

November 16, 2009

Mr. Stephen Perkins, Director  
Office of Ecosystem Protection  
U.S. Environmental Protection Agency  
Water Technical Unit "SEW"  
P.O. BOX 8127  
Boston, MA 02114

Mr. Glenn Haas, Acting Assistant Commissioner  
Department of Environmental Protection  
1 Winter Street  
Boston, MA 02108

RE: Massachusetts Water Resources Authority  
Permit Number MA 0103284  
O&M Annual Report

Dear Mr. Perkins and Mr. Haas:

Attached please find the MWRA's annual status sheets on plant performance and maintenance for the period covering July 2008 – June 2009. This submittal fulfills the requirements of MWRA's NPDES Permit MA0103284 - Section I.18.f and I.18.g that states in part:

“The MWRA shall submit annual status sheets on plant performance, using key indicators for maintenance ”

The Status Sheets will be posted at [www.mwra.com](http://www.mwra.com).

If you have questions or need additional information, please feel free to call Grace Bigornia-Vitale at 788-4942.

Sincerely,

Michael J. Hornbrook  
Chief Operating Officer

cc: MA DEP, Wilmington  
MA DEP, Worcester  
B. Pitt, US EPA  
T. Borci, US EPA  
D. Ferris, MA DEP  
C. Vakalopoulos, MA DEP  
F. Laskey, MWRA

# MWRA Annual Report on Operation & Maintenance

July 2008 – June 2009

This report has been generated to fulfill the requirements of MWRA's NPDES Permit MA0103284 - Section I.18.f that states:

"Within ninety (90) days of the effective date of this permit, the permittee shall develop and implement a long-range operations and maintenance plan that will maximize the life of the treatment facility. The permittee shall report on the plan's implementation and results to EPA and the MADEP on a yearly basis"

Also included with this submittal are the annual status sheets on plant performance, and maintenance as required in section I.18.g.

## **1. SYSTEM OVERVIEW**

### Deer Island Wastewater Treatment Plant

The Deer Island Wastewater Treatment Plant (DITP) is the centerpiece of MWRA's \$3.5 billion program to protect Boston Harbor against pollution from Metropolitan Boston's sewer systems. The DITP's purpose is to treat wastewater from household, business, and industrial facilities. The wastewater is collected and transported through 5,400 miles of pipes and community owned sewer lines and approximately 228 miles of Authority owned interceptors and tunnels.

DITP is a state of the art wastewater treatment facility and one of the most automated in the country. MWRA has made a considerable capital investment in the DITP and is fully committed to ensuring that this valuable public asset is cared for in the best possible manner. MWRA's Board of Directors, Executive Director, management team, and staff are dedicated to providing the highest quality of asset management. MWRA has assembled a highly skilled and qualified staff that will ensure that the treatment plant is operated and maintained to the satisfaction of the regulatory agencies and the public.

### Wastewater Transport System

The Field Operations Department (FOD) operates and maintains MWRA's wastewater transport system, which transports wastewater from MWRA member communities to the Deer Island Treatment Plant. This system includes a network of 228 miles of interceptor sewer lines, and related appurtenances; a screen house; 12 pumping stations; 4 headworks facilities; and 4 combined sewer overflow (CSO) facilities. The primary goal is to operate the system in a manner that will provide uninterrupted wastewater transport service in a safe, cost-effective, and environmentally sound manner.

## Biosolds Processing Plant

The operation and output of the Biosolds Processing Facility (BPF) is regulated, in part, by the terms of the NPDES permit, 40 CFR 503 regulations, and state sludge regulations in Massachusetts (310 CMR 32.00) and the states to which the pelletized product is shipped.

Under the terms of the current operating agreement between New England Fertilizer Company (NEFCo) and MWRA, NEFCo budgets for, and performs all necessary predictive, preventive and routine maintenance at the BPF. NEFCo's agreement contains a plan for the maintenance, repair and operation of the facility. NEFCo performance meets the necessary standard for proper operation and maintenance. Since the inception of the agreement in March of 2001, there has been one incident that temporarily interrupted pellet processing for 40 days. However, there was no interruption of the delivery of biosolids and production of biosolids cake during the incident.

The operating agreement requires NEFCo to provide a letter of credit in the amount of \$1,000,000 (adjusted for inflation) that MWRA may draw on in the event that there is a material breach of the operating agreement, such as failing to adequately maintain the facility.

## **2. PERMIT VIOLATIONS**

There were no violations at MWRA facilities due to inadequate maintenance efforts.

## **3. COMPUTERIZED MAINTENANCE MANAGEMENT SOFTWARE**

The maintenance management software used by the Authority is MAXIMO version 5.2. The software includes safety features that allow users to document hazardous materials and areas around plant. It has the ability to automate lockout/tag-out procedures or tasks and generate associated work orders for the field. MAXIMO provides document management capabilities to streamline maintenance and regulatory functions, and workflow capabilities for synchronizing operations. Applications can be fine-tuned to suit specific work processes or integrate with other programs. The software also includes mobile applications for gathering and downloading data and an intuitive interface.

Maintenance staff can prioritize tasks, assign work based on the availability of necessary parts and labor, and analyze equipment failures in order to implement appropriate preventive maintenance measures.

The MAXIMO maintenance management tool is used to manage all aspects of the DITP maintenance program and has been implemented for all Wastewater Facilities. The software is used for work order management, planning and scheduling, asset management, resource management, recording of maintenance costs, and generation of reports and analysis. The software can store large amounts of data and is equipped with built-in failure analysis programs. In addition, MAXIMO contains the historical record

for all maintenance activities, thus allowing staff to better address a problem with a facility, or a specific asset group.

The MAXIMO system was upgraded in February 2007 to an intranet version (Maximo 5.2) for both Deer Island and Field Operations Division. The upgrade allows continued customer support and takes advantage of web based software maintenance. This version reduces the labor hours for MIS staff to maintain the software as all testing and programming are completed remotely and not at each desktop computer.

MWRA has implemented a new module within Maximo called Transportation. This module focuses on Fleet services which includes all MWRA plated vehicle. Software is customized specifically to track, document and report information about all Transportation vehicles and equipment.

NEFCO has installed and populated a computerized maintenance management software - Quickmaint. Quickmaint is used for work order management including preventive and corrective maintenance work.

#### **4. FACILITIES ASSET MANAGEMENT PROGRAM (FAMP)**

The goals of the MWRA multi-year maintenance plan include coordinated, consistent asset inventory; condition assessment; maintenance scheduling and long-term replacement planning. The MWRA is developing, and implementing, this multi-year plan, in part, under an initiative entitled the “Facilities Asset Management Program.” This asset management program addresses the goal of becoming more efficient by developing consistent, compatible and cost-effective operations and maintenance procedures.

Since the start-up of new Authority facilities, the MWRA has been conducting its maintenance on a calendar schedule in accordance with the original equipment manufacturers’ (OEM) recommendations. This approach to maintenance was primarily driven by the contractual obligations of the OEM warranties. The Authority’s management team believed that it was important to modify its existing program with the goal of achieving a more holistic approach to maintenance management. MWRA management acknowledges the importance of asset management and developed the Facilities Asset Management Program (FAMP) to meet the long-term demands of facility maintenance. The main objective of the FAMP program was to develop a sound maintenance strategy that would ultimately lead to better overall asset management and extended equipment life and reliability.

During Phase II of FAMP, the MWRA expanded its efforts in the areas of condition monitoring; Reliability Centered Maintenance rollout; asset replacement prioritization and capital improvements; and training of staff.

#### **5. SERVICE CONTRACTS**

The maintenance program is supplemented by a series of service contracts. These contracts are intended to provide specialized services beyond the resources of the MWRA maintenance staff. Table 1 below shows the service contracts currently used by MWRA.

<b>TABLE 1</b>
<b>DEER ISLAND SERVICE CONTRACTS</b>
Laser alignment
Boiler maintenance
CCTV maintenance
Centrifuge maintenance
Combustion Turbine Generator maintenance
Continuous emissions monitoring
Copier/fax maintenance
Crane maintenance
Cryogenics facility maintenance
Digester Mixer overhauls
Electrical testing
Elevator maintenance
Facilities painting
HVAC chemical treatment
Hydro turbine generator maintenance
Hydraulic maintenance
Instrumentation maintenance
Janitorial services
Lab hood certification
Landscape services
Legion Ella testing
Locksmith services
Lube oil analysis
Oil separator cleaning
Overhead door maintenance
Pest control
Plant instrumentation and control system (PICs) maintenance
Pratt Whitney Preferred service
Public access grounds keeping
Reactor Mixer gearbox rebuild
Security
Steam turbine generator maintenance
Trash removal
Vibration analysis

## Deer Island Treatment Plant

July 2008 - June 2009

**Annual Report:** Attached, please find the Deer Island Maintenance page of the MWRA Report on Key Indicators of Performance for FY09. Monthly maintenance data is shown under six headings.

- Preventive Maintenance Orders Completed is shown with respect to the target of 100% in a bar chart. Maintenance is working to reach the PM goal to 100%. The average PM % completed was 99.9% for the past two years.
- Preventive Maintenance Kitting - The first step to increase wrench time is to have all parts available for preventive maintenance work orders. Kitting is a task where the maintenance planner identifies the specific parts required for a task and the warehouse personnel assemble the parts in one location (kit) for the technician to pick up and use. Deer Island reached their goal of 100% of all preventive maintenance work orders. This is an increase of 11% from 2008.
- Predictive Maintenance - To extend the useful life of equipment and plan for equipment replacements predictive maintenance technologies are being implemented. 4213 work orders were completed for vibration, acoustic ultrasonic, ultrasonic thickness, and oil analysis in the past year. As the year progressed more predictive maintenance was planned. For the year, 15 % of all work orders were predictive maintenance. This is an increase of 2.3% from 2008.
- Maintenance Backlog in Crew Weeks - Backlog is determined by totaling the planned craft hours in open work orders and comparing them to craft resources available. The average backlog for last year was 7.6 weeks for day to day plant maintenance activities which is slightly over the industry standard of 4 to 6 weeks. This includes 1 week of project backlog. DITP monitors all of our metrics very closely to ensure the backlog is not affecting our availability of equipment.
- Maintenance Overtime - The goal to maintain maintenance overtime to 5% of total wages and salaries was accomplished this year Overtime for the year was 4.0% of wages which was a decrease of 3.4 % from 2008.

**Critical Equipment Availability:** 12-Month Average – 99.4 %

An equipment availability report is generated daily that details the critical equipment required to treat the design flow of approximately 1.2 billion gallons per day. Higher maintenance priority is given to equipment that drops below the number required. No operational impact has occurred in the past year from a 99.4 % verses a 100% availability because the plant normally operates at approximately one-third the design flow capacity.

**Preventive Maintenance (PM):**

99.9% of all PMs were completed and 19,675 PM work orders were initiated this year. Incomplete PM's that are not completed in one month are rolled over into the next month's workload and given a high priority to complete first.

### **Predictive Maintenance (PdM)**

4213 predictive maintenance work orders were completed in the past year. Predictive maintenance work includes vibration, acoustic ultrasonic, ultrasonic thickness and oil analysis and is proactive maintenance work to extend equipment useful life.

### **Average Craft Hours per Month:**

Preventative Maintenance	3161 hours	22.1 %
Predictive Maintenance	377 hours	2.6 %
Corrective Maintenance	8160 hours	57.2 %
Emergency Maintenance	7 hours	0.3 %
Project Work	1844 hours	12.9 %
Other Work	702 hours	4.9 %
<b>Total</b>	<b>14,251 hours</b>	<b>100.0 %</b>

### **Total Work Orders:**

35,198 work orders initiated this year

34,018 work orders completed/closed

767 work orders canceled

### **Equipment Replacement:**

Major replacements, in the past year, include the following:

- **Centrifuges Refurbishment - \$ 89,949**

Eighteen centrifuges (two digested sludge centrifuges and sixteen waste sludge centrifuges) were refurbished by the original equipment supplier, Alfa Laval, in the past five years. In the past year, one waste sludge centrifuge and gearbox was refurbished. The centrifuge was disassembled, new parts installed or existing parts refurbished, reassembled, and balanced. The centrifuges require refurbishment at regular intervals based upon running hours for normal wear and tear and will continue in future years.

- **Digester Mixers Refurbishments - \$67,000**

One digester mixer was refurbished based upon impeller and bearing wear identified through vibration testing. One mixer was removed, shipped to the factory, bearing and impellers replaced and returned. The mixer motor was rebuilt this year.

- **Paint Contract \$1,354,790**

The Paint contract was awarded to SOEP painting contract. The contract includes coatings and painting. The areas completed last year were coating for chemical sump areas, painting of Cryogenic cold boxes and the exterior areas of Residuals.

- **Reactor Aerator/Mixer Gearbox Rebuilds \$ 300,400**

The secondary reactor aerators and mixers have large gearboxes that have started to fail. Nine gearboxes were refurbished with new gears, seals, and bearings as necessary.

- **Hydro Plant Repairs - \$162,753**

A maintenance contract was put in place to perform annual preventive maintenance and repairs as necessary. This contract will be combined with STG next year.



- Cryogenic Facility Repairs - \$384,045

The cryogenic facilities had three major maintenance items this year. One was new oxygen purity analyzers installed at cold boxes and main GOX line. The second was new isolation valves installed on the cooling towers. The third was new LOX vaporizer manufactured and installed in the #2 slot.

- Flare \$255,000

Due to Waste Gas Burners Lowered-burn rates and permit requirements DITP had to fabricate new burner rings assembly for waste gas burners and cleaned out gas header. This was in-house project due to OEM (the original manufacturer) inability to support this generation of burner. Replace Igniters, and upgrade controls from analog to digital. Electricians installed new PICS Cabinet and ran new conduit. Flare 1-2 was fully insulated and on line. Flare #3 will be completed next year.

- Prim/Secondary Drive Chain Replacement \$400,000

Replacing all drive chain in clarifiers due to early stages of corrosion. The new chain is 304 stainless Steel which is different from 400 series of stainless steel previously installed in the clarifiers. 400 series of stainless steel is more susceptible to corrosion. The first tank which DITP used 304 stainless steel was installed five years ago and is still in good condition. Primaries are about 85% Complete. Secondary's will start after primaries is 100% complete.

- Digester Gas compressor rebuilds \$150,000

All three compressors require some level of specialized maintenance and/or need for replacement parts, the age and maintenance history of this equipment implies that all of the operating compressors are scheduled for complete overhaul. The original equipment manufacturer has recommended a major inspection or overhaul at 8,000 run hours. Each of these compressors have an estimated of 24,000 run hours. This is three times the suggested time frame for an overhaul. The compressor (gas end) is considered to be "non-standard" and "custom machined" designed specifically for the Deer Island gas-system application. Initial inspection work performed by Norwalk technicians identified several items requiring OEM servicing, including, new pistons for the upper and lower halves of the compressors. One compressor was completely rebuilt. The remaining two will be next year.

- Dip tube project \$50,000

It was determined, due to the wear and tear with the dip tubes; it was proposed suspending operation of all primary dip tubes and keep up with the scum using the Vactor truck. DITP has started a new pilot project on B-11 and B-12. One unit is a gear drive and the other is belt driven. The unit is on line and being monitored by operations. It appears to be working fine but too early to tell.

- HVAC Equipment Replacements - \$ 99,000

Zone pumps for Power and Pump Facility

Fan coil units in the Laboratory

Compressor in Residuals

- Electrical Repairs - \$ 150,000

The electrical repairs are necessary throughout the plant and include:

Various variable frequency drive service and replacements

Battery and charger replacements

- Roof Replacements - \$ 2,700,000

DITP has started to budget money to replace roofs over the next few years. The Maintenance building and Winthrop facilities were replaced due to normal wear and tear. Additional facilities on Deer Island will be budgeted for roof replacements.

- Reline Hypochlorite tanks - \$1,700.000

This year, DITP relined the hypochlorite tanks. Tank number 1 and 4 were completed. The interior lining of the tank started to show signs of wear. These tanks are used to store our hypochlorite.

- Electrical upgrade \$ 7,500,000

This project is to upgrade our electrical system on top of the clarifier decks. The electrical wire is being installed above the clarifiers, previously installed inside the concrete slab. All control panels and wiring are being upgraded.

- Transformer replacement \$ 746,000

City light electrical company has replaced transformers located in the Liquid Train area. These transformers are replaced as part of our on-going electrical improvements.

# **Wastewater Transport System**

July 2008 - June 2009

## **Wastewater Transport System Overview**

The Field Operations Department (FOD) operates and maintains MWRA's wastewater transport system, which transports wastewater from MWRA member communities to the Deer Island Treatment Plant. This system includes a network of 228 miles of interceptor sewer lines and related appurtenances, a screen house, 13 pumping stations, four remote headworks facilities, and four combined sewer overflow (CSO) facilities. The Union Park CSO facility is operated under contract. The contract requires compliance with the facility NPDES permit and includes well defined maintenance tasks. The primary goal is to operate the system in a manner that will provide uninterrupted wastewater transport service in a safe, cost-effective, and environmentally sound manner.

## **Wastewater Transport Facilities**

### **1. Facilities Operational Statement**

During FY09 Wastewater Transport facilities operated at full capacity throughout the year. All required equipment to maintain flow and process of wastewater was available. CSO facilities operated with sufficient chlorination and dechlorination, though some NPDES exceedances were reported. The required number of pumps in each gravity and pumping CSO was available throughout the year.

### **2. Equipment Availability**

The critical equipment evaluated includes pumps and screens in the pump stations, CSOs, the screenhouse, and headworks. Operational staff track and report the availability of critical equipment on a daily basis and report on a weekly basis. The equipment availability for FY 09 for FOD facilities was 99.0%. Higher maintenance priority is given to equipment that drops below the number required.

### **3. SCADA Program**

The MWRA Supervisory Control and Data Acquisition (SCADA) systems provide a means of monitoring and controlling facilities and equipment from a remote centralized location, as well as providing a continuous record of facility operations. The Wastewater SCADA Implementation program originated with the development of a Master Plan in July 1999. In June 2002, Contract 6532 was awarded to Camp Dresser & McKee, Inc., to provide design, integration, training, construction administration and resident inspection services for SCADA improvements at MWRA's wastewater facilities.

Phase I (Construction Package 1 - Contract 6533), the first and most complex construction contract, was awarded in March 2006 and was completed in 2008. This contract successfully upgraded equipment, installed instrumentation, and integrated seven

pumping facilities, three CSO facilities, and the Chelsea Screen House into MWRA's SCADA system;

Phase II (Construction Package 2 - Contract 6534) was awarded in February 2008. The project is substantially complete with the exception of punch list items. This contract added instrumentation upgrades to the three older headworks facilities (Ward Street., Chelsea Creek, and Columbus Park) and the Nut Island headworks facility, to standardize and integrate these four facilities into the SCADA system. The contract also includes the upgrade of software, PLC and screen displays at the Squantum, Quincy and IPS facilities to make them consistent with the other wastewater facilities.

At the completion of Phase II, the only remaining wastewater transport facility to be upgraded in the SCADA system will be the Arthur Street Pump Station. This will be completed using a combination of in-house resources and consultant services.

#### **4. Equipment Replacement and Significant Maintenance Projects**

Equipment replacement is part of the overall maintenance strategy that ensures compliance with permit requirements. Projects and initiatives are completed during each fiscal year to maintain redundancy and continued reliability. Many projects are extensive, requiring significant in-house resources and use of specialty/service contractors. Some examples of key improvements, equipment replacement, or significant repair work during the past fiscal year include in-house and out-sourced projects:

##### ***In-house Projects***

Alewife Brook Pump Station: The grinder at the Alewife Brook Pump Station was rebuilt. The work consisted of the replacement of the cutter drum and associated parts.

Houghs Neck Pump Station: Pump #1 and Pump #2 were rebuilt by the manufacturer's representative. In-house Electrical and Mechanical staff completed all the work required to remove and replace the pumps.

Braintree/Weymouth Pump Station: Mechanical and Electrical staff replaced both of the grinders due to malfunction. The grinders were removed and sent to the manufacturer to be rebuilt and to have the cutter drum modified and larger motors installed.

Prison Point Pump Station: The wash down system was prone to breaking discharge piping on start up. Electrical crews installed a soft starter within the motor control center enabling operations to start the pump at a slower speed. This brings the pump up to speed slowly preventing possible piping breaks.

Caruso Pump Station: The Pump #1-2 was disassembled and the rotating assembly was replaced. The pump shaft was made by the machinists. After the pump was reinstalled the VFD failed. The VFD was repaired under warranty by the contractor.

Cottage Farm Outfall Screen: The outfall screen at Cottage Farm was corroded and in disrepair. Due to the size and shape, the decision was made to fabricate a new screen in

house. The outfall atmosphere is very corrosive requiring a stainless steel screen. The size of the screen and space restraints required the screen to be installed in two halves.

Somerville CSO: The Somerville CSO Air Handling Unit was replaced. The old unit was disconnected electrically and removed by HVAC Staff. A transition ductwork piece was fabricated to accommodate the new air handler. The new unit was mounted, wired electrically by MWRA Electricians and put into service.

#### Nut Island Headworks:

- Settlement of the Fire Pump Building resulted in failure of the tank fill lines. The lines were temporarily repaired. Plumbing staff installed both by-pass fill and suction lines, designed by MWRA staff.
- Screening Belt #1 was overhauled by mechanical staff. The overhaul consisted of the removal and replacement of the belt, rollers and bearings. The frame was steam cleaned and the system placed back on line.
- Grit Belt #4 was overhauled by mechanical staff. Mechanics disposed of the old cover and carrying belts, washed down the carriage, removed all worn or damaged rollers, shafts and bearings. New shafts, bearings and rollers were installed, the belts strung by MWRA mechanics. The two belts were vulcanized by an outside vendor; the belts were tracked and returned to service.

Chelsea Headworks: Plumbing staff removed and replaced Grit Pod #2. The grit pod showed extensive wear during ultrasonic testing. In addition to the replacement, staff also modified the compressed air piping along with the associated valves.

Ward Street Headworks: The chemical feed piping for the Ward Street Scrubber developed leaks and spray nozzles malfunctioned. Plumbing and Mechanical Crews worked together disassembling the old piping and nozzle arraignment. A new supply manifold was fabricated, installed and all nozzles were replaced.

#### ***Outsourced Projects***

#### Nut Island Headworks:

- Burner Replacement – The three burners at Nut Island were upgraded to a high efficiency units and have resulted in a savings of approximately \$50,000 per year.
- Hydraulic System Upgrade – the pressure switches on all hydraulic units were replaced with a more reliable pressure switch to improve system reliability

Ward Street Headworks: One burner and the pneumatic control valves were replaced to improve the efficiency of the boilers and to improve system operation.

Caruso Pump Station: The diesel generator governor was replaced after failure to ensure the generator is available for emergencies.

## **Wastewater Transport Pipelines**

### **1. Manhole Inspection and Rehabilitation Program**

The Technical Inspections Unit (TIU), of the FOD conducts manhole inspections. These inspections facilitated the beginning of the manhole rehabilitation program. Specialized equipment and training are the essential elements of the program. Pipeline maintenance crews perform manhole renovations and repairs that result in reduced I/I. The manholes are coated using cementitious material applied with spinning equipment and then covered with special coatings to resist corrosion from hydrogen sulfide.

In FY09 TIU staff inspected a total of 650 manholes. Approximately 108 manholes were repaired or rehabilitated. This work included frame and cover replacement, external repairs to raised manholes, internal repairs using the spin-cast application, and other miscellaneous repair work.

### **2. Pipeline Rehabilitation**

Pipeline Rehabilitation projects are first identified by the TIU during routine television inspections of the pipelines and interceptors. MWRA Engineers review these projects and perform or coordinate all necessary design and construction contracting, beginning with conceptual design. The following represents a list of current and ongoing pipeline projects construction/rehabilitation included in the MWRA Capital Budget.

#### **East Boston Branch Sewer Rehabilitation, East Boston:**

Initial work consisted of repair of approximately 5400 feet of 45-inch x 41-inch brick sewer, using a cured-in-place, resin-impregnated, flexible felt tube liner. Construction began in April 2003 and substantial completion in May 2004. A final video inspection performed after one year revealed 900 linear feet of liner failure. Removal and replacement of the failed portions, performed under the contract warranty, was completed in 2005. The project cost is about \$5.4 million.

The design phase for additional rehabilitation is complete. This consisted of construction of approximately 2.5 miles of relief sewer, using microtunneling, and one mile of rehabilitation, using pipe bursting. Construction began in June 2008 and should be completed in July 2010. Approximately 5,200 feet of relief sewer by microtunneling and 760 feet by pipebursting has been installed.

#### **Section 624 Braintree-Weymouth Interceptor**

Approximately 2,000 feet of Section 624, a 57-inch x 60-inch concrete sewer, requires rehabilitation due to continued corrosion from discharges containing hydrogen sulfide from the Hingham Pump Station. The design phase is ongoing. Construction is scheduled to begin in December 2009 and be completed in December 2010.

### **3. Pipeline Inspection and Cleaning**

The Technical Inspection and Wastewater Pipeline Maintenance groups were merged to more efficiently and consistently maintain the wastewater collection system. The work performed by the inspection staff is an important element to the planning and execution of pipeline maintenance work. The inspection tasks are shared by the entire staff and the maintenance workload is prioritized based on inspection data and information.

TIU conducts internal inspections of MWRA structures and pipelines to reveal potential problem areas and identify locations requiring maintenance. Pipeline inspections average about 70% of the workload followed by inspections of other structures and manholes. Approximately 32.0 miles of pipelines were TV inspected in FY09.

Approximately 0.24 miles of Community Assistance inspections were also performed. TIU uses sonar technology to inspect full pipes and structures enhancing our ability to identify maintenance areas.

Pipeline maintenance crews perform a variety of maintenance activities for the MWRA's Wastewater Transport system. The Transport collection system includes 228 miles of interceptor sewer lines. Approximately 36 miles of pipeline and 84 siphons were cleaned in FY09.

In addition to general pipeline and manhole repair work performed under this program, the following are other activities pipeline crews perform during the year:

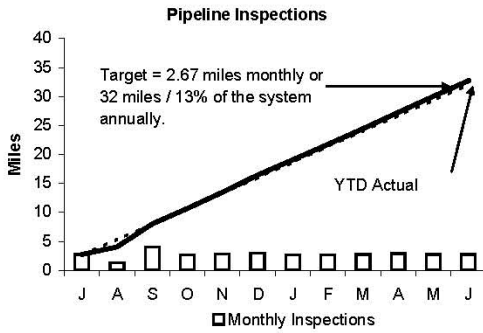
- pipeline spot repair work in shallow excavations
- clear obstructions and clean sections in community lines under the Community Assistance Program
- snow plowing and removal during winter months
- NPDES inspections and best practice management activities
- emergency pumping activities for communities during major wet weather events
- by-pass pumping for contracted pipeline rehabilitation or repairs
- emergency response and overflow monitoring during wet weather events
- response to odor complaints in the system

The attached “Maintenance Pipeline and Structure Inspections and Maintenance” page provides a breakdown of the pipeline inspections and maintenance activities for FY09.

# Wastewater Pipeline and Structure Inspections and Maintenance

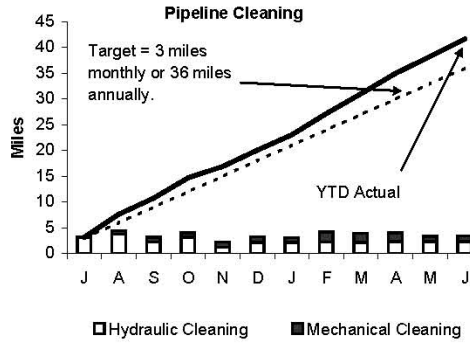
## June-09

### Inspections

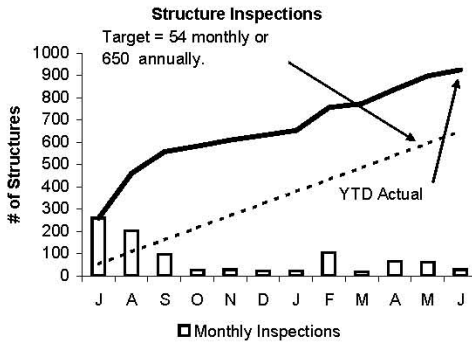


Staff internally inspected 2.71 miles of MWRA sewer pipeline. Community Assistance was provided to the city of Chelsea, 0.15 miles (800') of sewer was inspected.

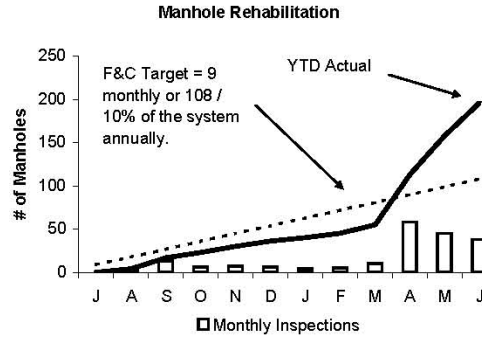
### Maintenance



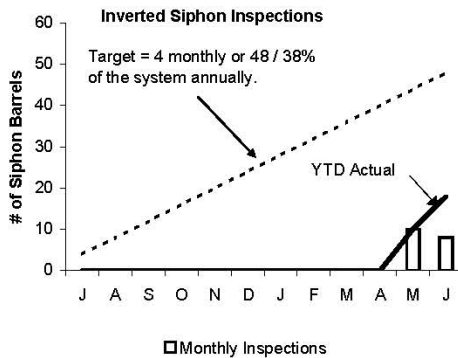
Staff cleaned 3.40 miles of MWRA's sewer system and removed 11 cubic yards of grit and debris. Community Assistance was provided to the city of Chelsea, 0.15 miles (800') of sewer was cleaned.



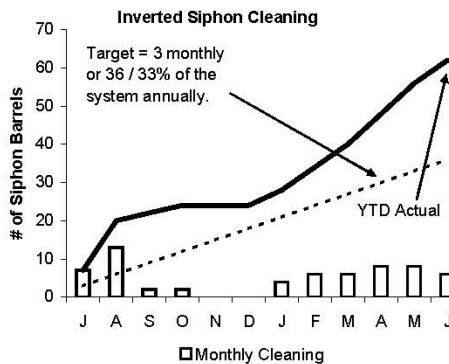
Staff inspected the 12 CSO structures and 15 additional manholes/structures.



Staff replaced 38 frames and covers and no manholes were rehabilitated this month.



Eight (8) siphon barrels were inspected this month.



Six (6) siphon barrels were cleaned this month.



## **FY09 Maintenance Program Costs, Staffing and Contracts**

### **1. Budget**

FOD has made a significant commitment to the maintenance of its wastewater system. Additional maintenance and improvement projects are included in the MWRA Capital Program and are identified on an annual basis. A Master Plan is ongoing within the Authority to prioritize projects and to determine required funding needs. The budget below includes only the Current Expense Budget (CEB). Maintenance includes protecting the many assets of the MWRA with individual programs that care for facility interior and exterior elements, maintain plant equipment, inspect and clean wastewater pipelines and structures, plan/schedule and track maintenance activities, manage each program and supervise staff, and provide adequate administrative support. The table below includes a summary of the approved budget in FY09 for programs within FOD for related maintenance activities.

### **FY09 APPROVED MAINTENANCE ANNUAL BUDGET**

<b>Budget Line Item</b>	<b>Total Funding</b>
Wages and Salaries	\$8,676,248
Overtime	\$345,083
Maintenance (Parts & Supplies)	\$3,974,553
Professional Services	\$100,000
Other Materials	\$242,116
Other Services	\$91,025
<b>Total</b>	<b>\$13,429,025</b>

### **2. Staffing**

A total of 135 employees are included in the chart below. They represent personnel responsible for the maintenance of wastewater transport facilities and pipelines. Unit Supervisors for each trade provide supervision and support in their respective areas: electrical, mechanical, machinists and welding, plumbing, HVAC, painting, and carpentry. Facility Maintenance and Equipment Maintenance are two consolidated programs made up of the mechanic specialists, machinists, metalworkers, welders, plumbers, HVAC specialists, electricians, building & grounds workers, and facility specialists (carpenters, painters, and masons). These groups perform maintenance activities at both wastewater and water facilities.

Work Coordination in FOD provides scheduling and job planning at all water and wastewater facilities, water and wastewater pipeline maintenance, and Western Operations. The Wastewater Pipeline Maintenance and Technical Inspection programs maintain the collections system for the Transport system only. The staffing represents

FY09 average levels for employees reporting to the Chelsea Facility. The table below indicates the amount of staffing available and dedicated to maintenance efforts.

### MAINTENANCE STAFFING LEVELS

<b>Staffing Categories</b>	<b>No. of Staff</b>
Equipment Maintenance Program	
Maintenance Manager	<b>1</b>
Engineers	<b>2</b>
Program Manager/Area Manager	<b>4</b>
Administration	<b>1</b>
Mechanic Specialists	<b>20</b>
Electrical Specialists	<b>11</b>
Plumbers	<b>8</b>
HVAC Specialists	<b>5</b>
Machinists and Welders	<b>5</b>
I&C Specialists (Operations Budget)	<b>1</b>
	<b>58</b>

Work Coordination Group Program	<b>17</b>
Collection System Technical Inspections Program	<b>10</b>
Wastewater Pipeline Maintenance Group	<b>18</b>
Building & Grounds Program	<b>18</b>
Facility Maintenance Program (Carpenters, Painters, Masons)	<b>14</b>
<b>Subtotal</b>	<b>77</b>
<b>Total</b>	<b>135</b>

*Staffing levels may vary as a result of vacancies, transfers, and other factors. This chart provides a number of available staff during the fiscal year for maintaining the collections system and wastewater facilities. Equipment Maintenance, Building & Grounds, and Facility Maintenance programs perform similar core business functions at Water Pumping Facilities and locations.*

### 3. Service Contracts

The Maintenance Program is supplemented by a series of service contracts. These services are intended to provide resources beyond the in-house capabilities of the Maintenance staff. FOD currently utilizes the following service contracts and services, listed below, to supplement the existing workforce and assist with maintenance projects at wastewater facilities.

<u>CURRENT SERVICE CONTRACTS</u>
Elevator Maintenance
Crane Maintenance
Hydraulic Equipment Maintenance
Instrumentation Maintenance
Fuel Storage Tanks
Fire Alarm and Sprinkler
Air Compressor Service
Boiler and Water Heater
Pest Control Services
Trash Removal
Electrical Testing
Grounds keeping
Lube Oil Analysis
Union Park Station Operation and Maintenance

## **Wastewater Transport Equipment Maintenance**

### **1. Annual Report**

The Field Operations Department Equipment Maintenance page for key indicators of performance for FY09 is attached. Monthly maintenance data is shown under six headings.

- Operations Light Maintenance PM Hours – In an effort to free up maintenance staff to complete more detailed and complex maintenance, operations staff have been committed to completing a number of the routine monthly preventative maintenance tasks. These tasks generally consist of observation and light maintenance tasks. The industry benchmark is 10% - 15% of the total preventative maintenance hours. In FY 09 operations staff completed an average of 387 hours per month which accounted for 18% of the total preventative maintenance hours.
- Overall Preventive Maintenance – The preventive maintenance work orders are completed by both operation and maintenance staff. The goal for FY09 was to complete 80% of all preventative maintenance work orders. By January of FY09 this goal was met and sustained for the remainder of FY09. The goal for FY10 has been raised to 100%.
- Time In Maximo – To ensure accurate data in the Maximo database, 8 hours of staff time per day must be entered into Maximo. The goal is 100%. The average for FY09 was 97%.
- Operations Light Maintenance % PM Completion – In an effort to free up maintenance staff to complete more detailed and complex maintenance, operations staff have been committed to completing a number of the routine monthly preventative maintenance tasks. The goal for operations staff is to complete 95% of the preventative maintenance work orders. In FY 09 operations staff completed an average of 87% of the work orders. The goal was attained in the second half of FY09 with the exception of March.
- Maintenance Backlog in Crew Weeks - Backlog is determined by totaling the planned craft hours in open work orders and comparing them to craft resources available. The FY09 backlog average was 5.9 weeks which remains within the industry standard of 4 to 6 weeks.
- Overtime Spending – Maintenance overtime spending was \$48,000 under budget for FY09. The overtime was used to support call ins for emergency maintenance and planned overtime.

In addition to these monthly performance indicators Field Operation's staff also tracks the following:

## **2. Critical Equipment Availability**

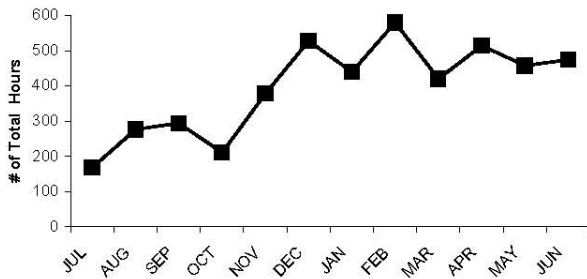
Operations staff began tracking equipment availability during the 2<sup>nd</sup> half of FY09. This matrix is a good indicator of the maintenance performance. The average equipment availability for the 2<sup>nd</sup> half of FY09 – 99.0 %. An equipment availability report is generated daily that details the critical equipment required to collect and transport the wastewater flow at the facility design capacity. Higher maintenance priority is given to equipment that drops below the number required. No operational impact has occurred in the past year from a 99.0 % versus 100% availability.

# Field Operations' Metropolitan Equipment & Facility Maintenance

## June 2009

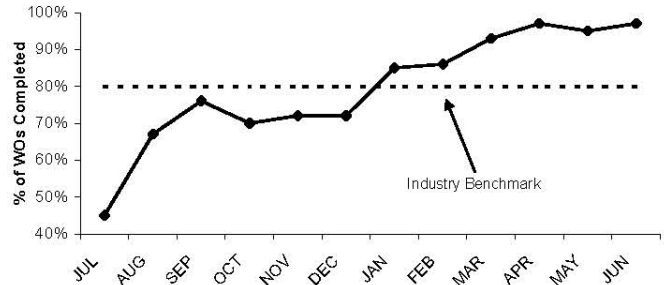
This is a new Yellow Notebook page for the Field Operations Department. Several maintenance and productivity initiatives are in progress. Operators now performing light maintenance tasks is one of those productivity initiatives. This initiative frees up maintenance staff to perform corrective maintenance and project work, thus reducing maintenance spending. Backlog and overtime metrics monitor the success of these maintenance initiatives.

### Operations Light Maintenance PM Hours



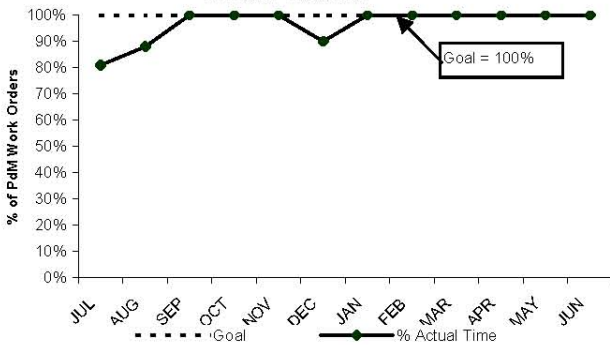
Operations staff completed 475 hours of preventive maintenance in June. 97% of the PMs were completed during the month of June. Overall Operations completed 23% of the total PM hours for the month which is above the industry benchmark of 10% to 15% of total PM hours completed.

### Overall Preventive Maintenance



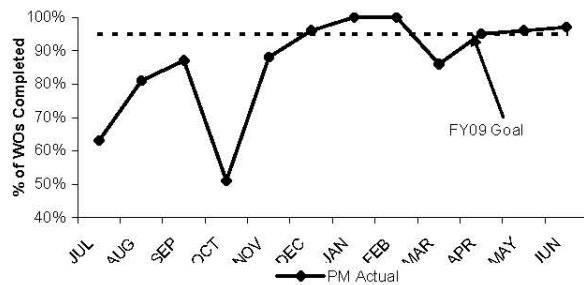
FOD's preventive maintenance goal includes completion of 80% of all PM work orders. In June, 97% of all PMs were completed and the overall goal of 80% was reached. Maintenance staff completed 98% of their assigned PM's and Operations completed 97% of their assigned PM's. The PM completion goal will be raised to 100% in FY10. The PM goal has been reached the past five months.

### Time in Maximo



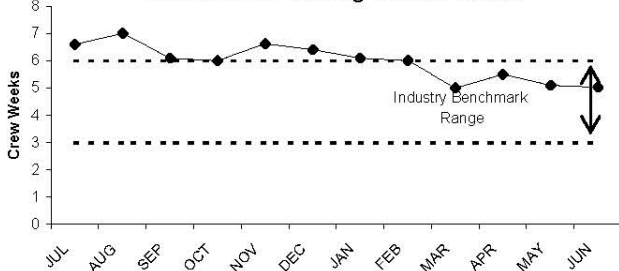
To ensure accurate data in the Maximo database, 8 hours of staff time per day must be entered into Maximo. A new method of time entry into Maximo and the issuance of a daily accountability report improved the time entry. 100% of time was entered in June. Maintenance managers ensure each week that time is entered for each supervisor's staff.

### Operations Light Maintenance % PM Completion



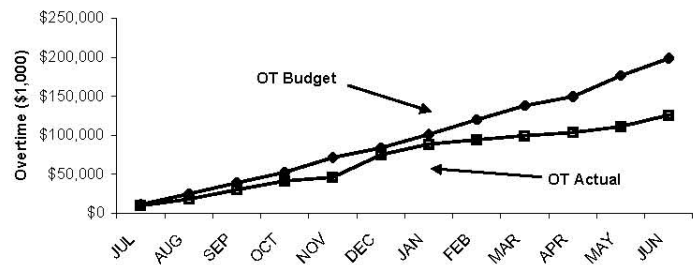
Operations' PM goal is completion of 95% of all PMs each month. Operations completed 97% of the PMs in June which is above the FY09 goal. Continued training for Operation staff to support the upcoming shift change impacted the completion of 100% of PMs this month.

### Maintenance Backlog in Crew Weeks



Current backlog is at 5.0 weeks while overtime spending is \$48K under budget for the year. The backlog for the Mechanics is currently greater than 7 weeks. Management's goal is to control the overtime budget and stay within the industry benchmark of 3 to 6 weeks.

### Overtime Spending



Maintenance overtime was \$4K under budget for June and is under budget by \$48K in total for the year. Overtime in June was used to support call-ins for emergency maintenance and no planned overtime was used.

## Annual Status Sheets – Biosolids Processing Facility

July 2008 - June 2009

Critical Equipment Availability: Twelve Month-Average – 75 %

Operating logs indicate that an average of 9 of the 12 centrifuges were available during FY09. The centrifuges and ancillary equipment make up the critical components at the facility because biosolids can be processed through the dryers or it can be sent to a landfill via the by-pass system. At this time, 10 centrifuges are available, giving the plant more than enough capacity to process current flows from Deer Island. The facility is currently operated on a 5-day workweek, ceasing operations most weekends. In order to process 100% of DI biosolids, the facility needs to run 6 centrifuges about 4.5 days per week. To process 75%, it would take 4 Centrifuges 4.5 days per week. On average in FY09, there were 75% (9 of 12) of the total number of centrifuges available for processing. In terms of maintaining the ability to process DI biosolids per the NPDES permit, the centrifuges and their feed pumps are the critical equipment because we can go to landfill if the dryer trains are down.

Backlog:

The current maintenance monitoring software does not track craft hours, but it is estimated that the outstanding work orders could be completed in approximately one week. Most of the incomplete work orders were due to parts issues; staff initiated the job and discovered that an additional part was necessary.

Work Orders:

In FY09, staff completed 2,011 or about 94 % of the 2132 work orders that were opened.

Equipment Replacement:

More than \$1,735,767 was spent on replacement parts and maintenance related items in FY09 including:

- Overhaul of Process Trains 2 and 4
- Replacement of Mixer Feed B Screw on Trains 2 and 4
- Dryer Drum Rebuild on Train 2.
- Complete Overhaul of the Rotating Assemblies on Centrifuge Nos. 5 and 8
- Regenerative Thermal Oxidizer No. 2 Media Replacement
- Replacement of RTO Inlet Duct Header