wastewater.

The Self-Assessment report includes information compiled by MWS on each of the 24 focus areas plus additional areas for CSOs. Each area was divided into various programs for closer evaluation. The performance of each program and the goals associated with the program were reviewed to determine any areas in need of improvement. Reference documents are attached in the appendices.

The completion of this 2006 Self-Assessment proved to be beneficial to MWS in analyzing current policies and procedures used by MWS pertaining to the wastewater collection and treatment system. MWS identified programs which were adequate as they are currently managed as well as programs where some improvements are needed. Proposed recommendations can be reviewed in detail in **Section 8 Program Recommendations, System Rehabilitation and Needs, and Rehabilitation Schedule**.

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Acronym and Abbreviation List

BAR	Budget Accountability Report
BETTER	Box Exchange Transport Temperature and Ecology
BOD	Biological oxygen demand
CAFR	Comprehensive Annual Finanacial Report
CCTV	Closed circuit television
CDL	Commercial drivers license
CIB	Capital Improvement Budget
CIS	Customer Information Systems
CIU	Categorical industrial user
CMMS	Computerized Maintenance and Management Systems
CMOM	Capacity, Management, Operations, and Maintenance Program
CPS	Central Pumping Station
CSC	Customer Services Center of MWS
CSO	Combined sewer overflow
CSS	Combined sanitary sewer
CSSAP	Continuous Sewer System Assessment Program
CWSRF	Clean Water State Revolving Fund
DROP	Departmental Review of Performance
EPA	Environmental Protection Agency
FLSA	Federal Labor Standards Act
FOG	Fats, Oils, and Grease Control Program
FSE	Food service establishments
GCE	Grease control equipment

GI	Grease interceptor
GIS	Geographic Information System
H_2S	Hydrogen sulfide
HR	Human Resources Division of MWS
ICS	Incident Command System
IDU	Intermediate drainage units
I/I	Infiltration/inflow
IMS	Information Management System
IPP	Industrial Pretreatment Program
ITS	Information technology service
IS	Information Services Section
LOCAP	Local Cost Allocation Plan
MARA	Multiple Antibiotic Resistance Analysis
Metro	Metropolitan Government of Nashville and Davidson County
MPC	Metropolitan Planning Commission
MWS	Metro Water Services
OAP	Overflow Abatement Program
O&M	Operations and Maintenance
OFM	Office of Fleet Management
Ops	Operations Division of MWS
OSHA	Occupational Safety and Health Administration
PILOT	Payment in Lieu of Taxes
PLC	Programmable logic controller
PM	Preventative maintenance
PPC	Plant Protection Criteria

PPE	Personal protection equipment
PSM	Process Safety Management
RMP	Risk Management Program
RTU	Remote terminal unit
SCADA	Supervisory control and data acquisistion
SIU	Significant industrial user
SMP	Standard maintenance procedures
SOP	Standard operating procedures
SSD	System Services Division
SSO	Sanitary sewer overflow
SSS	Separated sewer system
SP	Standard management procedures
SR	Service request
TDEC	Tennessee Department of Environment and Conservation
TLDA	Tennessee Local Development Authority
TOC	Tennessee One-Call
TOSHA	Tennessee Occupational Safety and Health Act
TSS	Total suspended solids
USGS	United States Geological Survey
WCMP	Wastewater Capacity Management Plan
WWTP	Wastewater treatment plant

Section 1

Certification by Responsible Officer of Utility

I certify that:

(1) I have personally examined and am familiar with the information submitted with regard to the CMOM Self-Assessment Report and all documents submitted therewith;

(2) to the best of my knowledge and belief, based on my inquiry of those individuals immediately responsible for obtaining the information, the submitted information is true, accurate and complete;

(3) the document(s) submitted to U.S. EPA Region IV September 2006, are complete and authentic, unless otherwise indicated; and,

(4) the principle executive officer of the municipality/authority has been notified of the CMOM Self-Assessment Report.

I am aware that there are significant penalties for submitting false information, including the possibility of fines or imprisonment.

Scott Potter, Director — Date: 22 Sep 06

Hal Balthrop, Assistant Director — Date: 9-22-06

Section 2. System Profile and Performance History

The following is a summary of the collection system components and the performance history.

I. Collection System Components:

- Service Area ..... 472,700 acres[1]
- Population Served ..... 659,923[2]
- Total 2007 Capital Improvement Budget ..... $66.9 million
  - Wastewater Allocation ..... $11.5 million
  - OAP Allocation ..... $21.3 million
- Total 2007 Operation and Maintenance Budget ..... $82.0 million
  - Waste Water Allocation ..... $50.1 million
- Average Wastewater Daily Flow(August 2005 – July 2006) ..... 120.7 MGD
- Total Customers ..... 171,341[2]
  - Residential ..... 136,322[2]
  - Small Commercial ..... 7,920[2]
  - Intermediate Commercial ..... 4,812[2]
  - Industrial ..... 599[2]
  - Other Utilities ..... 9[2]
  - Madison[3] ..... 15,551[2]
  - Goodlettsville[3] ..... 2,369[2]
  - Nolensville/College Grove[3] ..... 2,814[2]
  - Lakewood ..... 945[2]
- Total number of employees (excluding stormwater employees) 666
  - Number of employees designated for wastewater 428
- Approximate miles of piping 2,900
  - Gravity Lines (miles) 2,750
    - 8" diameter or less 2150
    - 10" – 24" diameter 450
    - >24" diameter 140
  - Force Mains (miles) 150
    - 8" diameter or less 60
    - 10" – 24" diameter 60
    - >24" diameter 30

- Age of the system[4]
  - Combined System (miles) 224
    - 1900-1924 74
    - 1925-1949 63
    - 1950-1974 74
    - 1975-2002[4] 13
  - Separate System (miles) 2,676
    - 1900-1924 25
    - 1925-1949 150
    - 1950-1974 1171
    - 1975-2002[4] 1146
    - 2002-present 184

- Number of Manholes 74,560

- 101 pump stations (See Table 2-1.)

Unless specified, all values FY2006
[1]Based on 1996 demographic profile
[2]Values FY2005
[3]These customers are not billed by MWS
[4] Data from 2002 study; 2002 to present data extrapolated from total miles of piping

Table 2-1 MWS Wastewater Pump Stations

Pump Station	Plant	Backup Power	Type	Primary Pump Size #	Primary Pump Size GPM	Secondary Pump Size #	Secondary Pump Size GPM	Total GPM	Total Number of pumps
Airpark East	Central	Stationary Generator	Propane	2	110			110	2
Alice Road	Central	Portable Generator	Diesel	2	175			175	2
Banbury Crossing	Central	Portable Generator	Diesel	2	95			95	2
Baronswood Drive	Central	Portable Generator	Diesel	2	100				
Beacon Hill	Central	Portable Generator	Diesel	2	180			180	2
Bell Road	Central	Portable Generator	Diesel	2	500			500	2
Bent Creek	Central	Portable Generator	Diesel	2	300				
Berwick Trail	Dry Creek	Portable Generator	Diesel	2	400			400	2
Birchwood	Central	Portable Generator	Diesel	2	80				
Bonnafair	Central	Stationary Generator		2	2,000			2,000	2
Bordeaux Hills	Whites Creek	Stationary Generator	Diesel	2	1,575	2	750	2,325	4
Bordeaux Hospital	Whites Creek	Portable Generator	Diesel	2	500			500	2
Brandywine Pointe	Central	Portable Generator	Diesel	2	140			140	2
Brentwood	Whites Creek	Stationary Generator	Diesel	2	4,700	2	2000, 2950	6,700	4
Brentwood Villa	Central	Portable Generator	Diesel	2	100			100	2
Browns Creek	Central	Dual Feed		4	40,000			40,000	4
Buena Vista	Whites Creek	Portable Generator	Diesel	2	280			280	2
Cabin Hill	Central	Portable Generator	Diesel	3	2,000	1		2,000	4
Caleb's Chase	Central	Portable Generator	Diesel	2	80			80	2
Chatham Pointe	Central	Portable Generator	Diesel	2	250			250	2
Clearlake Drive	Central	Stationary Generator	Diesel	2	380			380	2
Cleeces Ferry	Whites Creek	Stationary Generator		2	1,500			1,500	2
Clover Bottom	Central	Portable Generator	Diesel	2	900			900	2
Cockrill Bend	Whites Creek	Portable Generator	Diesel	2	400			400	2
Countryside Drive (N1)	Central	Portable Generator	Diesel	2	200			200	2
Cowan Street	Central	Portable Generator	Diesel	3	4,719			4,719	3
Davidson Branch	Whites Creek	Stationary Generator	Diesel	3	1,300			1,300	3

MWS Wastewater Pump Stations

Pump Station	Plant	Backup Power	Type	Primary Pump Size #	Primary Pump Size GPM	Secondary Pump Size #	Secondary Pump Size GPM	Total GPM	Total Number of pumps
Dodson Chapel	Central	Stationary Generator	Diesel	3	4,800			4,800	3
Donelson Plaza	Central	Portable Generator	Diesel	2	400			400	2
East Lakemont	Central	Portable Generator	Diesel	2	70			70	2
Edinburgh	Whites Creek	Portable Generator	Diesel	2	125			125	2
Fairway Center	Central	Portable Generator	Diesel	2	510			510	2
Farmingham Woods	Central	Portable Generator	Diesel	2	180			180	2
Gail Drive	Dry Creek	Portable Generator	Diesel	2	120			120	2
Germantown	Whites Creek	Portable Generator	Diesel	2	100			100	2
Gibson Creek	Dry Creek	Stationary Generator	Diesel	3	6,640	2	2,220	8,860	5
Harbourtown	Central	Stationary Generator	Diesel	2	900			900	2
Harpeth Trace No. 1	Whites Creek	Portable Generator	Diesel	2	130			130	2
Harpeth Trace No. 2	Whites Creek	Portable Generator	Diesel	2	100			100	2
Heartland Drive	Central	Portable Generator	Diesel	2	100			100	2
Hickory Hills	Central	Portable Generator	Diesel	2	85			85	2
Hickory Hollow	Central	Portable Generator	Diesel	2	350			350	2
Hidden Acres	Dry Creek	Portable Generator	Diesel	2	260			260	2
Hillview	Central	Portable Generator	Diesel	2	80			80	2
Holiday Travel Park	Central	Portable Generator	Diesel	2	825			825	2
Hopedale	Central	Stationary Generator	Diesel	2	150			150	2
Hurricane Creek	Central	Stationary Generator	Diesel	2	10,600	2	4,200	14,800	4
Joelton	Whites Creek	Portable Generator	Diesel	2	275			275	2
Lakeshore	Central	Portable Generator	Diesel	2	325			325	2
Lakeside Cove	Central	Stationary Generator		2	125			125	2
Lakeview Drive	Central	Portable Generator	Diesel	2	170			170	2
Lakewood	Dry Creek	Portable Generator	Diesel	2	260			260	2
Lankford Farms	Central	Portable Generator	Diesel	2	120			120	2
Longhunter chase	Central	Portable Generator	Diesel	2	200			200	2
Loves Branch	Dry Creek	Portable Generator	Diesel	2	1,550			1,550	2

MWS Wastewater Pump Stations

Pump Station	Plant	Backup Power		Primary Pump Size		Secondary Pump Size		Total	Total Number
			Type	#	GPM	#	GPM	GPM	of pumps
Madison Heights	Dry Creek	Portable Generator	Diesel	2	50			50	2
McCrory Creek	Central	Stationary Generator	Diesel	4	5,800			5,800	4
Metro Center	Central	Portable Generator	Diesel	3	1,100			1,100	3
Mills Creek	Central	Portable Generator	Diesel	2	1,100			1,100	2
Mt. View Ridge	Central	Portable Generator	Diesel	2	135			135	2
Munn Road	Central	Portable Generator	Diesel	2	680			680	2
Neely's Bend	Dry Creek	Stationary Generator	Diesel	3	900			900	3
Old Hickory	Dry Creek	Stationary Generator	Diesel	3	2,000			2,000	3
Old Hickory Hills	Central	Stationary Generator	Propane	2	320			320	2
Oldham Drive (N4)	Central	Portable Generator	Diesel	2	80			80	2
Pawnee Trail	Dry Creek	Portable Generator	Diesel	2	255			255	2
Penn Meade	Central	Portable Generator	Diesel	2	700			700	2
Peppertree	Central	Portable Generator	Diesel	2	330			330	2
Plantation Walk	Central	Portable Generator	Diesel	2	130			130	2
Rainbow Terrace	Dry Creek	Portable Generator	Diesel	2	30			30	2
Rhonda Lane	Whites Creek	Portable Generator	Diesel	2	45			45	2
River Drive	Whites Creek	Portable Generator	Diesel	2	650			650	2
River Retreat	Dry Creek	Stationary Generator	Diesel	3	1,550			1,550	3
Riverside Drive	Central	Portable Generator	Diesel	2	450			450	2
Robertson Road	Whites Creek	Portable Generator	Diesel	2	280			280	2
Rolling Hills Drive #1 (N2)	Central	Portable Generator	Diesel	2	75			75	2
Rolling Hills Drive #2 (N3)	Central	Portable Generator	Diesel	2	25			25	2
Shelby Park	Central	Portable Generator	Diesel	3	5,500			5,500	3
Shutes Lane	Central	Portable Generator	Diesel	2	250			250	2
Smith Springs	Central	Stationary Generator	Diesel	3	3,500			3,500	3
South Lebanon Road	Central	Portable Generator	Diesel	2	150			150	2
South Oak Hill	Central	Portable Generator	Diesel	2	100			100	2

MWS Wastewater Pump Stations

Pump Station	Plant	Backup Power		Primary Pump Size		Secondary Pump Size		Total GPM	Total Number of pumps
			Type	#	GPM	#	GPM		
South Shores	Central	Stationary Generator	Propane	2	454			454	2
Summerfield	Central	Portable Generator	Diesel	2	1,050			1,050	2
Sunliner Drive	Whites Creek	Portable Generator	Diesel	2	200			200	2
The Lakes	Central	Portable Generator	Diesel	2	280			280	2
Town Village	Central	Portable Generator	Diesel	2	500			500	2
Twenty-Eighth	Central	Stationary Generator	Diesel	3	11,500			11,500	3
Vandiver	Dry Creek	Stationary Generator	Diesel	3	1,300			1,300	3
Villa's of Lakemeade No.1	Dry Creek	Portable Generator	Diesel	2	150			150	2
Villa's of Lakemeade No.2	Dry Creek	Portable Generator	Diesel	2	30			30	2
West Park	Whites Creek	Dual Feed		3	15,000	2	13,400	28,400	5
White's Creek	Whites Creek	Stationary Generator	Diesel	1	7,500	2	4,050	11,550	3
Williamson Ferry	Central	Portable Generator	Diesel	2	1,200			1,200	2
Windhaven Shores	Central	Stationary Generator	Propane	2	140			140	2
Woodlake	Central	Portable Generator	Diesel	2	300			300	2
Woodland Hills	Central	Portable Generator	Diesel	2	160			160	2
Woodland Pointe No. 1	Central	Portable Generator	Diesel	2	310			310	2
Woodland Pointe No. 2	Central	Portable Generator	Diesel	2	160			160	2
Woodside Drive	Central	Portable Generator	Diesel	2	210			210	2
Wyntergrace	Central	Portable Generator	Diesel	2	80			80	2
Grinder pumps (Maintained by MWS)		N/A		401	80				401
TITANS # 1 (Maintained by MWS)		Portable Generator	Diesel	3	3500				

II. System Performance History:

Annual number of overflows	**Originally (FY 1990)**	**FY2005**
Sanitary Sewer Overflow Sites	164	55
Combined Sewer Overflow Sites	30	9
Number of Sanitary Sewer Overflows	512	Rainfall Induced – 263 Power Out – 12 Mechanical – 32 Maintenance – 76 **Total - 383**
Number of Combined Sewer Overflows	615	208

Central WWTP Performance History

Per capita wastewater flow for the maximum month	5,050 gallons per capita per month (occurred in January 2006)
Per capita wastewater flow for the maximum day	362 gallons per capita per day (occurred in August 2006)
Average annual influent BOD (08/05-07/06)	166 mg/L
Average annual effluent BOD (08/05-07/06)	2.9 mg/L

Month (08/05-07/06)	Monthly Peak Daily Wet Weather Flow (MGD)	Monthly Average Daily Flow (MGD)	Ratio of Monthly Peak Daily Wet Weather Flow to Monthly Average Daily Flow
August 2005	239.2	82.1	2.9
September 2005	106.0	78.0	1.4
October 2005	76.9	70.4	1.1
November 2005	110.1	75.4	1.5
December 2005	148.5	62.6	2.4
January 2006	216.1	107.5	2.0
February 2006	143.0	97.1	1.5
March 2006	145.5	87.5	1.7
April 2006	162.7	69.4	2.3
May 2006	131.3	86.9	1.5
June 2006	101.2	72.7	1.4
July 2006	118.8	73.9	1.6

Dry Creek WWTP Performance History

Per capita wastewater flow for the maximum month	1,045 gallons per capita per month (occurred in January 2006)
Per capita wastewater flow for the maximum day	78 gallons per capita per day (occurred in January 2006)
Average annual influent BOD (08/05-07/06)	153 mg/L
Average annual effluent BOD (08/05-07/06)	2.3 mg/L

Month (08/05-07/06)	Monthly Peak Daily Wet Weather Flow (MGD)	Monthly Average Daily Flow (MGD)	Ratio of Monthly Peak Daily Wet Weather Flow to Monthly Average Daily Flow
August 2005	46.8	14.7	3.2
September 2005	18.5	13.4	1.4
October 2005	12.9	12.0	1.1
November 2005	19.7	13.4	1.5
December 2005	30.2	14.9	2.0
January 2006	51.1	22.3	2.3
February 2006	27.7	18.9	1.5
March 2006	27.4	15.9	1.7
April 2006	31.9	16.6	1.9
May 2006	21.8	15.6	1.4
June 2006	15.6	13.0	1.2
July 2006	18.8	12.7	1.5

APPENDIX A

LIST OF SSOs

Appendix A - List of SSO Locations

Overflow #	Overflow Name	Location	Latitude	Longitude	Receiving Stream	WWTP Basin
109	Dry Creek Pump Station	Dry Creek WWTP - Edenwold Road	36.28804	-86.68949	Dry Creek	Dry Creek
222	Barker Road	149 Barker Road	36.17777	-86.69884	Sims Branch	Central
217	Basswood	516 Basswood Avenue	36.15635	-86.88458	Cumberland River	Whites Creek
107	West Park Pump Station	6109 Morrow Road	36.16200	-86.86450	Richland Creek	Whites Creek
130	Brown's Creek Pump Station / Visco Dr.	898 Visco Drive	36.15876	-86.74310	Brown's Creek	Central
104	Whites Creek Pump Station	White Creek SPS - East Stewarts Lane	36.19498	-86.85221	Whites Creek	Whites Creek
112	Gibson Creek Pump Station	816 Idlewild Drive	36.25166	-86.70602	Gibson Creek	Dry Creek
110	Loves Branch Pump Station	Loves Br SPS - Brush Hill Road	36.23784	-86.71551	Cumberland River	Dry Creek
114	Davidson Branch Pump Station	6924 Charlotte Pike	36.13127	-86.90226	Davidson Branch	Whites Creek
226	Cowan St. Relief Bleeder	1311 Vashti Street	36.19262	-86.78181	Cumberland River	Central
106	Vandiver Pump Station	211 Rio Vista Drive	36.26630	-86.68140	Cumberland River	Dry Creek
103	McCrory Creek Pump Station	710 Jobee Creek	36.16310	-86.63010	McCrory Creek	Central
117	Neely's Bend Pump Station	1218 Berwick Trail	36.23840	-86.68017	Cumberland River	Dry Creek
124	Williamson Ferry Pump Station	Williamson Ferry SPS - Glenshade Drive	36.21830	-86.70838	Cumberland River	Central
133	Holiday Travel Park Pump Station	2572 Music Valley Drive	36.23290	-86.70861	Cumberland River	Central
176	Dodson Chapel Pump Station	6024 Panama Drive	36.18849	-86.62175	Stoner's Creek	Central

Overflow #s are from Nashville Metro's Overflow Abatement Program Report of May 2007 (http://www.nashville.gov/water/docs/oap_reports/oap_current.pdf)

Overflow #	Overflow Name	Location	Latitude	Longitude	Receiving Stream	WWTP Basin
150	Hidden Acres Pump Station	597 Hidden Acres Dr	36.22818	-86.67532	Cumberland River	Dry Creek
132	Berwick Trail Pump Station	720 Center Street	36.24857	-86.69079	Cumberland River	Dry Creek
136	River Drive Pump Station	River Drive SPS - River Drive	36.19072	-86.83033	Cumberland River	Whites Creek
127	Madison Heights Pump Station	1329 Fernbank Drive	36.24129	-86.71189	Cumberland River	Dry Creek
339	Richland Creek (23rd St.)	746 23rd Street	36.16577	-86.87096	Richland Creek	Whites Creek
337	Richland Creek (TDOT)	6601 Centennial Blvd	36.16682	-86.87503	Richland Creek	Whites Creek
189	Langford Farms Pump Station	West Shady Trail Drive	36.23470	-86.56890	Old Hickory Lake	Centrral
379	622 Davidson	622 Davidson Road	36.11746	-86.88490	Davidson Branch	Whites Creek
329	Village Court	S of Davidson Street	36.16479	-86.74586	Cumberland River	Central
338	Benita Dr.	Behind 425 Benita Drive	36.09401	-86.71659	Mill Creek	Central
123	Lakewood Pump Station	396 Ray Avenue	36.24014	-86.64179	Cumberland River	Dry Creek

Overflow #s are from Nashville Metro's Overflow Abatement Program Report of May 2007 (http://www.nashville.gov/water/docs/oap_reports/oap_current.pdf)

against the Defendant for alleged violations of the CWA and the Tennessee Water Quality Control Act ("TWQCA"), Tenn. Code Ann. §§ 69-3-101, *et seq.*; and

WHEREAS, the United States and the State (collectively "Plaintiffs") have moved jointly that the two federal actions be consolidated, and Metro does not oppose that motion; and

WHEREAS, Metro is a governmental entity created by Tenn. Code Ann. §§ 7-1-101, *et seq.*; and

WHEREAS, Metro owns and operates municipal wastewater collection, retention and transmission systems designed to collect and convey municipal sewage (domestic, commercial and industrial) to its wastewater treatment plants ("WWTPs") or to its combined sewer overflows ("CSOs"), and is the holder of National Pollutant Discharge Elimination System ("NPDES") permits authorizing the discharge of pollutants from certain outfalls; and

WHEREAS, the collection, retention and transmission systems consists of separate sanitary sewer systems ("SSS") and combined sewer systems ("CSS"); and

WHEREAS, Metro maintains agreements with certain residential customers providing for the maintenance of grinder pumps located at such customers' residences and intends to continue to honor those agreements (the "Grinder Pump Maintenance Agreements"); and

WHEREAS, Metro, the City of Brentwood, Tennessee and the Tennessee Department of Environment and Conservation ("TDEC") entered into an Agreed Order, dated May 23, 2006, which addresses violations of the TWQCA at a pump station owned by the City of Brentwood and operated by Metro under a contractual agreement (the "Brentwood Pump Station"); and

WHEREAS, EPA Region 4 invited Metro by letter dated February 6, 2006, to participate in the Capacity, Management, Operations and Maintenance ("CMOM") Programs Project; and

WHEREAS, Metro agreed to participate in the CMOM Programs Project, which participation was confirmed through correspondence dated March 8, 2006 and Metro's attendance at the CMOM Programs Project Kick-off meeting of March 2, 2006; and

WHEREAS, EPA established a completion deadline of October 2, 2006 for Metro to submit a CMOM self-assessment; and

WHEREAS, Metro voluntarily has undertaken a self-assessment of its sanitary sewer collection and transmission systems to evaluate the capacity, management, operation and maintenance of its infrastructure, including its effectiveness at minimizing sanitary sewer overflows ("SSOs"), and in connection therewith, submitted to EPA its self-assessment on September 25, 2006 ("CMOM Self-Assessment"); and

WHEREAS, Metro's CMOM Self-Assessment made several recommendations to improve or refine Metro's current CMOM programs; and

WHEREAS, as a result of the CMOM self-assessment process and recommendations, Metro has already modified, refined, created, and it is now implementing several recommendations included in the CMOM Self-Assessment; and

WHEREAS, TDEC issued order #88-3364 on March 30, 1990, and order #99-0390 on September 17, 1999 to eliminate all non-compliant Combined Sewer Overflow ("CSO") discharges by December 31, 2007; and

WHEREAS, Metro, in response to the orders, reduced the number of combined sewer overflow outfalls ("CSO Outfalls") from 32 to 8; and

WHEREAS, Plaintiffs contend that Metro must update its Long Term Control Plan as well as improve upon its implementation of the Nine Minimum Controls to ensure that its CSOs

fully comply with EPA's 1994 CSO Control Policy, 59 Fed. Reg. 18688 ("CSO Control Policy"); and

WHEREAS, Metro certifies that it has documentation that the following accomplishments have been achieved between 1990 and 2007: a reduction in the volume of SSOs by 99%; a reduction in the frequency of SSOs by 45%; a reduction in the number of SSO locations from 164 to 27; the completion of over 260 projects to rehabilitate, parallel, or replace sewer lines, improve the capacity and reliability of sewer pumping stations, provide in-system storage for flow equalization, and increase WWTP capacity; the rehabilitation of over 317 miles of its wastewater collection system and the removal of over 3 billion gallons of inflow/infiltration annually from its wastewater collection system; a reduction in the frequency of CSO discharges by 59%; a reduction in the volume of CSO discharges by 72%; a reduction in the duration of CSO discharges by 83%; and a decrease of 15% in the average daily flow of sewage for treatment while experiencing an increase of 37% in the number of customers and 40% in the total footage of sewers reflecting the removal of inflow/infiltration into its wastewater collection system; and

WHEREAS, while Plaintiffs have not verified the information supporting the above-listed accomplishments, Plaintiffs do acknowledge the great progress that Metro has made, especially recently, in addressing problems within its Sewer System such as greatly reducing the frequency and volume of its SSOs and CSOs; and

WHEREAS, as announced at an event with EPA, TDEC, and Metro held on the bank of the Cumberland River in November 2002, 33 miles of the Cumberland River was removed from the EPA 303(d) list, the list of impacted waters of the State, for pathogens, reflecting the benefits of Metro's Overflow Abatement Program; and

WHEREAS, in this Consent Decree, Metro agrees to pay a civil penalty and to perform injunctive relief in settlement of the civil claims alleged in Plaintiffs' Complaints; and

WHEREAS, by entering this Consent Decree, Metro does not admit any liability to the Plaintiffs arising out of the transactions or occurrences alleged in the Complaints; and

WHEREAS, the Parties recognize, and the Court by entering this Consent Decree finds, that this Consent Decree has been negotiated by the Parties in good faith, that implementation of this Consent Decree will avoid prolonged and complicated litigation between the Parties, and that this Consent Decree is fair, reasonable, and in the public interest;

NOW THEREFORE, before the taking of any testimony, without admission by Metro of the non-jurisdictional allegations in the Complaints, without adjudication of any issue of fact or law, and upon the consent and agreement of the Parties to this Consent Decree, it is hereby ORDERED, ADJUDGED and DECREED as follows:

I. JURISDICTION

A. This Court has jurisdiction over the subject matter herein and the Parties to these consolidated actions pursuant to sections 309, 504 and 505 of the CWA, 33 U.S.C. §§ 1319, 1364 and 1365, and 28 U.S.C. §§ 1331, 1345 and 1355. This Court has subject matter jurisdiction over the state law claims of the State of Tennessee pursuant to 28 U.S.C. § 1367 and principles of supplemental jurisdiction, because the state law claims are so related to the Plaintiffs' federal law claims that they form part of the same case or controversy. The Complaints state claims upon which relief may be granted against Metro for injunctive relief and civil penalties. Metro agrees not to contest the jurisdiction of the Court to enter and enforce this Consent Decree. Authority to bring suit herein on behalf of the United States is vested in the

United States Department of Justice by 28 U.S.C. §§ 516 and 519, and 33 U.S.C. §§ 1366 and 1369. The Tennessee Attorney General has authority to bring this action on behalf of the State of Tennessee in accordance with Tenn. Code Ann. § 8-6-109.

II. VENUE

Venue is proper in the United States District Court for the Middle District of Tennessee, pursuant to sections 309(b) and 505 of the CWA, 33 U.S.C. §§ 1319(b) and 1365, and 28 U.S.C. §§ 1391(b) and (c) and 1395(a), because it is the judicial district in which Metro is located and in which the alleged violations occurred.

III. PARTIES BOUND

A. This Consent Decree applies to, and is binding upon, the Parties and their officials, officers, directors, employees, agents, servants, successors and assigns, and upon all persons, firms and corporations who assist Metro in performing its obligations under this Consent Decree.

B. Metro shall provide a copy of this Consent Decree to any consultant and contractor selected or retained to perform any activity required by this Consent Decree.

C. No later than twenty-one (21) Days prior to transfer of any ownership interest, operation, management, or other control of the Sewer System or a WWTP or any portion thereof, Metro shall give written notice and provide a copy of this Consent Decree to any such transferee or successor in interest. Metro shall require, as a condition of any such sale or transfer, that the purchaser or transferee agree in writing to be bound by this Consent Decree and submit to the jurisdiction of the Court for its enforcement. Metro shall also notify EPA Region 4, DOJ, and TDEC of any such planned transfer in accordance with Section XX (Form of Notice) of this

Consent Decree at least twenty-one (21) Days prior to the transfer, or if that is impossible, as soon as practicable. Metro may transfer within any twelve (12) Month period, an ownership interest, operation, management, or other control of portions of the Sewer System of up to one hundred (100) residential customer accounts, or the volumetric equivalent thereof, without this Section III.C applying to the Metro successors or assigns who take ownership or control of such portions of the Sewer System.

IV. OBJECTIVES

It is the express purpose of the Parties to further the objectives set forth in section 101 of the CWA, 33 U.S.C. § 1251, and to resolve Plaintiffs' claims for civil penalties and injunctive relief alleged in the Complaints in a manner consistent with the CWA, the TWQCA, and regulations promulgated under the CWA and the TWQCA. In light of these objectives, Metro agrees, *inter alia*, to perform the Work set forth in this Consent Decree; to use sound engineering practices to perform the Work; to use sound management, operation and maintenance practices to implement all the requirements of this Consent Decree; to expeditiously implement this Consent Decree under reasonable schedules using sound engineering practices; and to use its best efforts to achieve the goals of: (1) full compliance with the NPDES Permits, the CWA, the TWQCA, and their regulations; (2) the elimination of all SSOs, and (3) achieving compliance with EPA's CSO Control Policy including compliance by Metro's CSOs with water quality standards. Any schedules set forth in Deliverables shall reflect Metro's commitment to initiate and complete all Work under reasonable schedules. Metro shall maintain sufficient financial and personnel resources and sufficient equipment and analytical services to administer and implement the Work.

V. DEFINITIONS

A. Unless otherwise defined herein, terms used in this Consent Decree shall have the meaning given to those terms in the CWA, 33 U.S.C. §§ 1251, *et seq.*, and the regulations promulgated thereunder. For purposes of this Consent Decree, whenever terms listed below are used in this Consent Decree or appendices attached hereto and/or incorporated hereunder, the following definitions shall apply:

1. "Building Backup" is a wastewater backup into a building that is caused by blockages, malfunctions, or flow conditions in the Sewer System. A wastewater backup into a building that is caused by a blockage or other malfunction of a Private Lateral is not a Building Backup.

2. "Bypass" shall have the meaning set forth at 40 C.F.R. § 122.41(m).

3. "Calendar Quarter" shall mean the three (3) month periods ending on March 31st, June 30th, September 30th, and December 31st.

4. "Calendar Year" shall mean the twelve (12) month period starting on January 1 and ending on December 31.

5. "Certification" or "certify" when used in this Consent Decree shall require Metro Water to comply with Section XVIII of this Consent Decree.

6. "Combined Sewer Overflow" or "CSO" shall mean any discharge from any outfall currently identified, or identified in the future, as a combined sewer overflow or CSO in any Metro NPDES permit.

7. "Combined Sewer Overflow Outfall" or "CSO Outfall" shall mean the outfalls from which CSOs are discharged to waters of the United States or the State.

8. "Combined Sewer System" or "CSS" shall mean the portion of Metro's Sewer System designed to convey municipal sewage (domestic, commercial and industrial wastewaters) and stormwater runoff through a single-pipe system to Metro's Nashville Central Wastewater Treatment Plant or Combined Sewer Overflow Outfalls.

9. "Consent Decree" or "Decree" shall mean this document and all appendices hereto. In the event of a conflict between this document and any appendix, this document shall control.

10. "CWA" shall mean the Clean Water Act, as amended, 33 U.S.C. §§ 1251, *et seq.*

11. "Date of Entry" shall mean the date on which this Decree is entered by the United States District Court for the Middle District of Tennessee.

12. "Date of Lodging" shall mean the date on which this Decree is lodged by the United States with the United States District Court for the Middle District of Tennessee for a period of public comment.

13. "Day" or "Days" as used herein shall mean a calendar day or calendar days, unless otherwise indicated. When the day a report or other Deliverable is due under this Consent Decree falls on a Saturday, Sunday, or federal, State or Metro holiday, a Party shall have until the next calendar day that is not one of the aforementioned days for submittal of such report or other Deliverable.

14. "Defendant" shall mean Metro and any successor thereto.

15. "Deliverable" shall mean any written document required to be prepared and/or submitted by or on behalf of Metro pursuant to this Decree.

16. "DOJ" shall mean the United States Department of Justice, including any successor departments or agencies of the United States.

17. "EPA" shall mean the United States Environmental Protection Agency, including any successor departments or agencies of the United States.

18. "Metro" shall mean the Defendant in this action, the Metropolitan Government of Nashville and Davidson County, Tennessee, including all of its departments, agencies and instrumentalities such as the Department of Water and Sewerage Services, and any successor thereto.

19. "Month" shall mean one calendar month running from the numbered day to the same numbered day of the following calendar month, regardless of whether the particular month has 28, 29, 30 or 31 days. In the event a triggered event would occur on a day of the month which does not exist (for example, on February 30), then the event shall be due on the first day of the following month (for example, March 1).

20. "NPDES Permits" shall mean the most recently issued National Pollutant Discharge Elimination System Permits issued to Metro, including, but not limited to, those permits issued for the Nashville Central Wastewater Treatment Plant, Permit No. TN0020575 issued March 31, 2006; the Nashville Dry Creek Wastewater Treatment Plant, Permit No. TN0020648 issued November 30, 2005; and the Nashville Whites Creek Wastewater Treatment Plant, Permit No. TN0024970 issued November 30, 2005.

21. "Parties" shall mean the United States on behalf of EPA, the State, and Metro.

22. "Private Lateral" shall mean that portion of a sanitary sewer conveyance

pipe, including that portion in the public right of way, that extends from the wastewater main to the single-family, multi-family, apartment or other dwelling unit or commercial or industrial structure to which wastewater service is or has been provided.

23. "Public Document Repository" or "PDR" shall mean the main branch of the Nashville Public Library, located at 615 Church Street, Nashville, Tennessee 37219 and the Metro website.

24. "Sanitary Sewer Overflow" or "SSO" shall mean an overflow, spill, or release of wastewater from the Sewer System including: (a) Unpermitted Discharges; (b) overflows, spills, or releases of wastewater that may not have reached waters of the United States or the State; and (c) all Building Backups.

25. "Section," when used without a specific reference to a particular paragraph within this Consent Decree, shall mean a portion of this Consent Decree identified by an uppercase Roman numeral.

26. "Sewer System" shall mean the wastewater collection, retention, and transmission systems, including all pipes, force mains, gravity sewer lines, lift stations, pump stations, manholes and appurtenances thereto, owned or operated by Metro designed to collect and convey municipal sewage (domestic, commercial and industrial) to Metro's WWTPs or CSOs which is comprised of the SSS and CSS; provided, however, that Private Laterals, the Brentwood Pump Station and the grinder pumps maintained by Metro pursuant to the Grinder Pump Maintenance Agreements shall not be considered a part of the Sewer System for purposes of this Consent Decree.

27. "State" shall mean the State of Tennessee, including all of its departments,

agencies and instrumentalities.

28. "TDEC" shall mean the Tennessee Department of Environment and Conservation and any successor departments or agencies of the State.

29. "Timely," when applied to the submittal of a Deliverable shall mean submitted no later than the deadline established in this Consent Decree (or in a document approved pursuant to this Consent Decree) and containing all of the elements pertaining to the submittal as set forth in this Consent Decree (or in a document approved pursuant to this Consent Decree). "Timely," when applied to the implementation of any Work shall mean implemented no later than the deadline established in this Consent Decree (or in a document approved pursuant to this Consent Decree) and in accordance with the elements pertaining to such Work as set forth in this Consent Decree (or in a document approved pursuant to this Consent Decree).

30. "TWQCA" shall mean the Tennessee Water Quality Control Act, Tenn. Code Ann. §§ 69-3-101, *et seq.*

31. "United States" shall mean the United States of America, including its departments, agencies and instrumentalities.

32. "Unpermitted Discharge" shall mean a discharge of pollutants which reaches waters of the United States or the State from (a) the Sewer System, (b) WWTPs through a point source not specified in an NPDES Permit, or (c) WWTPs which constitutes a prohibited Bypass.

33. "Wastewater Treatment Plant" or "WWTP" shall mean devices or systems used in the storage, treatment, recycling, and reclamation of municipal wastewater. For purposes of this Consent Decree, this definition shall include all facilities owned, managed, operated, and

maintained by Metro, including but not limited to the following treatment facilities: Nashville Central Treatment Plant, Nashville Dry Creek Treatment Plant, and Nashville Whites Creek Treatment Plant.

34. "Work" shall mean all activities Metro is required to perform under this Consent Decree.

VI. REVIEW, APPROVAL AND IMPLEMENTATION OF DELIVERABLES

A. 1. Prior to the submission of a Deliverable to EPA and TDEC, Metro shall notify the Reference Librarian at the main branch of the Nashville Public Library (located at 615 Church Street in downtown Nashville) identifying the Deliverable to be submitted and providing a one-page instruction flyer containing a brief synopsis of the Deliverable and instructions on how to navigate to Metro's website and shall make available a copy of each Deliverable on Metro's website. The main branch of the Nashville Public Library and Metro's website shall constitute the Public Document Repository ("PDR"). Further, Metro shall make reasonable efforts to provide the same information to the other large branch offices of the Library, but shall not be subject to stipulated penalties for failure to do so. Metro shall then allow the public a period of thirty (30) Days to inspect and comment to Metro on the Deliverable ("Public Review Requirement"). Metro shall provide instructions to the public in the PDR for submitting a comment. Thereafter, Metro shall consider public comments for a period of up to fifteen (15) Days.

2. Metro shall bear the sole responsibility for depositing all Deliverables in the PDR. Within seven (7) Days after its submission to EPA and TDEC, Metro shall place a copy of the submitted version of the Deliverable in the PDR in the same fashion as for the

original submission. Within seven (7) Days after EPA's approval, approval upon conditions, or modification by EPA pursuant to this Section, Metro shall place a copy of such version of the Deliverable in the PDR. Such copy shall replace all previous copies of that Deliverable in the PDR, and shall remain in the PDR along with all comments until termination of this Consent Decree. In addition, Metro shall maintain in the PDR a listing of all Deliverables and comments.

B. Review of Deliverables.

1. Initial Submittal. All Deliverables shall be submitted to EPA and TDEC for review. After a reasonable period of consultation with the State, EPA may, in its discretion: (a) approve, in whole or in part, the Deliverable; (b) approve the Deliverable upon specified conditions; (c) disapprove, in whole or in part, the Deliverable, directing Metro to modify the Deliverable; or (d) any combination of the above. A disapproval under (c) or (d) of this Section VI.B.1 will set forth the reasons for the deficiencies in sufficient detail for Metro to correct the deficiencies.

2. Obligation to Implement Deliverable. In the event EPA approves, or approves upon conditions, the submission, or approves, approves upon conditions, or modifies any resubmission of a Deliverable pursuant to this Section, Metro shall proceed to take any action required to implement the Deliverable, as approved or modified by EPA, subject only to its right to invoke dispute resolution pursuant to Section XII (Dispute Resolution).

3. Resubmission of Disapproved Deliverable.

(a). Upon receipt of a notice of disapproval pursuant to Section VI.B.1(c) or (d), Metro shall, within thirty (30) Days, or such longer time as specified by EPA in such notice or agreed to in writing by EPA, revise the Deliverable as required by EPA and

resubmit the Deliverable to EPA for approval, subject only to Metro's right to invoke dispute resolution pursuant to Section XII (Dispute Resolution). Concurrent with the resubmission to EPA, the revised Deliverable shall also be provided to TDEC.

(b). Any portion of a Deliverable that is not specifically disapproved by EPA in a notice of disapproval shall be considered approved and Metro shall proceed to implement the approved portion of the Deliverable, provided that implementation of the approved portion of the Deliverable is not dependent upon implementation of the disapproved portion. Implementation of the approved portion of a Deliverable shall not relieve Metro of liability for stipulated penalties under Section X (Stipulated Penalties).

(c). In the event that a resubmitted Deliverable, or portion thereof, is again disapproved by EPA, after consultation with the State, EPA may again require Metro to implement changes as required by EPA, in accordance with the preceding paragraphs. EPA, after consultation with the State, may also modify the resubmitted Deliverable to cure the deficiencies, subject only to Metro's right to invoke dispute resolution pursuant to Section XII (Dispute Resolution).

4. Deliverables Are Enforceable. Deliverables, including all schedules set forth therein, shall be enforceable under this Consent Decree as if they were set forth herein upon approval, approval upon conditions, or modification by EPA, and after conclusion of any dispute resolution period. Any portion of a Deliverable that is not specifically disputed by Metro shall be enforceable during any dispute resolution period, provided that implementation of the non-disputed portions of the Deliverable is not dependent upon implementation of the disputed portion.

C. EPA Review of Deliverables. EPA agrees to use best efforts to expeditiously review and comment on Deliverables. If EPA issues written comments and decisions on a Deliverable more than one-hundred and twenty (120) Days after receipt of such submission, any subsequent deadline or milestone that is dependent upon such comments or decisions shall be extended. The length of the extension shall be determined by calculating the number of Days between EPA's receipt of the submission and the date of EPA's written response, less one-hundred and twenty (120) Days. Within thirty (30) Days of the date that Metro knows or should know of a deadline or milestone that Metro believes is extended under this paragraph, Metro shall inform EPA, in writing, of its belief and the amount of time Metro believes the deadlines or milestones are extended. If EPA disagrees with Metro's determination that a deadline is dependent upon such comments or decisions, EPA shall inform Metro in writing. Metro may dispute EPA's conclusion regarding whether a deadline is dependent upon such comments or decisions pursuant to Section XII (Dispute Resolution).

D. Revisions to Deliverables. The Parties recognize that Metro may need or want to revise certain Deliverables during the term of this Consent Decree. Such revisions shall not be considered modifications to the Consent Decree for purposes of Section XXI (Modification). Metro must obtain EPA's prior written approval of any revision to the substance of a Deliverable and shall place copies of any such revised Deliverable in the PDR in accordance with the provisions of Sections VI.A.1 and 2. Metro may revise the form of any Deliverable without consulting EPA and shall place a copy of any such revised Deliverable in the PDR within seven (7) Days after making such revision.

VII. PERFORMANCE OF THE WORK

A. Obligation to Perform Work. Upon the Date of Entry, Metro shall implement the Work pursuant to this Consent Decree. Metro is responsible for ensuring that any contractors hired to perform Work pursuant to this Consent Decree comply with all applicable laws and with this Consent Decree. All Work shall be performed using sound engineering practices, which may include appropriate provisions of the *Handbook: Sewer System Infrastructure Analysis and Rehabilitation*, EPA/625/6-91/030, 1991; *Existing Sewer Evaluation and Rehabilitation*, WEF MOP FD-6, 1994; and the *Tennessee Design Criteria for Sewage Works* in accordance with Tenn. Comp. R. & Reg., ch. 1200-4-2-.03.

B. Remedial Measures for Sanitary Sewer Overflows

1. Corrective Action Plan/Engineering Report ("CAP/ER") for Sanitary Sewer Overflows. No later than twenty-four (24) months from the Date of Entry, Metro shall prepare and submit to EPA and the TDEC a Corrective Action Plan/Engineering Report ("CAP/ER") that addresses the conditions causing SSOs and with the goal of eliminating the SSO locations identified in Appendix A. To accomplish this goal, the CAP/ER shall identify the specific corrective action projects to be taken and any other alternatives considered but not chosen as a part of Metro's analysis. The CAP/ER shall also include a map clearly identifying known SSO locations, pertinent flow measurement data, and a project schedule for beginning and completing all Work specified in the CAP/ER. Among other items, in establishing the project schedule, Metro shall evaluate the frequency and severity of an SSO, the proximity of an SSO to public areas and the complexity of the corrective action necessary to eliminate an SSO. All such Work under the CAP/ER shall be completed no later than nine (9) years after the

approval or modification of Metro's CAP/ER pursuant to Section VI of this Consent Decree; provided, however, the CAP/ER shall include a completion date of December 31, 2008 for the Dry Creek Pump Station SSO location and a completion date of December 31, 2009 for the Barker Road SSO location. The Dry Creek SSO location and the Barker Road SSO location, as such locations are more particularly described on Appendix A, account for approximately fifty (50) % of Metro's total SSO volume over the five (5) years prior to the Date of Entry. The CAP/ER may include projects currently under construction and projects planned for construction currently identified in Metro's capital improvement plans which are consistent with the goals of the CAP/ER. In addition, upon request, Metro shall make available to EPA and TDEC any additional information in its possession that may be of use to EPA or TDEC in evaluating the CAP/ER.

C. Capacity, Management, Operation and Maintenance ("CMOM") Programs.

1. Implementation of CMOM Programs. Metro shall continue to implement the CMOM programs as described in Metro's CMOM Self-Assessment submitted to EPA and TDEC on September 25, 2006 and as updated on April 26, 2007. The referenced Self-Assessment report and update, excluding attachments, are attached hereto as Appendix B. Metro shall implement all the program recommendations included in Section 8 of the CMOM Self-Assessment no later than the implementation deadlines listed in the recommendation table of the same section. Within ten (10) Days of the Date of Entry, Metro shall place in the PDR all documents that constitute these programs. In the event Metro desires to substantially change or discontinue implementation of all or a portion of any of these CMOM programs, Metro shall submit such proposed change or request for discontinuance for review and EPA's approval. The

proposed change or discontinuance shall be placed in the PDR for public review and information, but shall not be subject to the Public Review Requirement of Section VI.A.1. However, Metro shall receive questions and comments from the public on such documents for a period of twenty (20) Days after placement in the PDR. For purposes of this paragraph, a substantial change to one of these CMOM programs or to the way in which one of these CMOM programs is implemented shall mean a change that materially or significantly hampers the beneficial purpose of that program.

2. Specific CMOM Program Development - Spill and Overflow Response Plan ("SORP"). Metro submitted an updated SORP to EPA and TDEC on May 4, 2007, which is attached hereto as Appendix C. Metro shall continue to implement this updated SORP and by June 1 of each year, Metro shall review the SORP and submit for review and EPA approval an update with any proposed changes as appropriate.

3. Specific CMOM Program Development - Inter-Jurisdictional Agreement Program. No later than six (6) months after the Date of Entry, Metro shall submit to EPA and TDEC an Inter-Jurisdictional Agreement Program for when Metro renews existing agreements or enters into new agreements that cover the collection, conveyance and treatment of sewage by Metro from municipal satellite sewer systems and/or large volume sewer customers. The program shall delineate the minimum provisions to be set forth in these agreements with which the contracting municipality or large volume sewer customer must comply. Such provisions shall include requirements on the contracting party to properly manage, operate and maintain its sewage collection and conveyance systems so as to minimize peak flows into Metro's Sewer System by excluding, to the maximum reasonable extent, the intrusion of surface and ground

water and other extraneous flows. The program shall also delineate provisions addressing the term or life of these agreements; mechanisms for appropriate modification of the agreements; and mechanisms for enforcement of the agreements (including a description of the legal support necessary to develop, oversee and enforce the agreements) such as provisions permitting termination of the agreement and physical disconnection from Metro's sewer system within a reasonable time not exceeding two (2) years upon the failure of the contracting party to comply with its management, operation and maintenance obligations. TDEC continues to be responsible in all respects for enforcing the requirements of any state operating permits for such municipal satellite sewer systems and/or large volume sewer customers. Metro shall not be responsible for enforcement of any such permits or for management or oversight of any such municipal satellite sewer systems and/or large volume sewer customers.

The parties acknowledge that Metro currently has in place agreements covering the collection, conveyance and treatment of sewage from certain other municipal satellite sewer systems that may or may not currently satisfy the requirements of the Inter-Jurisdictional Agreement Program as set forth above. Metro represents that these existing agreements may expire or terminate before or after the Date of Entry of this Consent Decree. When any of these currently existing agreements expire or terminate, Metro may, but shall not be required to, renew any such agreement or enter into a new agreement covering the collection, conveyance and treatment of sewage from such other municipal satellite sewer system. In the event Metro does renew such an agreement or enters into any new agreement, each agreement shall be consistent with the requirements of this Inter-Jurisdictional Agreement Program.

4. <u>CMOM Specific Program Development - Capacity Assurance Program</u>

Metro submitted an updated Capacity Assurance Program to EPA and TDEC on June 6, 2007, which is attached hereto as Appendix D. Metro shall continue to implement this updated Capacity Assurance Program.

5. Specific CMOM Program Development - Pump Station Operation Plan for Power Outages. No later than nine (9) months after the Date of Entry, Metro shall submit to EPA and TDEC a Pump Station Operation Plan for Power Outages. This operation plan shall include an evaluation of the adequacy of its current pump station backup power and emergency procedures for power outages achieved via emergency generators, emergency pumping capabilities, or separate power feeds from separate substations. Emergency generators may be either permanently installed or portable. Emergency pumping typically consists of portable, engine-driven pumps that can be quickly connected to a pump station.

(a). The evaluation of emergency procedures for power outages shall consider the following criteria:

i. An adequate alternative power source must have sufficient capability to operate the station at its rated capacity, as well as operate all ancillary equipment and instrumentation;

ii. Emergency pumping capability means modification of a pump station to allow rapid connection of a portable pump to the pump station and provision of a pump with the capability to handle that station's peak flows. This includes providing "quick-connect" couplers for both pump suction and discharge.

iii. The ability of maintenance personnel to take corrective action

within the critical response time calculated for each pump station.

iv. In evaluating the adequacy of its current situation, Metro shall consider its current inventory of portable pumps and its history of equipment failure-related, power-loss-related and lightning strike-related SSOs during the past five (5) years prior to the Date of Entry.

(b). Metro shall include in the Pump Station Operation Plan for Power Outages detailed information regarding the criteria specified above for each of its Pump Stations. In particular, the Pump Station Operation Plan for Power Outages shall:

i. Describe each pump station;

ii. Provide detailed information regarding the results of the evaluation of each pump station;

iii. Provide detailed information about its backup power, emergency pumping capability, and emergency procedures at each pump station;

iv. Provide information regarding lightning strike protection equipment at each pump station;

v. Provide detailed descriptions of its history of power-loss-related and lightning strike-related SSOs during the past five (5) years prior to the Date of Entry;

vi. Identify all measures necessary to correct all identified deficiencies, including all appropriate emergency procedures and

lightning strike-protection measures necessary to minimize power-loss related SSOs; and

vii. Include expeditious schedules for the implementation of all identified measures; provided, however, that such schedules shall not extend beyond two (2) years of the Date of Entry.

D. Remedial Measures for Combined Sewer Overflows

1. Nine Minimum Controls ("NMC") Compliance Plan. No later than six (6) months from the Date of Entry, Metro shall prepare and submit to EPA and the TDEC a NMC Compliance Plan evaluating and identifying corrective actions for achieving compliance as set forth in the CSO Control Policy with the NMCs set forth below. The NMC Compliance Plan shall include an implementation schedule for completing corrective actions on or before the deadlines set forth below. The identified corrective actions shall be in accordance with the "Guidance for Nine Minimum Controls", EPA 832-B-95-003, May 1995. The identified corrective actions shall be designed to achieve compliance with the following NMCs:

(a). control of solid and floatable materials by installation of devices at CSO Outfalls within twenty four (24) months after the approval or modification of Metro's NMC Compliance Plan pursuant to Section VI of this Consent Decree.

2. Long Term Control Plan ("LTCP"). No later than twenty-four (24) months from the Date of Entry, Metro shall submit to EPA and TDEC an updated LTCP. The updated LTCP shall be consistent with the CSO Control Policy and EPA's "Guidance for Long-Term Control Plan," EPA 832-B- 95-002, September 1995. The updated LTCP shall include

expeditious schedules, deadlines and timetables for remedial measures that will be designed to bring Metro's CSOs into full compliance with the water quality standards criteria as soon as practicable based on sound engineering judgment by no later than nine (9) years after the approval or modification of Metro's updated LTCP pursuant to Section VI of this Consent Decree.

(a). The updated LTCP shall meet the following goals:

i. Ensure that if CSOs occur, they are only as a result of wet weather;

ii. Bring all wet weather CSO discharge points into compliance with the technology-based and water quality-based requirements of the CWA; and

iii. Minimize the impacts of CSOs on water quality, aquatic biota, and human health.

(b). The updated LTCP shall include, at a minimum, the following elements:

i. The results of characterization, monitoring, and modeling activities as the basis for selection and design of effective CSO controls;

ii. A report on the public participation process that actively involved the public in the decision-making to select long-term CSO controls;

iii. Identification of how the LTCP addresses sensitive areas as the highest priority for controlling overflows;

iv. A report on the cost analyses of the alternatives considered;

v. Operational plan revisions to include agreed-upon long-term CSO controls;

vi. Maximization of treatment at Metro's existing WWTPs for wet weather flows;

vii. Identification of and an implementation schedule for, the selected CSO controls; and

viii. A post-construction compliance monitoring program adequate to ascertain the effectiveness of CSO controls and to verify compliance of Metro's CSOs with water quality-based CWA requirements.

VIII. SUPPLEMENTAL ENVIRONMENTAL PROJECT

A. Metro shall perform and complete the Supplemental Environmental Project ("SEP") set forth in Appendix E, which has the objective of securing significant environmental or public health protection and improvements. Metro shall complete the SEP in accordance with the schedule and requirements set forth in Appendix E. The SEP shall be completed by December 31, 2010.

B. The total expenditure for the SEP shall be not less than $2.8 million. Metro shall include documentation of the expenditures made in connection with the SEP as part of the SEP Completion Report described in Section VIII.E below. In the event that Metro fails to perform and complete the SEP as set forth in Appendix E, it shall pay stipulated penalties in accordance with Section X (Stipulated Penalties).

C. Metro is responsible for the satisfactory completion of the SEP in accordance with

the requirements of this Decree. Metro shall be deemed to have satisfactorily completed the SEP when (1) EPA determines that Metro made good faith efforts to spend the entire amount set forth in Section VIII B; and (2) Metro certifies, with supporting documentation, that at least ninety (90) percent of the amount of money required to be spent on the SEP has been disbursed to pay for installation of wastewater collection and transmission systems necessary to allow residences in the Brandywine and Sanitarium Road neighborhoods to hook into Metro's Sewer System to alleviate a threat to nearby waters and to public health caused by the failure rate of septic tanks in those neighborhoods as identified by the Metro Public Health Department.

D. Metro hereby certifies that, as of the date of this Consent Decree, Metro is not required by any federal, state, or local law or regulation to perform or develop the SEP; nor is Metro required by agreement, grant, or as injunctive relief in this or any other case to perform or develop the SEP. Metro further certifies that it has not received, and is not presently negotiating to receive, credit in any other enforcement action for the SEP; nor will Metro realize any profit attributable to or associated with the SEP, or receive any reimbursement for any portion of the SEP from any other person.

E. SEP Completion Report. Metro shall complete the SEP by December 31, 2010. Metro shall submit a SEP Completion Report to the Parties within ninety (90) Days after completion of the SEP. The SEP Completion Report shall contain the following information:

1. A detailed description of the SEP as implemented;

2. A description of any implementation problems encountered and the solutions thereto;

3. An itemization of all SEP costs and acceptable evidence of such costs;

4. Certification that the SEP has been fully implemented pursuant to the provisions of this Consent Decree, including Appendix E;

5. A description of the environmental and public health benefits resulting from implementation of the SEP (with a quantification of the benefits and pollutant reductions to the extent feasible); and

6. Copies of any brochures, databases, software, or similar information relating to the SEP.

F. Periodic Reports. While the SEP is being planned and implemented, Metro shall submit semiannual reports to the Parties describing the progress of the SEP up to and during the most recent Calendar Quarter within one (1) Month after the end of the second and fourth Calendar Quarters following the Date of Entry. Each periodic report shall contain the information described in Appendix E.

G. Following receipt of the SEP Completion Report described in Section VIII.E above, EPA, after consultation with TDEC, will do one of the following in writing:

1. accept the SEP Completion Report; or

2. reject the SEP Completion Report, notifying Metro, in writing, of deficiencies in the SEP Completion Report.

If EPA rejects the SEP Completion Report, Metro shall have one (1) Month from the date of receipt of EPA's notice in which to correct any deficiencies and submit a revised SEP Completion Report. Metro agrees to comply with any SEP related requirements imposed by EPA's notice, subject to dispute resolution.

H. If upon receipt of the SEP Completion Report, EPA, after consultation with

TDEC, determines that part or all of the SEP has not been implemented in accordance with this Consent Decree, including Appendix E, and any statements of work, EPA may require Metro: (1) to perform additional tasks; (2) to repeat any deficient tasks; or (3) if specific tasks set forth in Appendix E were not performed at all, to perform such tasks. EPA shall provide any such requirement to Metro in writing. Metro agrees to comply with any SEP related requirements imposed by EPA's notice, subject to dispute resolution.

I. Metro bears the burden of segregating eligible SEP costs from costs not eligible for SEP credit. Any cost evidence that contains costs that are both eligible and not eligible for SEP credits shall be disallowed in its entirety. For purposes of this Section VIII, "acceptable evidence" includes invoices, purchase orders, or other documentation that specifically identifies and itemizes the individual costs of the goods or services for which payment is made. Canceled drafts are not acceptable evidence unless such drafts specifically identify and itemize the individual costs of the goods or services for which payment is made.

J. Metro hereby agrees that, in estimating the cost of the SEP, it did not take into account any savings Metro expects to achieve by claiming deductions on its state or federal tax returns. Metro further agrees that it will not claim a deduction on such tax returns based upon any funds expended by Metro in the performance of the SEP. Metro, at the time of completion of the SEP, shall submit to the United States and the State written certification that any funds expended in the performance of the SEP have not been and will not be claimed as a deduction on such taxes.

K. Any public statement, oral or written, in print, film, or other media, made by Metro making reference to the SEP shall include the following language, "This project was

undertaken in connection with the settlement of a civil enforcement action taken by the United States and the State of Tennessee for violations of the Clean Water Act." If Metro fails to include such language, it shall immediately issue a retraction of its public statement.

IX. CIVIL PENALTY

A. Metro shall pay a civil penalty as follows:

1. Metro shall make a payment to the United States of $282,019 within thirty (30) Days after the Date of Entry. Payment to the United States shall be made by electronic funds transfer, in accordance with written instructions to be provided by the United States after Date of Lodging of this Consent Decree. The costs of such electronic funds transfer shall be the responsibility of Metro. Metro shall send a copy of the electronic funds transfer authorization form, the electronic funds transfer transaction record, and the transmittal letter to the Parties as specified in Section XX (Form of Notice) below. The transmittal letter shall reference the case name, USAO File Number, and DJ No. 90-5-1-1-09000.

2. Metro shall make a payment as directed by the State as follows: Metro shall spend $282,019 on the State Project in accordance with and as more particularly set forth in Appendix F of this Consent Decree. IDEC has approved this payment as an appropriate State Project recognizing the value of this project and its potential to positively impact the local environment.

3. The payments at the direction of the State of $282,019, together with the payment to the United States of $282,019, constitute a total civil penalty of $564,038.

B. In the event that full cash payment to the United States is not made within thirty (30) Days of the Date of Entry, Metro shall pay interest on the balance due from the original due

date to the date of payment, at the rate calculated pursuant to 28 U.S.C. § 1961.

X. STIPULATED PENALTIES

A. EPA may assess against Metro stipulated penalties under the circumstances described below. Fifty (50) percent of each payment due pursuant to this Section shall be paid to the United States and fifty (50) percent shall be paid to the State.

1. Unpermitted Discharges. For each Unpermitted Discharge, EPA may assess a stipulated penalty. Any such penalty shall be determined as follows:

If Unpermitted Discharge Occurs:	Penalty per Unpermitted Discharge:
After December 31, 2009 but on or before December 31, 2014	$1,000
After December 31, 2014	$3,000

2. Dry Weather CSOs. For each CSO that occurs due to causes not associated with a wet weather event, EPA may assess a stipulated penalty. Any such penalty shall be determined as follows:

If Dry Weather CSO Occurs:	Penalty per Unpermitted Discharge:
Within 12 Months of Date of Entry	$500
More than 12 Months of Date of Entry	$1,000

3. Failure to Timely Submit Deliverable. For each Day Metro fails to Timely submit any Deliverable, EPA may assess daily stipulated penalties for each such Deliverable as follows:

Period of Noncompliance:	Penalty Per Deliverable Per Day:
1 - 10 Days	$500
11- 20 Days	$1,000

21- 60 Days	$2,000
more than 60 Days	$3,500

4. Failure to Timely Implement Work. For each Day Metro fails to Timely implement any Work (other than the Timely submittal of a Deliverable or implementation of a SEP), EPA may assess daily stipulated penalties for each such item of Work as follows:

Period of Noncompliance:	Penalty Per Violation Per Day:
1 - 14 Days	$1,000
15 - 30 Days	$2,000
31 - 60 Days	$3,000
60-180 Days	$4,000
more than 180 Days	$5,000

5. Failure to Timely Implement SEP Milestones. For each Day Metro fails to Timely implement a SEP milestone set forth in Section VIII or Appendix E, EPA may assess daily stipulated penalties as follows:

Period of Noncompliance:	Penalty Per Violation Per Day:
1 - 15 Days	$1,000
16 - 30 Days	$1,500
31 - 60 Days	$2,500
over 60 Days	$4,000

6. Failure to Complete a SEP or Failure to Spend Agreed-Upon Amount. In the event that Metro fails to complete a SEP in accordance with the terms of this Consent Decree relating to the performance of the SEP as described in Section VIII and Appendix E, and/or to the

extent that Metro's actual expenditures for the SEP do not equal or exceed the required cost of the SEP as described in Section VIII.B, EPA may assess stipulated penalties according to the provisions set forth below:

(a). Except as provided in subparagraph (b) immediately below, if the SEP that has not been completed satisfactorily, EPA may assess a stipulated penalty in the amount of $375,000.

(b). If the SEP is not completed in accordance with Section VIII and Appendix E, but EPA determines that Metro (i) has made good faith efforts to complete the SEP; and (ii) has certified, with supporting documentation, that at least 90 percent of the amount of money required to be spent on the SEP, Metro shall not be liable for any stipulated penalty.

(c). If the SEP is completed in accordance with Section VIII and Appendix E, but Metro spent less than 90% of the amount of money required to be spent on the SEP, EPA may assess a stipulated penalty in the amount of $37,500.

(d). For failure to submit a SEP Completion Report required by Section VIII.E, EPA may assess a stipulated penalty in the amount of $1,000 for each Day after the report was originally due until the report is submitted.

(e). For failure to submit any other report required by Section VIII, or Appendix E, EPA may assess a stipulated penalty of $500 for each Day after the report was originally due until the report is submitted.

7. Delay in Payment of Civil Penalty. In the event Metro fails to pay the United States and/or the State the civil penalty pursuant to Section IX.A, EPA or the State may assess a stipulated penalty of $2,000 for each Day that Metro is late in paying.

B. Stipulated penalties shall automatically begin to accrue on the first Day of noncompliance as specified in paragraph A above, and shall continue to accrue through the final Day of the correction of the noncompliance, but shall only be payable as provided in Section X.C below.

C. Metro shall pay stipulated penalties within thirty (30) Days of receipt of a written demand for payment. All stipulated penalties paid to the United States pursuant to this Section shall be made by electronic funds transfer, in accordance with written instructions to be provided by the United States after Date of Lodging of this Consent Decree. The costs of such electronic funds transfer shall be the responsibility of Metro. Metro shall send a copy of the electronic funds transfer authorization form, the electronic funds transfer transaction record, and the transmittal letter to the Parties as specified in Section XX (Form of Notice) below. The transmittal letter shall reference the case name, USAO File Number, and DJ No. 90-5-1-1-09000. All stipulated penalties paid to the State shall be paid by check payable to "The State of Tennessee." Each check shall reference the case name and civil action numbers herein and shall be sent to:

Barry Turner
Deputy Attorney General
Office of the Tennessee Attorney General
Environmental Division
P. O. Box 20207
Nashville, TN 37202

D. In the event that a stipulated penalty is not paid in full when due, Metro shall pay interest on the balance due calculated pursuant to 28 U.S.C. § 1961, with interest accruing from the date payment of the stipulated penalty is due to the date of payment.

E. Upon receipt of a written demand for payment of a stipulated penalty, Metro may dispute its liability for such stipulated penalty pursuant to the dispute resolution provisions of Section XII of this Consent Decree. In that event, any stipulated penalties and interest that are ultimately determined to be due under this Consent Decree shall be paid within thirty (30) Days of the date of EPA's written decision or, if applicable, any Court order. Stipulated penalties and interest shall continue to accrue during the pendency of the dispute, and EPA shall have the right to collect all penalties and interest that accrued during the dispute.

F. The payment of stipulated penalties shall not alter in any way Metro's obligation to implement or complete all Work required under this Consent Decree.

G. The United States may, in the unreviewable exercise of its discretion, reduce or waive stipulated penalties otherwise due it under the Consent Decree. In exercising its discretion under this paragraph, the United States shall consider, among other factors, the amount of time that has elapsed between the date that EPA became aware of the violation and the date of EPA's assessment of a penalty for that violation.

H. Payment of stipulated penalties as set forth above shall be in addition to any other rights or remedies which may be available to the United States or the State by reason of Metro's failure to comply with requirements of this Consent Decree, and any applicable Federal, State or local laws, regulations, NPDES Permits and all other applicable permits, including but not limited to penalties and relief remedies under the CWA for future violations of the CWA, regardless of whether EPA could demand a stipulated penalty under this Consent Decree for those violations.

XI. FORCE MAJEURE

A. "Force Majeure" for the purposes of this Consent Decree is defined as an event arising from causes beyond the control of Metro or of any entity employed by Metro, including, but not limited to, its consultants and contractors, which delays or prevents the performance of any obligation under this Consent Decree, despite Metro's best efforts to fulfill the obligation. The requirement that Metro exercise "best efforts to fulfill the obligation" includes using best efforts to anticipate any potential Force Majeure event and best efforts to address the effects of any potential Force Majeure event (1) as it is occurring and (2) following the potential Force Majeure event, such that delay is minimized to the greatest extent possible. Force Majeure does not include unanticipated or increased costs, financial inability to perform an obligation required by this Consent Decree, or a failure to achieve compliance with the NPDES permits, the TWQCA, the CWA or the CSO Control Policy. Application for construction grants, State Revolving Loan Funds, or any other grants or loans, or delays caused by inadequate facility planning or plans and specifications on the part of Metro do not constitute Force Majeure.

B. Solely for purposes of this Consent Decree, Metro shall be deemed to know of any circumstance of which Metro or any entity controlled by Metro, including Metro's consultants and contractors, knew or should have known.

C. Where any compliance obligation under this Consent Decree requires Metro to obtain a federal, State or local permit or approval, Metro shall submit timely and complete applications and take all other actions necessary to obtain such permits and approvals. Metro may seek relief under this Section for any delay in performance of any such obligation resulting from a failure to obtain or a delay in obtaining, any permit or approval required to fulfill such

obligation, if Metro has submitted timely and complete applications and has taken all other actions necessary to obtain all such permits and approvals.

D. When circumstances are occurring or have occurred which may delay the completion or prevent the performance of any requirement of this Consent Decree, whether or not due to a Force Majeure event, Metro shall notify EPA and TDEC in writing no later than twenty (20) Days after Metro knew, or in the exercise of reasonable due diligence under the circumstances, should have known, of the event. Notice shall be provided pursuant to Section XX (Form of Notice). The notice shall specifically reference this Section of the Decree and describe in detail: the basis for Metro's contention that it experienced or will experience a Force Majeure event if Metro intends to make a claim of Force Majeure; the obligations for which Metro believes performance will be delayed; the anticipated length of the delay; the precise cause or causes of the delay; the measures taken or to be taken to prevent or minimize the delay; and the timetable by which those measures will be implemented. Failure to so notify EPA and TDEC shall constitute a waiver of any claim of Force Majeure as to the event in question.

E. If EPA, after consultation with TDEC, finds that a delay or prevention in performance is, or was, caused by a Force Majeure event, it shall extend the time for performance, in writing, for a period not exceeding the delay actually caused by such event, and stipulated penalties shall not be due for such period. In proceedings on any dispute regarding a delay in performance or prevention of performance, the dispute resolution provisions of Section XII shall apply, and Metro shall have the burden of proving that the delay in performance or prevention of performance is, or was, caused by a Force Majeure event, and that the amount of additional time requested is necessary to compensate for that event.

F. Compliance with a requirement of this Consent Decree shall not by itself constitute compliance with any other requirement. An extension of one compliance date based on a particular event shall not automatically extend another compliance date or dates. Metro shall make an individual showing of proof regarding the cause of each delayed incremental step or other requirement for which an extension is sought. Metro may petition for the extension of more than one compliance date in a single request.

XII. DISPUTE RESOLUTION

A. Unless otherwise expressly provided for in this Consent Decree, the dispute resolution procedures of this Section shall be the exclusive mechanism available for resolving any disputes under this Decree between Metro and the United States. However, such procedures shall not apply to actions by the United States to enforce obligations of Metro that have not been disputed in accordance with this Section. The Parties acknowledge that the procedures of this Section shall not extend to disputes concerning the modification, revocation, renewal or reissuance of NPDES permits, which shall be governed by prevailing law.

B. Disputes with respect to any portion of a requirement of this Consent Decree shall not delay implementation of any portion of that requirement that is not in dispute and that is entirely independent of the requirement being disputed unless EPA agrees in writing, after consultation with the State, to a stay of Metro's obligation to perform, or the Court grants an order staying Metro's obligation to perform.

C. Informal Dispute Resolution. Metro shall invoke the informal dispute resolution procedures of this Section by notifying all other Parties in writing of the matter(s) in dispute and of Metro's intention to resolve the dispute under this Section. The notice shall: (1) outline the

nature of the dispute; (2) include Metro's proposed resolution; (3) include all information or data relating to the dispute and the proposed resolution; and (4) request negotiations pursuant to this Section to informally resolve the dispute. Metro and the United States shall then attempt to resolve the dispute informally for a period of thirty (30) Days from the date of the notice (or such longer period as Metro and the United States may agree in writing), with the goal of resolving the dispute in good faith, without further proceedings. Notice of any such extension shall be provided by Metro to the State. The State shall have the right to participate in informal negotiations between the United States and Metro as to disputes under this Consent Decree and all Parties may file a written statement of position. However, resolution of the dispute shall be solely between the United States and Metro. The period for such negotiations may be extended by written agreement of the United States and Metro. Notice of any such extension shall be provided by Metro to the State. If informal negotiations result in an agreement between the United States and Metro, such agreement shall be set forth in a single document in writing and Metro shall provide a copy to all Parties. If the United States and Metro cannot resolve a dispute by informal negotiations, then the position advanced by the United States shall be considered binding unless, within thirty (30) Days after the conclusion of the informal negotiation period, Metro invokes formal dispute resolution procedures as set forth below.

D. Formal Dispute Resolution. Metro shall invoke formal dispute resolution procedures, within the time period provided in the preceding paragraph, by serving on the United States a written Statement of Position regarding the matter in dispute. The Statement of Position shall include, but may not necessarily be limited to, any factual data, analysis, or opinion supporting Metro's position and any supporting documentation relied upon by Metro.

E. The United States shall serve its Statement of Position within fourty-five (45) Days of receipt of Metro's Statement of Position. The United States' Statement of Position shall include, but may not necessarily be limited to, any factual data, analysis, or opinion supporting that position and any supporting documentation relied upon by the United States. The United States shall consult with the State during preparation of its Statement of Position. The United States' Statement of Position shall be binding on Metro, unless Metro files a motion for judicial review of the dispute in accordance with the following paragraph.

F. Judicial Dispute Resolution. Metro may seek judicial review of the dispute by filing with the Court and serving on the United States, in accordance with Section XX (Form of Notice) and the Local Rules, a motion requesting judicial resolution of the dispute. The motion must be filed within thirty (30) Days of receipt of the United States' Statement of Position pursuant to the preceding paragraph. The motion shall contain a written statement of Metro's position on the matter in dispute, including any supporting factual data, analysis, opinion, or documentation, and shall set forth the relief requested and any schedule within which the dispute must be resolved for orderly implementation of the Consent Decree.

G. The United States shall have at least sixty (60) Days in which to respond to Metro's motion. The United States and Metro may file reply memoranda to the extent permitted by the Local Rules, or allowed by the Court.

H. A dispute concerning EPA's failure to act on a submittal (i.e., to accept, require modification of, or reject the submittal), which Metro is required to submit for EPA's approval, shall be governed by the procedures of this Section. If Metro petitions the Court for resolution of such a dispute, Metro shall seek only an order from the Court directing EPA to act on the

submittal within an appropriate period of time.

I. Except as provided in this Consent Decree, or agreed to in writing by the United States and Metro, or allowed by the Court, submission of any matter for dispute resolution under this Section shall not extend any of the deadlines set forth in this Consent Decree, or act as a stay of the disputed requirement and all dependent requirements.

J. In any dispute in Court under this Section, Metro shall bear the burden of proving by a preponderance of the evidence that Metro's position on the issues in dispute should prevail over the United States' position. The United States or Metro may request an evidentiary hearing for good cause.

K. Stipulated penalties with respect to the disputed matter shall continue to accrue from the first Day of noncompliance, but payment shall be stayed pending resolution of the dispute as provided in Section X.E. If Metro does not prevail on the disputed issue, stipulated penalties may be assessed and shall be payable as provided in Section X (Stipulated Penalties).

XIII. RIGHT OF ENTRY

A. The United States and State and their authorized representatives and contractors shall have authority at all times, upon the presentation of proper credentials, to enter the premises of Metro to:

1. Monitor the Work required by this Consent Decree;
2. Verify any data or information submitted to the United States and State;
3. Obtain samples from any portion of the WWTPs or the Sewer System;
4. Inspect and evaluate any portions of the WWTPs or the Sewer System;
5. Inspect and review any records required to be kept under the terms and

conditions of this Consent Decree or any NPDES Permit, the CWA and the TWQCA; and

6. Otherwise assess Metro's compliance with federal and state environmental laws and this Consent Decree.

B. The rights created by this Section are in addition to, and in no way limit or otherwise affect, the authority of the United States and State to conduct inspections, to require monitoring and to obtain information from Metro as authorized by law.

C. The United States and the State agree to provide Metro an opportunity to obtain split samples of samples taken by the United States or the State.

XIV. NOT A PERMIT

This Consent Decree is not and shall not be construed as a permit, nor a modification of any existing permit, issued pursuant to Section 402 of the CWA, 33 U.S.C. § 1342, nor shall it in any way relieve Metro of its obligations to obtain permits for its WWTPs and related operations or facilities and to comply with the requirements of any NPDES permit or with any other applicable federal or State law or regulation. Any new permit, or modification of existing permits, must be complied with in accordance with applicable federal and State laws and regulations.

XV. ONGOING COMPLIANCE OBLIGATIONS

A. Nothing herein shall be construed to relieve Metro of the duty to comply with the CWA or the TWQCA, the regulations promulgated thereunder, and all applicable permits issued thereunder, including the NPDES Permits, or to relieve Metro of its duty to comply with other applicable federal, State and local laws and regulations.

B. The United States and State, by their consent to the entry of this Consent Decree,

do not warrant or aver in any manner that Metro's compliance with this Consent Decree will result in compliance with the provisions of the CWA, the TWQCA, the CSO Control Policy, or with the NPDES Permits.

C. Notwithstanding review or approval by the United States or State of any plans, reports, policies or procedures formulated pursuant to this Consent Decree, Metro shall remain solely responsible for any noncompliance with the terms of this Consent Decree, all applicable permits, including the NPDES Permits, the TWQCA, the CWA, the CSO Control Policy, applicable local laws, and regulations promulgated thereunder.

XVI. NON-WAIVER PROVISIONS

A. This Consent Decree is entered in full and final settlement of the civil claims for the violations alleged in the Plaintiffs' Complaints, but shall not affect rights or obligations not specifically addressed herein, as to which the Parties specifically reserve their rights.

B. Nothing contained in this Consent Decree shall be construed to prevent or limit the rights of the United States or the State to seek penalties or further or additional relief under the CWA or other federal statutes or regulations, or State laws and regulations. The United States and the State reserve the right to file a civil action for statutory penalties or injunctive relief against Metro for any violations of the CWA and/or the TWQCA by Metro not expressly identified as violations in their Complaint. The Complaints assert only claims of civil liability under the CWA against Metro, and therefore this Consent Decree only pertains to and resolves such civil liabilities of Metro under the CWA and no other liabilities, criminal or otherwise.

C. This Consent Decree in no way affects or relieves Metro of any responsibility to comply with any federal, state, or local law or regulation. The Parties agree that Metro is

responsible for achieving and maintaining compliance with all applicable federal, State and local laws, regulations, permits and ordinances.

D. This Consent Decree does not limit or affect the rights of the Parties as against any third parties which are not Parties to this Consent Decree. The Parties recognize that this Consent Decree resolves certain matters between the Parties, and that its execution does not preclude Metro from asserting any legal or factual position in any action brought against Metro by any person or entity not a Party to this Consent Decree. Metro reserves the right to contest all factual and legal positions taken in any pending and future proceedings other than an action to enforce this Consent Decree brought by a Party.

E. The Parties reserve any and all legal and equitable remedies available to enforce the provisions of this Consent Decree.

F. This Consent Decree shall not limit any authority of EPA or TDEC under any applicable statute, including the authority to seek information from Metro or to seek access to the property of Metro nor shall anything in this Consent Decree be construed to limit the authority of the United States or State to undertake any action against any person, including Metro, in response to conditions that may present an imminent and substantial endangerment to the environment or to the public health or welfare.

G. Obligations of Metro under the provisions of this Consent Decree to perform duties that may occur prior to the Date of Entry, shall be legally enforceable from the Date of Entry. Liability for stipulated penalties, if applicable, shall accrue for violation of such obligations and payment of such stipulated penalties may be demanded by EPA after the Date of Entry.

H. This Consent Decree was negotiated, mutually drafted, and executed by the Parties in good faith to avoid further litigation and is a settlement of claims that were vigorously contested, denied and disputed. Neither the execution of this Consent Decree nor any action taken hereunder is an admission of any fact, liability, or wrongdoing of any kind regarding any of the matters addressed in the Consent Decree.

XVII. COSTS OF SUIT

The Parties shall bear their own costs and attorneys' fees with respect to matters related to this Consent Decree.

XVIII. CERTIFICATION OF SUBMISSIONS/RECORD RETENTION

A. Metro shall retain all data, documents, plans, records and reports, including research reports that Metro has relied upon, (1) that relate to Metro's performance under any Deliverable or SEP, and (2) which are in the possession, custody, or control of Metro or its consultants or contractors. Metro shall retain all such materials for five (5) years from the date of origination. Drafts of final documents, plans, records, or reports do not need to be retained.

B. At any time during this retention period, upon request by EPA or TDEC, Metro shall submit copies of such materials required to be maintained under this Section within thirty (30) Days of such request, or such longer time as agreed upon by the requesting Party. The requesting Party shall not unreasonably refuse to extend such deadline. This Section does not limit or affect any duty or obligation of Metro to maintain records or information required by the NPDES Permits.

C. At the conclusion of this retention period, Metro shall notify EPA, DOJ, and the State at least one-hundred and twenty (120) Days prior to the destruction of any such materials,

and upon request by any of these Parties, Metro shall deliver any such materials to that Party or other specified Party.

D. In all notices, documents or reports submitted to the United States and/or State pursuant to this Consent Decree, Metro shall, by a responsible party of Metro, as defined by 40 C.F.R. §122.22 or Part I.D.1 of the NPDES Permits, sign and certify each such notice, document and report as follows:

> I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering such information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

XIX. REPORTING REQUIREMENTS

A. Beginning thirty (30) Days after the first Calendar Quarter following the Date of Entry, and thirty (30) Days after each Calendar Quarter thereafter until termination of the Consent Decree, Metro shall submit to the Parties, and simultaneously place in the PDR, a Quarterly Progress Report. Quarterly Progress Reports shall not be subject to the Public Review Requirement of Section VI.A.2. However, Metro shall receive questions and comments from the public for Metro's review for a period of twenty (20) Days following placement in the PDR. Each Quarterly Progress Report shall contain at a minimum:

1. A description of the Work conducted during the previous quarter to comply with the requirements of this Consent Decree, in Gantt chart or similar format;

2. The date, location, duration, volume, and cause of all SSOs and dry

weather CSOs for the current quarter;

3. The anticipated Work that will be performed in the successive quarter to comply with the requirements of this Consent Decree, in Gantt chart or similar format; and

4. Any additional information necessary to demonstrate that Metro is adequately implementing the Work.

B. Beginning on January 31, 2009, and every twelve (12) Months thereafter until termination of this Consent Decree, Metro shall submit to the Parties, and simultaneously place in the PDR, an Annual Report. The Annual Report shall cover the most recent Calendar Year. The Annual Report shall not be subject to the Public Review Requirement of Section VI.A.2. However, Metro shall accept questions and comments from the public for Metro's review for a period of twenty (20) Days following placement in the PDR. Each Annual Report shall contain at a minimum:

1. A summary of the CMOM Programs implemented or modified pursuant to this Consent Decree (including those programs described in Metro's Self-Assessment in Appendix B), including a comparison of actual performance with any performance measures that have been established;

2. Specific dates for beginning and completing projects and activities identified by Metro in the CAP/ER, the NMC Compliance Plan and/or LTCP for the upcoming Calendar Year; and

3. A trends analysis of the number, volume, duration and cause of Metro's SSOs and dry weather CSOs for a twenty-four (24)-Month period updated to reflect the SSOs and dry weather CSOs that occurred during the previous Calendar Year.

C. Compliance with this Section does not relieve Metro of any other reporting obligation imposed under any law, regulation, or permit.

D. Notification to EPA or TDEC pursuant to this Section of an anticipated delay shall not by itself excuse the delay or otherwise satisfy the notification requirements set forth in Section XI (Force Majeure).

E. Metro may request in writing a modification of the items to be addresssed in the Quarterly Progress Report or the Annual Report. This may include a request to move items currently addressed in the Quarterly Progress Report to the Annual Report. Any such modification is a Non-Material Modification under Section XXI (Modification).

XX. FORM OF NOTICE

A. Unless otherwise specified, or as may be changed from time to time, all reports, notices, or any other written communications required to be submitted under this Consent Decree shall be sent to the respective Parties at the following addresses:

As to the United States:

Chief, Environmental Enforcement Section
Environment and Natural Resources Division
U.S. Department of Justice
Post Office Box 7611
Washington, D.C. 20044-7611
Reference DOJ Case No. 90-5-1-1-09000

United States Attorney
Middle District of Tennessee
110 Ninth Avenue, South, Suite A961
Nashville, TN 37203

Chief
Water Programs Enforcement Branch
Water Management Division

U.S. Environmental Protection Agency,
Region 4
Atlanta Federal Center
61 Forsyth Street, S.W.
Atlanta, Georgia 30303

For oral notification: Doug Mundrick, Chief, Water Programs Enforcement Branch, (404) 562-9328 (subject to change on written notice to Metro).

As to the State of Tennessee:

Barry Turner
Deputy Attorney General
Office of the Tennessee Attorney General
Environmental Division
P. O. Box 20207
Nashville, TN 37202

As to TDEC:

Patrick Parker
Assistant General Counsel
Tennessee Department of Environment and Conservation
20th Floor, L & C Tower
401 Church Street
Nashville, TN 37243

As to Metro:

Director/Chief Operating Officer
Metro Water Services
1600 2nd. Avenue North
Nashville, TN 37208

B. Notifications to or communications with the Parties shall be deemed submitted on the date they are postmarked.

XXI. MODIFICATION

This Consent Decree, including Appendices, contains the entire agreement of the Parties and shall not be modified by any prior oral or written agreement, representation, or understanding. Prior drafts of this Consent Decree shall not be used in any action involving the interpretation or enforcement of this Consent Decree. Except as set forth below, this Consent Decree may not be materially amended or modified except by written agreement of the Parties, and approval of this Court ("Material Modification"). Any Material Modification of this Consent Decree shall be effective upon approval of the Court. Except as provided in the following sentence, non-material modifications of the Consent Decree which do not significantly alter the requirements of this Consent Decree may be made in writing by the United States after consultation with the State ("Non-Material Modification"). Non-Material Modifications which affect only Metro's obligations to the State may be made by written agreement with the State. Except as provided in Section VI D, any changes to the deadlines established in CAP/ER, NMC Compliance Plan, or the LTCP of this Consent Decree shall be considered Material Modifications.

XXII. PUBLIC COMMENT

The Parties agree and acknowledge that final approval by the United States and entry of this Consent Decree are subject to the requirements of 28 C.F.R. § 50.7, which provides for notice of the lodging of this Consent Decree in the Federal Register, an opportunity for public comment, and consideration of any comments. Metro and the State consent to the entry of this Consent Decree without further notice.

XXIII. CONTINUING JURISDICTION OF THE COURT

The Court shall retain jurisdiction to effectuate and enforce the terms and conditions and achieve the objectives of this Consent Decree and to resolve disputes arising hereunder as may be necessary or appropriate for the construction, modification, implementation, or execution of this Consent Decree.

XXIV. FINAL COMPLIANCE AND TERMINATION

A. Metro shall achieve final compliance with all terms of this Consent Decree on or before nine (9) years after the approval or modification by EPA of either the CAP/ER or the updated LTCP pursuant to Section VI of this Consent Decree, whichever comes later. All Work required under this Consent Decree shall be completed by that time. The United States' determination that the Consent Decree should be terminated shall be based on a consideration of whether all of the following have occurred, after consultation with the State:

1. Metro has paid all civil and stipulated penalties it is obligated to pay under this Consent Decree;

2. Metro has completed all Work required pursuant to Sections VII (Performance of the Work); VIII (Supplemental Environmental Project); XVIII (Certification of Submissions/Record Retention) and XIX (Reporting Requirements) of this Consent Decree; and

3. Metro has provided certification of its payment of all outstanding penalties and its completion of performance of the Work described in Section XXIV.A.2 above.

B. Metro may request that the United States make a determination pursuant to Section XXIV.A that this Consent Decree may be terminated. Any such request shall be in writing and shall include a certification, that the requirements of Section XXIV.A have been met.

Metro shall serve a copy of any such request on all Parties.

C. If the United States agrees, after consultation with the State, that Metro has met the requirements of Section XXIV A above, the United States will file a motion with the Court seeking an order terminating the Consent Decree. If the United States determines not to seek termination of the Consent Decree, the United States shall so notify the Parties in writing. The United States' notice shall summarize the basis for its decision and describe the actions necessary to achieve final compliance. If Metro disagrees with any such determination by the United States not to seek termination of the Consent Decree, Metro must invoke the dispute resolution procedures of Section XII (Dispute Resolution) before filing any motion with the Court regarding the disagreement.

XXV. RESCISSION OF ORDER AND ASSESSMENT NO. 99-0390

The State will take the necessary steps to rescind existing Order and Assessment No. 99-0390 against Metro as of the Date of Entry of this Consent Decree. Metro's obligations under Order and Assessment No. 99-0390 shall terminate upon entry of this Consent Decree. Further, upon entry of this Consent Decree, its provisions shall supercede Order and Assessment No. 99-0390 with respect to any unfulfilled obligation(s) of Metro pursuant to Order and Assessment No. 99-0390 and Metro shall have no liability or legal responsibility with respect to any such unfulfilled obligation(s).

XXVI. FINAL JUDGMENT

Upon approval and entry of this Consent Decree by the Court, this Consent Decree shall constitute a final judgment between and among the Parties. The Court finds that there is no just reason for delay and therefore enters this judgment as a final judgment under Fed. R. Civ. P. 54

and 58.

XXVII. SIGNATORIES

A. The Assistant Attorney General, on behalf of the United States, and the signatories for the State and Metro, certify that they are fully authorized to enter into the terms and conditions of this Consent Decree and to execute and legally bind such Parties to this document.

B. Metro and the State agree not to oppose entry of this Consent Decree by this Court or to challenge any provision of this Consent Decree unless the United States has notified them in writing that it no longer supports entry of this Consent Decree.

C. Metro's agent identified on the attached signature page is authorized to accept service of process by mail on Metro's behalf with respect to all matters arising under or related to this Consent Decree. Metro agrees to accept service of process in that manner and to waive the formal service requirements set forth in Rule 4 of the Federal Rules of Civil Procedure and any applicable local rules of this Court, including but not limited to service of a summons.

Dated and entered this 12th day of March, 2009 ~~2007~~.

UNITED STATES DISTRICT JUDGE

WE HEREBY CONSENT to the entry of this Consent Decree in United States, et al. v. Metropolitan Department of Water and Sewerage Services, Civil Action No. _____, subject to the public notice and comment requirements of 28 C.F.R. § 50.7.

FOR PLAINTIFF THE UNITED STATES OF AMERICA

DATE: 19 Oct. 2007

RONALD J. TENPAS
Acting Assistant Attorney General
Environment and Natural Resources Division
United States Department of Justice

DATE: 10/22/2007

KARL J. FINGERHOOD
Trial Attorney
Environmental Enforcement Section
Environment and Natural Resources Division
United States Department of Justice
Post Office Box 7611
Washington, D.C. 20044
(202) 514-7519

EDWARD M. YARBROUGH
United States Attorney
Middle District of Tennessee

DATE: 10/23/07

By: Lisa S. Rivera

LISA S. RIVERA
Assistant United States Attorney
Middle District of Tennessee
110 Ninth Avenue, South, Suite A961
Nashville, TN 37203
(615) 736-5151

I HEREBY CONSENT to the entry of this Consent Decree in United States, et al. v. Metropolitan Department of Water and Sewerage Services, Civil Action No. _____, subject to the public notice and comment requirements of 28 C.F.R. § 50.7.

DATE: September 20, 2007

Granta Y. Nakayama

GRANTA NAKAYAMA
Assistant Administrator
Office of Enforcement and Compliance Assurance
United States Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, DC 20460

DATE: 8/29/07

MARY WILKES
Regional Counsel
United States Environmental
Protection Agency - Region 4
Atlanta Federal Center
61 Forsyth Street, S.W.
Atlanta, GA 30303

DATE: 8/28/07

WILLIAM B. BUSH, JR.
Associate Regional Counsel
United States Environmental
Protection Agency - Region 4
Atlanta Federal Center
61 Forsyth Street, S.W.
Atlanta, GA 30303
(404) 562- 9538

WE HEREBY CONSENT to the entry of this Consent Decree in United States, et al. v. Metropolitan Department of Water and Sewerage Services, Civil Action No. _____.

FOR PLAINTIFF THE STATE OF TENNESSEE

DATE: _____

_____
BARRY TURNER
Deputy Attorney General
Office of the Tennessee Attorney General
Environmental Division
Post Office Box 20207
Nashville, TN 37202-0207
(615) 532-2586

WE HEREBY CONSENT to the entry of this Consent Decree in United States, et al v. Metropolitan Department of Water and Sewerage Services, Civil Action No. _____.

FOR DEFENDANT METROPOLITAN GOVERNMENT OF NASHVILLE AND DAVIDSON COUNTY

DATE: 10/18/07

THOMAS G. CROSS
Assistant Metropolitan Attorney
108 Metropolitan Courthouse
Nashville, TN 37201

Agent authorized to accept service of process on behalf of Metro:

Director/Chief Operating Officer
Metro Water Services1600 2nd Avenue NorthNashville, TN 37208