October 17, 2006

Ms. Linda Murphy, Director
Office of Ecosystem Protection
U.S. Environmental Protection Agency
Water Technical Unit "SEW"
P.O. BOX 8127
Boston, MA 02114

Mr. Glenn Haas, Director
Department of Environmental Protection
1 Winter Street
Boston, MA 02108

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

Dear Ms. Murphy and Mr. Haas:

Attached please find the MWRA's annual status sheets on plant performance and maintenance for the period covering July 2005 – June 2006. 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.

If you have questions or need additional information, please feel free to call Grace Bigornia-Vitale at 788-4716.

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 2005 – June 2006

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 Sewage Treatment Plant

The Deer Island Sewage 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. DITP's purpose is to remove human, household, business, and industrial pollutants from the wastewater that is collected and transported through 5,400 miles of pipes and community-owned sewer lines and approximately 230 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, 13 pumping stations, 4 headworks facilities, and 5 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.

Fore River Pelletizing Plant

The operation and output of the Fore River Pelletizing Plant (FRPP) is regulated in part by the terms of federal regulation (40 CFR 503) state sludge regulations in Massachusetts (310 CMR 32.00) and the states to which the pelletized product is shipped. Other important external factors that influence operation of the FRPP include an extensive residuals management facilities plan developed as part of the permitting process for the FRPP as well as commitments to local communities.

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 FRPP. NEFCO's operational agreement contains a plan for the maintenance, repair and replacement of the facility. This plan is intended to establish the standard, by which, to measure NEFCO's performance. Based on reviews of maintenance records and process reliability, it is apparent that the facility is being properly maintained.

The agreement further requires NEFCO to provide a letter of credit in the amount of $1,000,000 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 MWRA is MAXIMO version 4.1.1. The software includes safety features that allow users to document hazardous materials in real time, automate lockout/tag-out/lineup activities, and "push" proper procedures out to 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. 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 an equipment part, for example.

In FY06, prelimary work has been completed to upgrade the MAXIMO system to an intranet version. It is expected that the upgrade will be completed in FY07. The upgrade will allow continued customer support, take advantage of web based software maintenance, and to utilize new functionality.

FRPP is using a different 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 MWRA's multi-year maintenance plan include coordinated, consistent asset inventory, condition assessment, maintenance scheduling, and long-term replacement planning. 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.

After initial start-up of facilities, MWRA conducts 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. MWRA'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.

TABLE 1
CURRENT SERVICE CONTRACTS
Trash removal
Janitorial services
Centrifuge maintenance
PICS maintenance
Security
Copier/fax maintenance
Electrical testing
CTG maintenance
STG maintenance
Boiler maintenance
Elevator maintenance
Crane maintenance
Oil separator cleaning
Vibration analysis
Overhead door maintenance
Lab hood certification
Locksmith services
HVAC chemical treatment
Continuous emissions monitoring
Alignment
Pest control
Public Access groundskeeping
Facilities painting
Cryo facility maintenance
CCTV maintenance
Legionella testing
Bridge crane services
Air balancing
Lube oil analysis
Instrumentation maintenance

Deer Island Treatment Plant

July 2005 - June 2006

Annual Report: The annual summary of Deer Island Maintenance activities in FY06 is presented in Figure 1 and summarized as follows:

- Preventive Maintenance Orders Completed is shown with respect to the target of 100%. Maintenance is working to reach the PM goal to 100%. The average PM % completed was 98.6% in the past year.
- 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 kitted PMs for 42% of all work orders in the past year a substantial increase compared to the previous year.
- Predictive Maintenance - To extend the useful life of equipment and plan for equipment replacements predictive maintenance technologies are being implemented. 2387 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 month of June 2005, 10.3% of all work orders were predictive maintenance which is an increase of 1.3% over 2005.
- 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 June 2006 backlog was 5.3 weeks for day to day plant maintenance activities and remains within the industry standard of 4 to 6 weeks.
- Maintenance Project Backlog in Crew Weeks – The backlog for normal day to day maintenance activities and project backlog as of June 2006 is 7.3 weeks and includes a 2-week project backlog.
- Maintenance Overtime - Overtime for the year (FY06) was approximately 6.3% of wages.

Critical Equipment Availability: 12-Month Average - 98.5 %
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 98.5 % versus a 100% availability because the plant normally operates at approximately one-third the design flow capacity.

Day to Day Plant Maintenance Backlog: 5.3 weeks as of June 2006
Backlog is determined by totaling the planned craft hours in open work orders and comparing them to craft resources available. Day to day plant maintenance backlog includes all preventive, predictive and corrective maintenance. A 5.3-week backlog constitutes 5.3 weeks of work for the entire maintenance workforce. This backlog is within industry standards of 4 to 6 weeks.

Preventive Maintenance (PvM):
98.6% of all PMs were completed and 19,156 PM work orders were initiated this year. Incomplete PM's that are not completed in one month are safely rolled over into the next month's workload.

Predictive Maintenance (PdM)
2387 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	3696 hours	24.3 %
Predictive Maintenance	334 hours	2.2 %
Corrective Maintenance	8537 hours	56.2 %
Emergency Maintenance	42 hours	0.3 %
Project Work	2210 hours	14.5 %
Other Work	381 hours	2.5 %
Total	***15,200 hours***	***100.0 %***

Total Work Orders:
36,554 work orders initiated this year
28,325 work orders completed/closed
1709 work orders canceled

Equipment Replacement:

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

- Centrifuges Refurbishment - $ 219,746
  Sixteen centrifuges (two digested sludge centrifuges and fourteen waste sludge centrifuges were refurbished by the original equipment supplier, Alfa Laval, in the past five years. In the past year, three waste sludge centrifuges and associated gearboxes were refurbished. The centrifuges were 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 - $ 136,375
  Two digester mixers were 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 and one mixer was refurbished on site. The mixer motors also were replaced or refurbished for each mixer.
- Reactor Aerator/Mixer Gearbox Rebuilds $ 82,891
  The secondary reactor aerators and mixers have large gearboxes that have started to fail. Three gearboxes were refurbished with new gears, seals, and bearings as necessary.
- Primary Scum Actuator Replacements - $ 100,000
  The primary scum actuators are reaching the end of their useful life and are being replaced with a more robust design to extend the service life.
- Hydroplant Repairs - $561,000
  The two hydro turbines were repaired and returned to service in the past year.
- Gravity Thickener Rebuilds - $ 25,000
  One gravity thickeners were rebuilt with the baffle plates replaced and uprights reconstructed.
- Digester Gas Chiller Replacement - $ 635,240
  The digester gas chiller was replaced to provide a more reliable machine to cool the digester gas provided to the thermal plant.
- Digester Gas Storage Tank Gas Bag Replacement - $ 323,540
  The digester gas storage tank gas bag failed and replacement was required.
- Cryogenic Facility Repairs - $ 353,737
  The cryogenic facilities were inspected and necessary corrective work was completed including rebuild of the vaporizers, extensive valve replacements, and replacement of the expander turbine.
- Pump Station Mechanical Seal Installation - $ 286,380
  Mechanical seals are being installed to replace the packing and sleeve in the north main pump station, south system, and Winthrop facility pumps. The mechanical seals will save energy and ease maintenance of the pumps and are being replaced over several years.
- South System Pump Station Motor Replacement - $ 46,000
  One SSPS pump station motor was refurbished due to bearing failure in the past year.
- Heat Loop Piping Replacements - $505,240
  Portions of the underground piping for the plant hot water heating loop have failed. This project relocated a portion of the heating loop above ground to prevent additional failures.
- Reactor Feed and Vent Valves - $107,100
  All secondary reactor feed, vent and purge valves were replaced with a more robust design to provide more reliable service. System performance has improved with the valve replacements.
- Residual Roof Replacement - $ 178,000
  The residual roof for the centrifuge building was replaced due to normal wear and tear.

- HVAC Equipment Replacements - $124,595
  Various HVAC units were replaced throughout the facility due to the harsh environment causing corrosion related failures.
- Electrical Repairs - $ 1,237,340
  The major electrical repairs were completed with in-house staff in the last year included:
  - Various variable frequency drive service and replacements
  - Battery and charger replacements
  - Uninterruptible power supply replacements
  - Bus duct and load break switch replacements
  - Power conditioners
- Ancillary Modifications I Construction - $11,170,862 ($ 6,086,530 was expended in FY06 for this project)
  This contract was awarded in June 2004 and the major project elements include:
  - Rehabilitation of Residuals Complex scum screen room
  - Rehabilitation of Winthrop Terminal Facility including Influent Screens
  - Rehabilitation of North Met Trunk Sewer
  - Replacement of North Main Pump Station Sump Pumps
  - Replacement of various valves and meters in Digester Complex
  - Insulation of HVAC ductwork in NMPS and WTF
  - HVAC Modification in Disinfection Gallery
- Ancillary Modifications 2-2 Design and Construction $6,031,459 ($2,006,030 was expended in FY06 for this project)
  This contract is for the replacement of the South System Pump Station variable frequency drives, harmonic filters, exterior DC chokes and roof mounted isolation transformers. This contract is in progress and one of the eight VFDs has been replaced.

Wastewater Transport System

July 2005 - June 2006

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, 4 headworks facilities, and 5 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.

During FY06, the Braintree-Weymouth Pump Station was decommissioned and a temporary bypass pumping operation was setup to maintain flows while the Replacement Braintree-Weymouth Pump Station is being constructed. In FY06, the Intermediate Pump Station (IPS) came on-line providing MWRA with more pumping capacity in the Braintree-Weymouth Interceptor tributary area. The Braintree Weymouth Replacement Pump Station is scheduled to be completed by the end of FY07.

Wastewater Transport Facilities

1. Facilities Operational Statement

During FY06 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 exceedences 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, CSO's, the screenhouse, and headworks. Operational staff track and report the availability of critical equipment on a daily basis and report on a weekly basis. Weekly operation and maintenance reports include flow and chemical usage information. Transport facilities operated at full capacity throughout the year with sufficient available equipment to meet wastewater flow demands. This is further represented by the data in the following table.

Facility Types	Pumps Available (monthly average)	Pumps Required	Screens/in-line grinders Available (monthly average)	Screens/in-line grinders Required
Pump Stations (13)	50	26	19	10
Pumping CSOs (2)	8	6	9	7
Screenhouse (1)	0	0	4	3
Gravity CSOs (3)	0	0	4	3
Headworks (4)	0	0	17	13
Total available (reported)	58	**32**	53	**36**
Total number (in facilities)	60		55	
Total number required	32		39	
Percentage available	98%		98%	
Percentage required	53%		75%	

3. 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 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 repairwork during the past fiscal year include in-house and outsourced projects.

In-house Projects

Headworks Screen Assessment Study and Rehabilitation; Approximately $175,000
The aging screens at the Headworks are scheduled for replacement under the Capital Budget within the next five years. As an interim step to ensure reliability, staff engaged a consultant and the original manufacturer to assess the condition of the screens to make recommendations concerning operation and maintenance. A report was generated with a schedule of replacement parts and components for each unit, along with a spare part inventory for future scheduled maintenance. MWRA procured approximately $175,000 worth of screen parts, $100,000 for parts to be installed by in-house staff, and another $75,000 for spare parts. Mechanical staff started work at the Ward Street Headworks, completing two screens in FY06.

Houghs Neck Pump Station Equipment Replacement; Approximately $23,000
The Hough's Neck Pump Station has been in operation since 1998 and required a new in-line grinder and pumps. A new grinder unit was installed relieving the pumps from clogging and overheating. One new pump was installed and one unit rebuilt and re-installed.

Headworks Grit & Screening Removal System; Approximately $37,500
New valves were purchased to replace the worn routing valves. The valves move grit and screenings from the lower level of the plant to upper floors for discharge into the dumpsters for off-site disposal. An initiative is underway to replace these valves over a 2- year period. In addition, fittings and piping are also being replaced based on weak

points as determined by thickness analysis. Many fittings and pipings are in need of replacement after about 10 years in operation.

Alewife Brook Pump Station Screen Overhaul; Approximately $7,300
Major components are being replaced in FY07. A full array of parts was purchased for a scheduled overhaul of the screens. This year's project is intended to provide continued reliability of the screens until they are replaced. In addition, a capital investment project (CIP) is in the planning stages to replace the pumps and screens at this facility by 2009.

Caruso Pump Station HVAC System Ductwork; Approximately $12,000
The rooftop ductwork required removal and replacement of insulation. Contractors replaced small sections of the ductwork and removed old deteriorating and weathered insulation. In-house staff is installing all new exterior insulation. This will improve not only airflow and heating efficiency, but will ensure that maximum ventilation is provided throughout the facility.

Cottage Farm Sluice Gates; Approximately $22,000
Three sluice gates required new actuators. The actuators open gates from the detention tanks. The old actuators failed, and newer units were installed with more reliable controls. The gates provide a means to release stored wastewater from detention tanks after storm activations to the North Charles Relief Sewer.

Nut Island Headworks Maintenance Projects; Approximately $79,000
This facility is now 8 years in operation and a number of components require corrective maintenance or replacement on a variety of equipment. These include the odor control/chemical feed system, gate controls/actuators, conveyor system drives and rollers and de-watering pumps.

Prison Point CSO; Approximately $45,000
Several types of replacement pumps and components were purchased for installation and/or back-up for facility pumping systems, including the tank washdown system, dry weather flow pumping system, detention tank stripping pump and engine cooling water system. Installation of an auxiliary cooling water line system using potable water is underway. This will supplement or replace the river water supply line through the plant strainer. The incoming river water line is scheduled for FY07 to be re-lined, and will require the use of the auxiliary line for engine cooling while under rehabilitation.

Outsourced Projects

Chelsea Headworks HVAC System Replacement; Approximately $1.5 million.
The heating system boilers and piping were replaced, changing over from a steam system to hot water. This conversion eliminated the glycol coils located within the scrubber chamber. The rooftop ventilation system was replaced using variable speed drives for intake and exhaust fan motors. The system was integrated with the set-back control system that provides energy conservation during unoccupied periods in the plant areas below.

Wastewater Pipelines

1. Manhole Inspection and Rehabilitation Program

The Technical Inspections Unit (TIU), of the Field Operations Department, 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 with cemetitious material applied with spinning equipment and then covered with special coatings to resist corrosion from hydrogen sulfide.

In FY06 the Technical Inspections Unit (TIU) staff inspected a total of about 933 manholes. Approximately 105 manholes were repaired or rehabbed. 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.

Section 80,82, & 83 Sewer Rehabilitation, Arlington:
The Mill Brook Valley Sewer is a 75-year-old vitrified clay sewer 20-24-inches in diameter. Sections of the pipe are damaged and 6100 feet will be rehabilitated. Final design was completed in July 2005 with construction scheduled to begin in 2007 and end in 2008.

Sections 47 and 86, Winchester Contract 6186 & 6916:
Section 47, the Cummingsville Branch Sewer, is a 100-year-old vitrified clay sewer 15 to 20 inch diameter. Section 86, the Cummingsville Branch Relief Sewer, is a 50-year old concrete sewer, 30-inches in diameter. They receive flow from Winchester, Woburn and Burlington. The system experiences surcharging and overflows during wet weather. Contract 6186 will replace Section 47 with 4850 linear feet of new sewer. Portions of Section 86 will be rehabilitated, and other portions will be filled and abandoned. Construction under Contract 6186 began in March 2005 and was completed in March 2006. The remaining construction under Contract 6916 is scheduled to begin in February 2007 and be completed in September 2007.

Section, 160, Winchester, and Medford:
Portions of the Mystic Valley Sewer, which is a 27" brick and concrete sewer, were identified as being damaged. Approximately 11,000 feet of the sewer will be rehabilitated. Construction is currently scheduled to begin in February 2007.

Section 93A, Lexington Contracts 6798 & 6987:
The rehabilitation of 1425 linear feet of 30-inch concrete gravity sewer was completed in April 2005. During construction, however, deterioration of a portion of the upstream, force main was discovered. Rehabilitation of 1200 linear feet of 24-inch, ductile iron pipe, by sliplining is currently under design. Construction began in May 2006 and is scheduled to be completed in January 2007.

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. Substantial completion was 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, were completed in 2005. The project cost is about $5.4 million.

The design phase for additional rehabilitation is currently underway. This consists of construction of approximately 2.5 miles of relief sewer, using microtunneling, and one mile of rehabilitation, using pipebursting. Construction is scheduled to begin in June 2008 and be completed in March 2010.

Upper Neponset Valley Relief Sewer:
The project includes design and construction of 18,500 feet of relief and/or replacement interceptors. These interceptors serve Brookline, Newton, West Roxbury, and Dedham. Construction, which consists of two contract packages, began in March 2005, and is scheduled to be completed in March 2008.

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.

The Technical Inspection Unit (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 36 miles of pipelines were TV inspected in FY06. Included in this total is approximately 6.2 miles of community assistance work.

Approximately 6.2 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 20 miles of pipeline and 88 siphons were cleaned in FY06.

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

FY06 Maintenance Program Costs

1. Budget

The Field Operations Department (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 annual basis. A Master Plan is underway within the Authority to begin prioritizing 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 FY06 for programs within FOD for related maintenance activities.

FY06 APPROVED MAINTENANCE ANNUAL BUDGET

Budget Line Item	Total Funding
Wages and Salaries	$7,520,215
Overtime	$404,960
Maintenance (Parts & Supplies)	$2,792,076
Prof Services	$50,000
Other Materials	$384,138
Other Services	$77,000
Total	$11,228,389

2. Staffing

A total of 131 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 and painters). These groups perform maintenance activities at both wastewater and water facilities.

Work Coordination in the Field Operations Department (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 FY06 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

Staffing Categories	**No. of Staff**
Equipment Maintenance Program	
Maintenance Manager	1
Engineers	2
Program Manager/Area Managers	4
Administration	1
Mechanic Specialists	18
Electrical Specialists	12
Plumbers	7
HVAC Specialists	3
Machinists and Welders	4
I&C Specialist (Operations Budget)	1
Subtotal	**53**

Work Coordination Group Program	16
Collection System Technical Inspections Program	12
Wastewater Pipeline Maintenance Program	18
Building & Grounds Program (Grounds/Custodial)	16
Facility Maintenance Program (Carp/Painters/Masonry)	16
Subtotal	**78**
Total	**131**

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.

SERVICE CONTRACTS & UTILIZED SERVICES

Type and description	Term	Type of service
Boiler and Water Heater Service (Contract)	2 years	Scheduled, corrective & emergency repairs
Elevator maintenance (Contract)	2 years	Scheduled, corrective & emergency repairs
Crane maintenance (Contract)	2 years	Scheduled, corrective & emergency repairs
VFD maintenance (Purchase order)	1 year	Scheduled maintenance
Instrumentation maintenance (Contract)	2 years	Scheduled maintenance
HVAC pneumatic controls (Purchase order)	As needed	As needed adjustments
High Voltage Maintenance (Purchase order)	As needed	Preventive Maintenance
Hydraulics Maintenance Service (Contract)	2 years	Preventive and Corrective Maintenance
Compressed air maintenance (Purchase order)	As needed	Preventive and Corrective Maintenance
Diesel generator maintenance (Purchase order)	As needed	Preventive and Corrective Maintenance
Nut Island Landscape (Contract)	2 years	Specified scope
Overhead door maintenance (Purchase order)	As needed	Corrective Maintenance
Engineering & Consultants (Task order)	As needed	Mechanical, Electrical, HVAC, and Architectural Design

Annual Maintenance Program Performance

1. Backlog

The Maximo computerized maintenance management system captures all work order requests from operations and maintenance personnel. This gives management the ability to track, prioritize work orders, and generate reports for all work activities. The backlog varies from as

low as 2 weeks, for essential work orders, and up to 6 months for low priority work. Backlog levels depend on resources available, but daily prioritization and coordination ensures that primary and critical equipment is functioning at adequate levels at all times.

Critical equipment status is monitored by Operations and this information is provided to the Equipment Maintenance section. Work is prioritized accordingly, with critical equipment receiving the most attention.

Maximo is the system that captures the work activities and is capable of generating all of the necessary information and reporting. Metrics are used to measure how well we are performing maintenance, and monthly meetings are held by the Department Director to review various performance measures.

2. Preventive Maintenance

A primary focus in FOD is preventive maintenance. Both Operations and Maintenance staff perform preventive maintenance tasks. The tasks performed by operational staff are defined as light maintenance duties, such as filter changes.

Wastewater Operations crews also travel from facility to facility using a handheld monitoring system. Roving crews perform daily checks of equipment that include taking readings and conducting visual inspections. The information is captured in a separate database outside of the Maximo work order system. Reports can be generated and information retrieved about the condition of any equipment. Abnormal conditions are noted and forwarded to planner/schedulers for work order processing and further action by the Equipment Maintenance section. FOD staff continue to review resources and allocation of workforce to improve the percentage of preventive work orders completed for all related facility equipment.

Lube oil analysis is used as a primary condition monitoring technique to check the internal condition of equipment. Samples are taken, by in-house staff, from a number of equipment oil reservoirs and then analyzed by an outside lab service. Based on the results, the oil/fluid is either scheduled for change or for repeat sampling. Other condition monitoring techniques, such as infrared thermography, ultrasonic thickness testing, and bearing temperature readings provide a look at equipment condition prior to failure.

In order to enhance asset life, staff are working to improve the percentage completion of scheduled maintenance work orders with a number of strategies, including organizational re-assignment, contracts, and crew tracking. Though all PM's are not completed, equipment availability is at acceptable, defined levels.

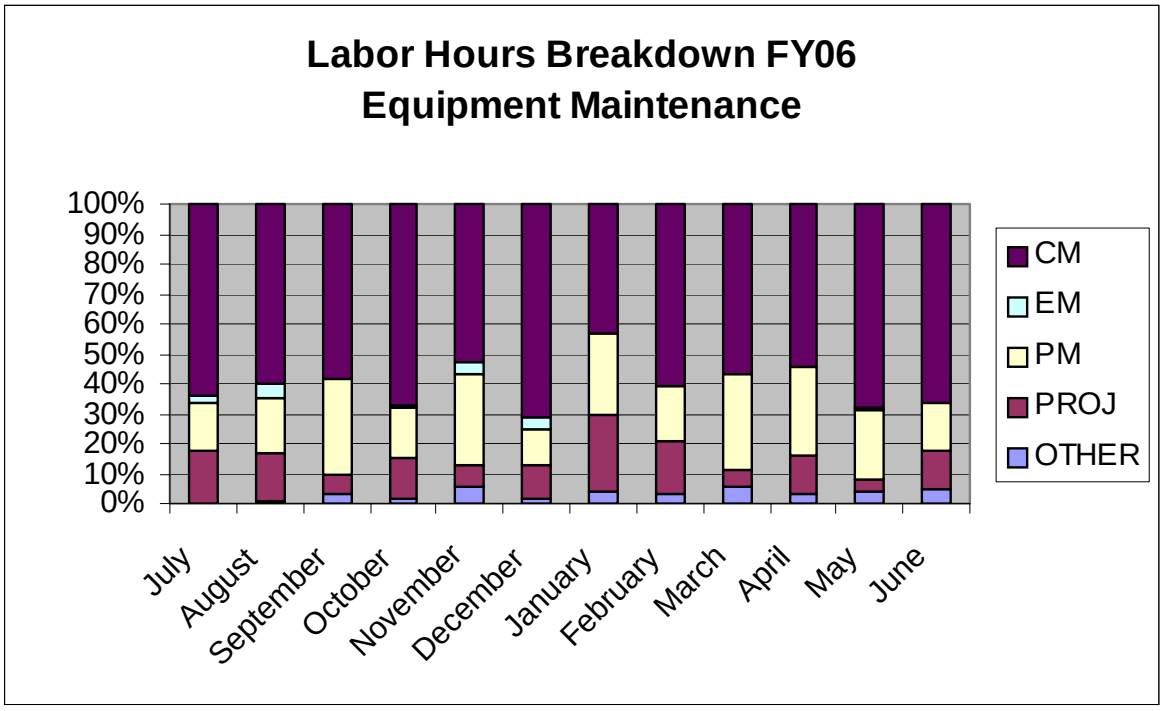
3. Annual Statistical Maintenance Performance Indicators

Equipment Maintenance

Key indicators of performance are used to monitor maintenance activities. Monthly maintenance staff hours are used to track productivity as well as monitor the type of maintenance performed. Labor utilization reports are generated throughout the month and

final report at the end of month to ensure that all of the labor is reported on a consistent and timely manner by the immediate supervisors.

Equipment maintenance personnel are dedicated trades staff that maintain the wastewater facilities as well as water facilities. Staff in the associated trade shops are utilized for both types of facilities, and are assigned work based on critical items, priority, and backlog demand. Preventive/Predictive Maintenance (PM), Corrective Maintenance (CM), Emergency (EM), Project Work, and Other Work are the work types for Equipment Maintenance activities. The percentages will vary each month depending on the extent of corrective maintenance that is needed. The following graph represents the level of effort for wastewater facilities, and is indicative of the percentage of time spent by various crews during FY06 for each category of work. This was derived from the reported hours in the Maximo work order system.

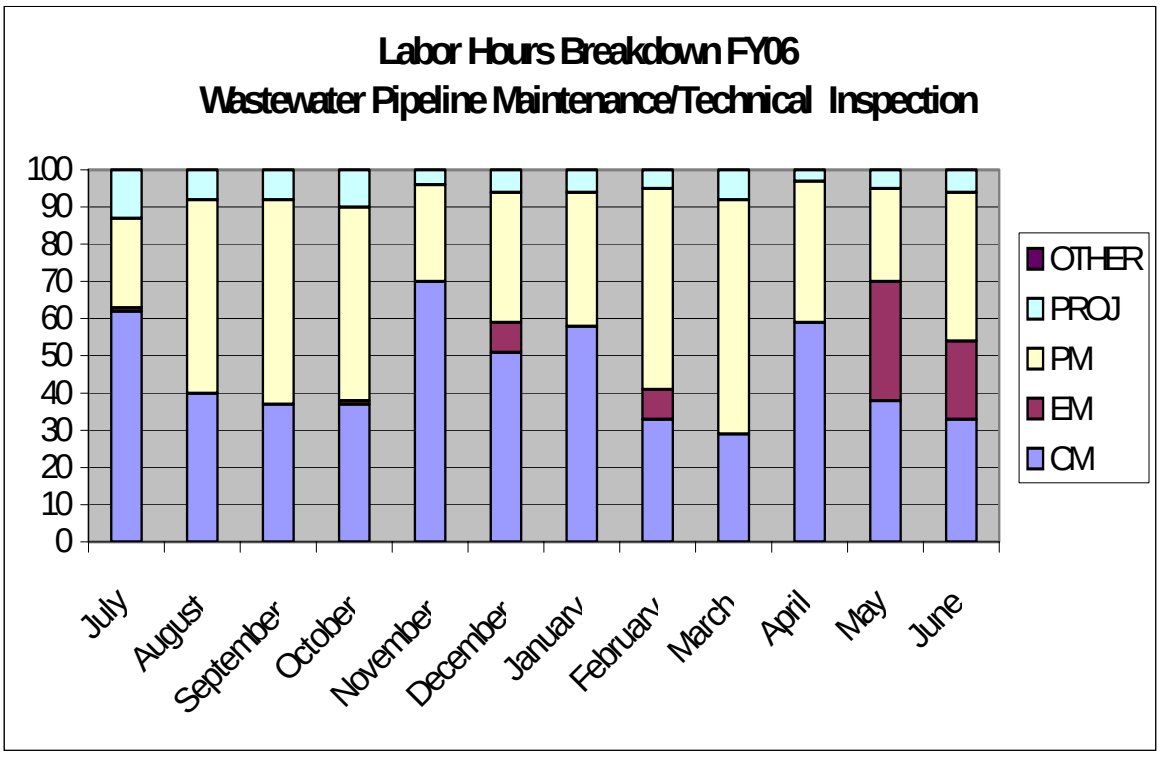


Wastewater Pipeline & Technical Inspections

The Wastewater Pipeline & Technical Inspections Section is responsible for inspecting the various elements of the Transport Wastewater Collections System. Pipeline inspections average about 70% of the workload followed by structure inspections, including manholes, averaging about 30%. Approximately 42.6 miles of pipelines were inspected in FY06. Tide-gate inspections are part of the monthly routine inspections required by the NPDES permit, (60) were performed in FY06. Other structures inspected include (46) headhouses, (53) diversion structures, and (933) manholes.

The information generated by this program provides the general workload and priority for pipeline cleaning and maintenance. The data is used by MWRA to define major initiatives and engineering studies, such as the future Master Plan for asset replacement.

The following graph is indicative of work activities for the Wastewater Pipeline Maintenance crews during FY06. Key work types are used to report maintenance manhours in the Maximo database, and the graph shows the percentage of work performed for each general work type category. These categories can be further broken down into subcategories. An example of this is CM (corrective maintenance) which is comprised of bucketing, jetting, and manhole repair activities that are corrective in nature. Work hours are reported, categorized, and accumulated to also provide reports on staff utilization for individual program managers.



Annual Status Sheets – Biosolids Processing Facility

July 2005 - June 2006

Critical Equipment Availability: Twelve Month-Average – 83.3%

Operating logs indicate that an average of 10 of the 12 centrifuges were available during FY06. The centrifuges and ancillary equipment make up the critical components at the Pelletizing Plant because sludge can be processed through the Dryers or it can by 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.

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.

Work Orders:

In FY06, staff completed 2722 or about 94% of the 2894 work orders that were opened.

Equipment Replacement:

More than $ 1,862,080 was spent on replacement parts and maintenance related items in FY06 including:

- Cooling tower replacements (3 for a total of $668,510)
- Plant wide lighting upgrade
- Overhaul Mixer Feed B screw conveyors in Trains 2, 3, and 5
- Dryer Drum No. 4 tire and trunion replacement
- Complete overhaul of Centrifuges Nos. 3 and 9
- Overhaul of the scroll in Centrifuge No. 5
- Replace the media and repair the insulation in RTO No. 3