

**City of Detroit
 Detroit Water & Sewerage Department
 Waste Water Treatment Plant
 Corrective Action Plan
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Introduction

This Corrective Action Plan (CAP) represents Detroit's "Roadmap" for sustainable compliance. Our Roadmap has been built upon a consensus-based initiative undertaken by the Mayor's Office of the City of Detroit through its Chief Operating Officer (COO).

Under this initiative, the Detroit Water & Sewerage Department (DWSD) and its Waste Water Treatment Plant (WWTP) undertook with external assistance an in-depth examination of the root causes that contributed to the solids violations in the MDNRE's April 14, 2010 Second Notice of Violation No. 000341 (Violations) and have identified the steps necessary to achieve compliance.

Our Roadmap spells out immediate short-term action items and, importantly, addresses long-term measures required to achieve a transformed WWTP. While specific in nature, our Roadmap should be considered as a flexible one. For example, it is essential that we maintain the ability to change our Roadmap to capitalize upon developments in technology advancements or accommodate environmental and legal requirement changes.

Here in summary are the highlights of Detroit's CAP Roadmap that are more fully described in this report:

1. Establish an Empowered Enterprise Change Office (EECO) that will be responsible for the coordination and successful execution of the CAP;
2. Repair and/or replace existing dewatering, disposal, conveyance, and supporting equipment to perform at a minimum solids processing annual average rate of 450 (dry) tons per day (tpd), a maximum 30-day moving average rate of 550 (dry) tpd, and a peak 10-day solids production rate of 840 (dry) tpd;
3. Evaluate and develop a Long-term Disposal Plan recognizing the impact of climate change and other potential environmental regulation changes on the licensing, implementation and operation of any future option;
4. Improve current methods of maintenance planning and maintenance implementation;
5. Establish and aggressively manage the operation through robust metrics;
6. Improve safety and housekeeping;
7. Transform WWTP into a model of sustainability;
8. Improve current methods of capital planning and capital program management;
9. Improve current methods of staffing and procurement;

Proactive Leadership: The EECO

The Violations served as a catalyst for change within the City and DWSD. Critical to the execution of constructive change is proactive leadership. To this end, the City determined that it was essential to start at the top with the creation of an Empowered Enterprise Change Office (EECO) reporting to the Office of the Mayor and specifically the City's Chief Operating Officer (COO) and the DWSD Director.

EECO serves as both a unifier and an enabler bringing together under one umbrella entity key representatives of the City, DWSD and the WWTP. EECO's mission is to oversee and drive the implementation of the CAP and to create a long-term sustainable and efficient operation of the WWTP in compliance with the NPDES Discharge Permit.

Given the fact that a search for a new DWSD Director is currently underway, the City's COO and current DWSD Deputy Director are working in concert to spell out specific staffing and position definitions of the EECO. While this effort will be finalized by the end of September, 2010, here are some important preliminary guidelines that have been developed:

- EECO shall be led by a senior DWSD employee.
- EECO shall include at least one (1) outside independent representative with subject matter expertise.
- EECO shall include representatives from the DWSD staff and representatives from the City's Human Resources, Purchasing, and Legal Departments.
- EECO shall include technical support from DWSD employees and outside resources on an as-needed basis.

Operations & Maintenance

The DWSD and WWTP will achieve compliance with its permitted solids effluent limitations, production expectations and control of the solids inventory through execution of the Operational and Maintenance actions discussed below.

Solids Dewatering

Overarching Goal: Increase Dewatering Capacity for the Short & Long Term

An Overview of Solids Dewatering

The WWTP's dewatering capacity will operate at minimum solids processing annual average rate of 450 (dry) tpd, a maximum 30-day average rate of 550 (dry) tpd, and a peak 10-day solids production rate of 840 (dry) tpd to effectively reduce and control the solids inventory.

These operating levels will be achieved, in the short-term, by:

- Repair of existing dewatering equipment and supporting equipment,
- The addition of rental dewatering units, and
- Supplementing maintenance through service contracts.

Further, the operating levels will be maintained in the long-term by:

- Replacement of the dewatering Complexes I and II
- The addition of supplemental transport equipment, and
- The continued investigation and implementation of new dewatering technologies as applicable.

Short-Term Dewatering Goals & Action Items

Goal: Improve Existing Dewatering Equipment

Action Item: Repair & Maintain Complex I & II (Belt Filter Press) BFP Dewatering.

Mechanical parts and replacement belt cloths are being acquired through the Komline parts contract, purchase order number 2507987. WWTP staff has reviewed the repair parts requirements with the manufacturer and identified additional part quantities to support repairs of the Complex I & II BFP units. A budget increase has been processed through Purchasing to accommodate the increased requirements. Parts have been ordered and will be available for installation by DWSD's maintenance staff.

The Complex I polymer system is also capable of supplying Complex II dewatering units. The polymer feed pumps will be rebuilt through the skilled trades contract (PC-758) and will be completed by December, 2010.

Repair and maintenance of Complex I BFP will be ongoing until its replacement. Repair and maintenance of Complex II BFP will be ongoing subject to the rebuild activity immediately discussed below.

Action Item: Rebuild Complex II BFP Dewatering.

Eight (8) of the twelve (12) Complex II BFP units will be rebuilt using the parts and materials contract discussed above, with technical support from Komline and skilled maintenance labor through the PC-758 contract. The rebuilds will be made in pairs, with a minimum of four (4) weeks required to complete each pair of BFP units. Work will begin October, 2010 on the first pair, and completed with the fourth pair in March 2011. (Note: The work includes a complete replacement of bearings, local control panels, and wear parts, SFE pumps, grinder replacement and repair of control valves and supplemental equipment.)

Action Item: Rebuild Complex II Centrifuge Dewatering.

The Complex II centrifuge units installed during 2000-2005 have operated sporadically and required extensive maintenance support, with numerous mechanical and electrical failures. A service contract for parts, maintenance and major overhaul repairs of the centrifuge units was awarded to Decanter Machine, Inc. (contract purchase order number

2816397) in April, 2010. The contractor has started work on the contract, and the EECO and WWTP will track the performance to assess the benefits of this service contract. The contract is for a three-year period with two renewal options of one (1) year each. Three (3) major rebuilds will be completed every six (6) months.

Goal: Supplement Existing Dewatering Equipment

Action Item: Rent Additional Dewatering Equipment.

The WWTP has ordered three (3) rental centrifuges for an initial 6 month period, to provide an additional 150 dry tpd of production capacity to the WWTP. These units will be at full operation by the end of September, 2010.

The rental centrifuge units will be operated and maintained by the vendor, Pace Dewatering Systems, Ltd. The initial lease period of 6 months may be extended based upon the condition of the WWTP's dewatering equipment, and the solids inventory. The additional dewatered solids from these units, when added to the WWTP's available equipment, will allow for the reduction of the solids inventory and create opportunities for the scheduled repair of existing dewatering units and supporting equipment and prevent the likelihood of excessive solids inventory.

The rental units will be located behind dewatering Complex II, and dewatered solids will be conveyed to conveyor belt A to feed complex II incineration or the Central Offload Facility (COF).

Goal: Improve Conveyors and Transport Equipment to Minimize Production Constraints

Action Item: Repair & Maintain Conveyor and Transport Equipment.

Dewatered solids are transported to incineration and off-site disposal via conveyors in Complex I and II. As an initial action, the WWTP has secured a conveyor repair subcontractor (DP Brown), through the skilled trades contract PC-758 to rebuild twelve (12) conveyors. The first conveyor belts to be rehabilitated are belt "A", which transfers solids from the lower level of Complex II dewatering to the COF or Complex II incineration, and belt "K", which feeds Complex II incinerators 7-10. This work has begun and all twelve (12) conveyors will be completed by the first quarter of 2011.

DWSD's operations and maintenance staff will evaluate the condition of the plant's conveyor belts on a monthly basis and assign work to the sub-contractor to meet operational needs.

Goal: Improve Maintenance Planning & Maintenance Implementation

Action Item: Develop a New Maintenance Planning Process and System.

Proactive maintenance planning on a plant-wide basis at WWTP is essential to the success of its operations and compliance. DWSD recognizes that past maintenance planning has too often been either after the fact of a breakdown or stalled by barriers relating to capital, staffing and other realities or perceptions. Moving forward, maintenance planning will be DWSD and the EECO's priority and will be based upon a comprehensive and realistic assessment of the useful life of its equipment in the context of this CAP Roadmap. With proper planning, DWSD will have the tools to undertake the right maintenance before the fact of a failure reducing both operational downtime and risk of noncompliance. Therefore, one of the major deliverables of the EECO will be a completely reworked maintenance planning process and system. The EECO will establish the specific schedule for the development of the new maintenance planning process and systems by the end of 2010

Action Item: Create a Maintenance Management Service Contract.

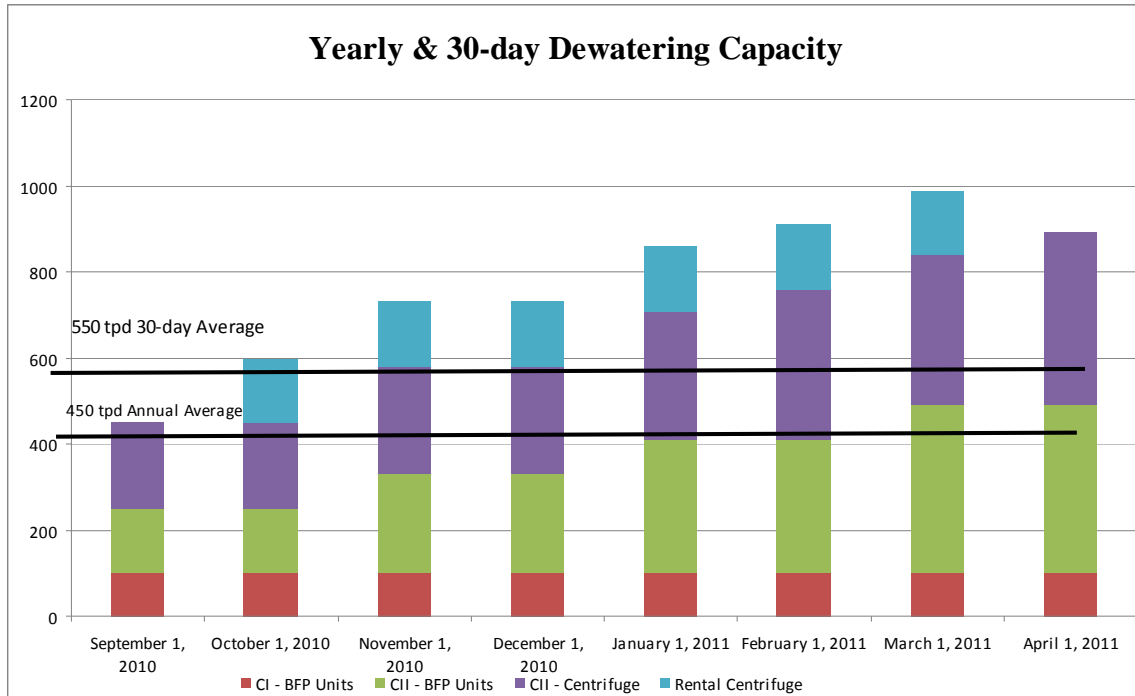
The EECO will work with DWSD and WWTP staff to develop and implement a "Master" Maintenance Managerial Contract to coordinate existing service contracts relating to skill trades, equipment rental & repair contracts, instrumentation & control and HVAC services and other similar contracts. This Master Contract will provide engineering, supervisory, operational and maintenance services to support existing and new WWTP staff. This effort will continue until the complete implementation of the revised processes at DWSD with Human Resources and Purchasing determines that the Master Contract can be terminated.

Action Item: Award and Implement New Skilled Trades Contract

The current skilled trade contract PC-758 is scheduled to expire June 30, 2011. A successor contract (PC-778) has been bid and is being evaluated. This contract will be in place on or before the expiration of the existing contract or extensions thereto in order to permit a seamless transition.

Short-term Dewatering Capacity

The chart below graphically depicts the capacity increases expected as a result of the implementation of identified short-term action items as discussed previously.



Long-Term Dewatering Goals & Action Items

Goal: Replace Complex I and II Dewatering Equipment at End of Useful Life

Action Item: Advance Replacement of Complex I BFP Unit.

DWSD has advanced the schedule for the study and design to replace the Complex I BFP and supporting equipment by amending of the existing contract CS-1483 (Study & Design of Complex II Belt Filter Presses). A Capital Improvement Program (CIP) project to replace these units was submitted for FY 2012/13. DWSD has amended this contract to include this work to significantly shorten the time frame for implementation of this task. The Board of Water Commissioners (BOWC) approved the amendment in May, 2010 and is currently in the Detroit City Council approval process.

Action Item: Advance Replacement of Complex II BFP Units.

CS-1483 was initiated in January, 2010 for the engineering study and design work for replacement of the Complex II BFP units. The engineering consultant has investigated options for repairing the dewatering units, conveyance systems, etc., as well as replacement alternatives.

WWTP will submit its recommendation to the EECO for the replacement of the Complex I and II dewatering following completion of the Complex I engineering study evaluation. The schedule for the recommendation is December, 2010. The construction actions for dewatering replacement are addressed as a long term item issue below

Action Item: Implement Replacement of Complex I & II BFP Units

Following completion of the Engineering Study & Design of Complex I and II dewatering operations under CS-1483, the WWTP and EECO will recommend alternatives for replacement of the Complex I and II BFP units and supporting systems. These recommendations will be available in January 2011, and used to develop the construction contracts to perform the actual work. The completion of Complex I is expected by the end of 2014 and Complex II by the end of 2015.

Goal: Provide Conveyors and Transport Equipment that Minimize Production Constraints

Action Item: Prioritize and Perform Maintenance of Conveyance Equipment

A Conveyor Maintenance Service contract has been developed to secure services needed to keep the conveyors and transport equipment in a reliable operating condition. The contract encompasses 3-year subcontractor support for rebuilding, parts and materials, and maintaining the conveyors supporting solids dewatering and disposal. The EECO will drive the timely processing of this contract request.

Action Item: Investigate the Need for Additional Conveyor and Transportation Equipment and Implement

An engineering evaluation will be undertaken to determine the need for additional conveyor and transport equipment such that there is sufficient redundancy to minimize the constraints on dewatering and disposal production. The evaluation will take into consideration the outcomes relating to the evaluations for long-term dewatering and disposal. The EECO will determine the schedule for this engineering evaluation by the end of 2010.

Goal: Investigate Dewatering Technologies

Action Item: Investigate Cost-effective and Innovative Technologies

The DWSD will continue to investigate cost-effective and innovative technologies including potential pilot efforts having commercial applications for solids dewatering.

Long-Term Dewatering Capacity

Below is a table describing the potential capacity benefits as a result of the measures identified above:

	Capacity TPD	Estimated Completion Date
Replace Complex I (10 BFP)	500	End of 2014
Replace Complex II (12 BFP)	600	End of 2015
Centrifuges	400	April, 2011

Solids Disposal

Overarching Goal: Increase Solids Disposal Capacity for the Short and Long Term

An Overview of Solids Disposal

In the short term, the WWTP solids disposal goals presented earlier will be achieved with the following actions:

- Adding off-site landfill capacity;
- Improving COF storage, and
- Repairing existing incineration units.

For the long term, the WWTP will develop and assess a portfolio of options for solids disposal. DWSD recognizes that current issues of climate change and other environmental and regulatory issues will be factored into its decision-making process. During the evaluation process, the DWSD will seek to prioritize alternatives based upon the impact on licensing, implementation and operation of bio-solids disposal by future climate change and other legislative or regulatory environmental changes.

Short-Term Solids Disposal Goals & Action Items

Goal: Increase Land-fill Disposal Capacity

Action Item: Acquire Additional Landfill Disposal Capacity.

The WWTP uses off-site landfill disposal to meet approximately 30% of its annual solids disposal requirements. Landfill operations have been limited to Monday through Friday, and a half day on Saturday. Sunday use has not been available. Beginning in November 2009, DWSD's landfill operator limited daily deliveries to 1,000 wet tons of limed solids (~250 dry tons). This constraint was the result of reductions in municipal solid waste receipts and the parameters of the landfill's local operating agreements. DWSD sought supplemental landfill sources to increase this capability in December 2009. An emergency purchase order and contract was issued in April, 2010 for a 6-month period

(ending December, 2010), to provide an additional 1,000 wet tons of disposal capacity per day. This contract will be extended if required.

Action Item: Secure On-Going Landfill Services.

The WWTP's Landfill Service Contract was re-bid in June, 2010. To assure that the WWTP's landfill disposal needs can be met, the Purchasing Department will award a multi-year purchase order and contract to more than one vendor in order to have adequate landfill disposal capacity of at least 2,000 wet tons per day (~500 dry tpd). The EECO will monitor and assist the WWTP to secure the timely award of this service contract on or before December, 2010 when the existing and supplemental contracts are set to expire.

Action Item: Secure Sunday Service (if feasible).

The WWTP has requested Sunday service from its landfill operators. This request is under consideration by several operators and a response is expected by the end of September, 2010. WWTP is currently in a test mode for six (6) loads (~70 dry tons) with one of the operators.

Goal: Improve On-Site Storage Reliability and Availability

Action Item: Increase Storage Capacity of Central Offload Facility (COF)

The COF receives dewatered cake and adds lime prior to loading trucks for off-site disposal. The WWTP is only able to use approximately 65% of this storage capacity of the COF due to the limitations of the mechanical gate operator. At this time, loads in excess of 65% of the total volume will result in failure of the gate operator. WWTP engineering staff has developed a solution to replace the mechanical operator with a pneumatic unit. The replacement work on all silos is scheduled for completion by October, 2010. These modifications will permit dewatering equipment to operate at a higher capacity with fewer interruptions.

Goal: Improve Reliability and Availability of Multiple Hearth Incineration

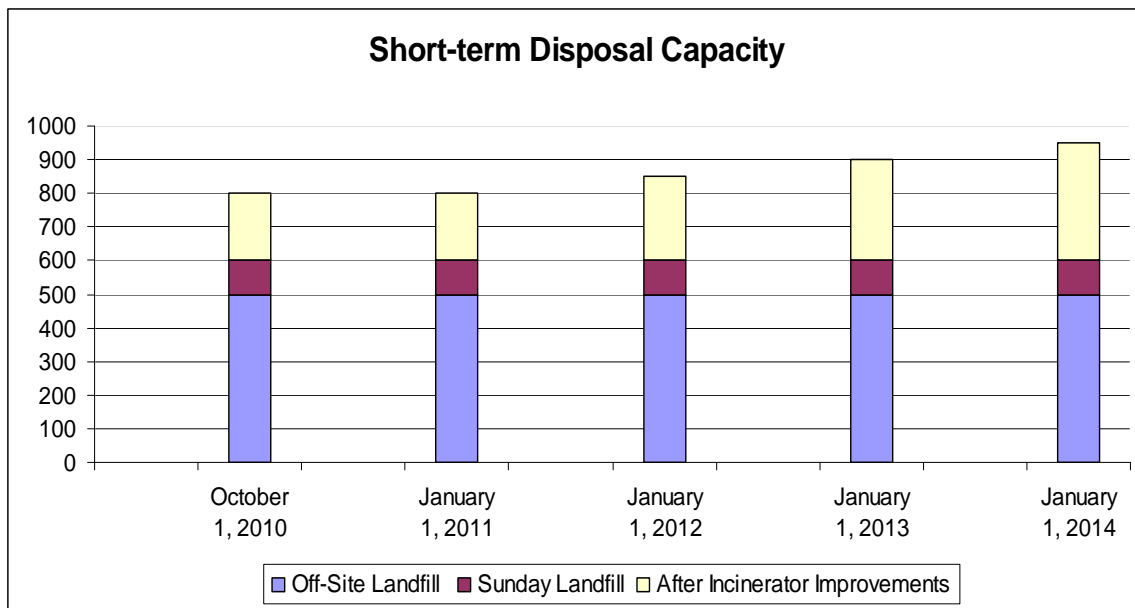
Action Item: Repair Complex I and II Incinerators.

The maintenance and repair of the multiple hearth incinerators is required to address incinerator operation and reliability, and will be attained through PC-744. Efforts will include inspection and repair of the large internal casting equipment and repairs to the internal hearth brickwork, and instrumentation. The repairs will not increase capacity or emissions of the incinerators.

This contract was approved by the BOWC in April, 2010, and is currently before the Detroit City Council, awaiting approval. The EECO will drive the timely processing of this contract.

Short-Term Disposal Capacity

Below represents a quantification of capacity resulting from the implementation of the short-term disposal action items discussed in the preceding section of this CAP:



Long-term Disposal Goals & Action Items

Goal: Replace Current Solids Disposal Equipment at End of Useful Life

Action Item: Identify Alternative Solid Disposal Options and Develop Implementation Plan.

DWSD began its re-evaluation of solids disposal alternatives in January 2009. DWSD is investigating DWSD-based alternatives and non-DWSD alternatives, with the objective of identifying opportunities that will be impacted the least by changing environmental regulations.

An initial investigation and evaluation of DWSD-based Long Term Disposal Alternatives was conducted through CS-1452A, beginning in January 2009. The final report was issued in June, 2010. No decision has been made to act on this report pending completion of the evaluation of non-DWSD alternatives discussed below as well as the development of an overall solids disposal capital plan.

DWSD initiated a parallel review of non-DWSD solid disposal options as alternatives or supplements to any DWSD-based disposal options. A Statement of Qualifications (SOQ) was advertised in August 2009 and eight (8) responses were received in December 2009. Following a review of the SOQ's, five (5) firms were short listed to receive a Request for Proposal (RFP). The RFP is expected to be issued in September, 2010 and returned for evaluation in December, 2010.

In addition, DWSD will continue to investigate innovative technologies including potential pilot efforts having commercial applications for solids disposal.

Therefore, another major deliverable of the EECO will be the development of the long-term solids disposal capital plan. A final recommendation of alternatives and options is targeted for mid-2011.

Long-term Disposal Capacity

Below is a description of the timeline for the implementation of long-term disposal options:

Long-Term Options	
Measure	Expected Completion Date
Finalize Long Term Disposal Option	June 2011
Complete Implementation	End of 2015

Management

An Overview of Management

This Roadmap addresses not only the operation and maintenance of the WWTP but also addresses systemic management issues that have affected compliance.

General Management Issues

Goal: Improve WWTP Performance Utilizing Robust Metrics

Action Item: Establish Appropriate Metrics for Managing WWTP

The EECO and WWTP will develop a comprehensive set of metrics to manage and improve performance. The EECO and WWTP will also benchmark best practices in utilizing metrics for performance management, root cause analysis and corrective action planning. This effort will be one of the first deliverables of the EECO with the revised metrics and management process complete by the end of the 2010.

Examples of metrics under consideration are included in Appendix A. The metrics shown in Appendix A address the question of the Judicial Adjunct.

Goal: Improve Safety and Housekeeping

Action Item: Create Revised Safety and Housekeeping Practices.

The continuous improvement of safety and housekeeping is critical for the protection and morale of the WWTP employees and impacts the performance level of the plant. As a result, a revised WWTP safety plan will be investigated and implemented. Some highlights include:

- A benchmarking effort of local best practice safety programs will be undertaken by management and the unions represented at the WWTP. Subsequently, a revised safety program will be implemented. This effort will begin in October, 2010.

- A short term, accelerated housekeeping effort will be undertaken over the next two (2) months using existing staff and contract labor through the skilled trades contract PC-758.
- Longer term housekeeping efforts will be handled by increasing the in-house staff.

Goal: Transform WWTP into a Model of Sustainability

Action Item: Create and Implement Sustainability Plan for WWTP

The EECO and WWTP will create a sustainability plan and then drive its implementation to achieve its goal of becoming a model of sustainability. As a part of this effort, EECO and WWTP will work with the City of Detroit's Green and Sustainability Initiative. Specific components of the resulting sustainability plan will, for example, include energy efficiency, beneficial reuse and solids disposal. This effort will begin in October, 2010.

Goal: Improve Capital Planning and Capital Program Management

Action Item: Create & Implement Capital Planning Process for DWSD

The EECO will facilitate the development and implementation of a long-term capital planning process that is consensus driven with the City and DWSD to meet compliance and operational requirements in light of the short and long-term measures set forth in this CAP and then execute on the resulting capital planning needs. To accomplish this, a benchmarking effort will be undertaken of best practices for capital planning from other utilities both local and national. This effort will begin in November, 2010.

Action Item: Create Best Practice Capital Program Management

The EECO and WWTP will undertake a review of program management best practice and will implement. This effort will begin in November, 2010.

Human Resources Issues

Goal: Improve Staffing Process

Action Item: Re-Engineer the DWSD Staffing Process

The EECO will engage a collaborative effort with the City Human Resource Department, the Michigan Lean Consortium, and DWSD to re-engineer the staffing process, with the objective to reduce the time of “*Requisition to Hire*” significantly. This effort will begin in September, 2010.

Goal: Optimize WWTP’s Workforce

Action Item: Create an Effective Organizational Structure and Associated Workforce Plan

The EECO will work with the consultant IMG and the DWSD management to create a revised and strategically realigned organizational structure, clear role definition and a supporting workforce plan. This effort will begin in September, 2010.

Goal: Ensure Adequate Staff

The WWTP maintenance staff requires additional staffing to (i) perform routine maintenance and preventive maintenance tasks, (ii) carry out repairs to dewatering and disposal equipment, and (iii) provide the needed personnel to achieve sustainable compliance. Current staffing levels and importantly skills distribution are not sufficient to satisfy all of these requirements. Addressing this situation includes the following three approaches:

Action Item: Hire WWTP Full-Time Staff.

As of August 31, 2010, Critical Need Letters will have been submitted for full-time positions for operations, maintenance, engineering and administration required by WWTP to achieve sustainable compliance. The EECO will work with WWTP and Human Resources to accelerate the hiring of critical resources.

Action Item: Continue to Supplement WWTP Maintenance Staff.

DWSD will continue to supplement the existing maintenance staff to address equipment repairs. This is currently being done using the skilled trades contract, PC-758, to supplement maintenance staff for complex II BFP unit repairs. The WWTP Maintenance Superintendent and Plant Manager will use and manage the contract on a day-to-day basis and identify labor needs where these supplemental staff will benefit the WWTP.

As discussed under the dewatering area, supplemental staff from the skilled trades contract PC-758 will be used for performing the major rebuilds of the four (4) Complex II BFP units.

The WWTP is also supplementing the work performed by its Instrument Technicians using staff procured through the contract PC-713. There are currently two staff assigned through this contract to the Combined Sewer Overflow (CSO) basins. This alleviates the need for WWTP Instrument Technicians to support these external facilities, and allows them to focus on the WWTP.

Action Item: Utilize Service Contracts as required.

In collaboration with its union constituents, DWSD will identify those maintenance tasks that should be performed through a service contract or with subcontracted staff and if acceptable enter into such contracts as appropriate.

Purchasing Issues

Goal: Improve the Procurement Process

Action Item: Optimize the Existing Procurement Process in the Near Term

WWTP personnel are working with Purchasing daily and meeting together every two weeks to update progress on plant needs, resolve and address issues that may impede requisition processing, and resolve and address questions concerning specifications and requirements. Additionally, staff is reviewing parts and material supply projections to establish updated ordering and stocking requirements with the Materials Management staff. The EECO will investigate and change as necessary the activities associated with WWTP's management of the existing procurement process. The effort will begin in September, 2010.

Action Item: Re-Engineer the Procurement Process

The EECO will engage a collaborative effort with the City Finance and Purchasing Department and DWSD to re-engineer the procurement process, with the objective to reduce the time of “*Requisition to Receipt*” significantly. This effort will begin in September, 2010.

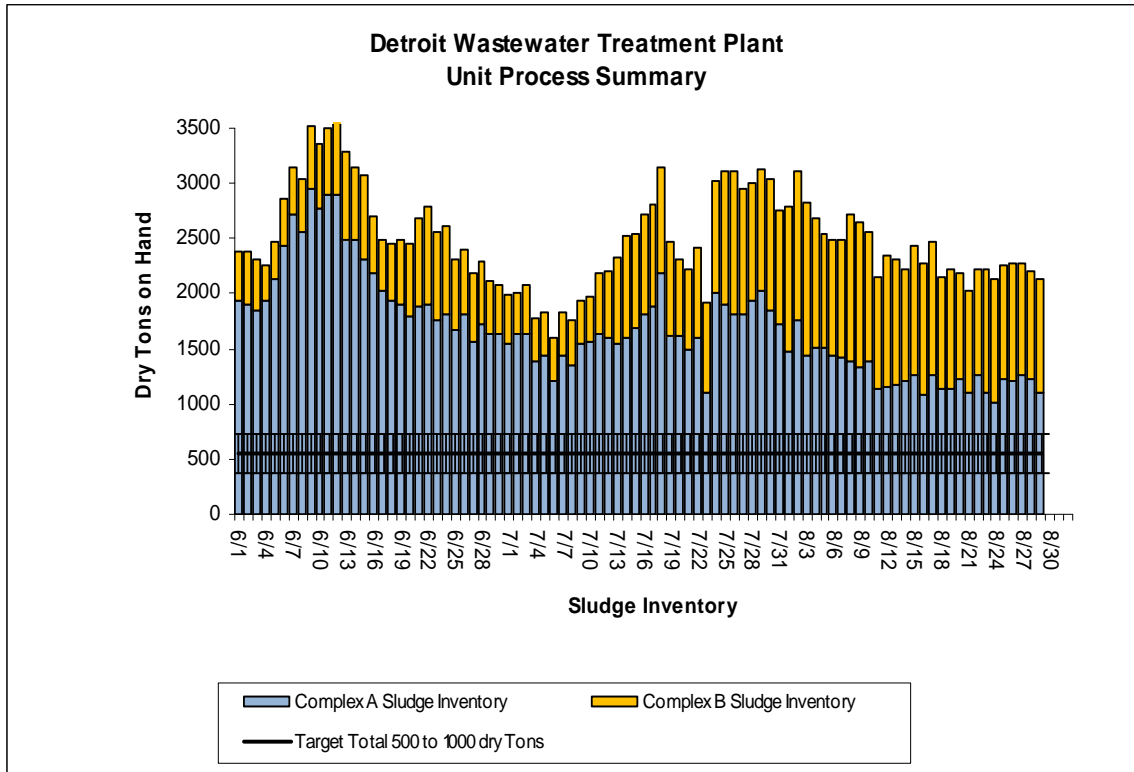
Conclusion

The City of Detroit and DWSD are determined to break the cycle of compliance/noncompliance experienced at the WWTP and institute permanent corrective measures to achieve its goal of long-term sustainable compliance.

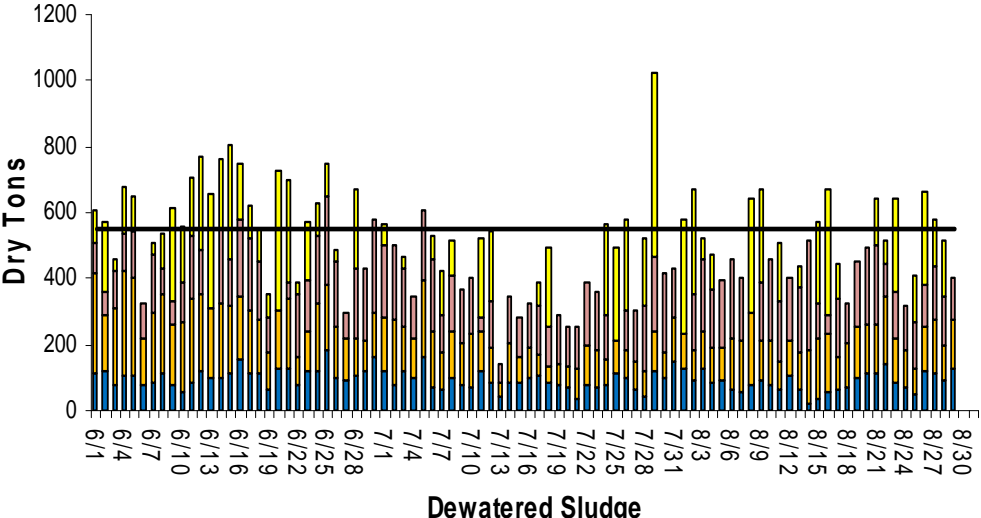
Success cannot be achieved through the reduction of the solids inventory or equipment repairs alone. The actions and timeframes identified within this Roadmap are intended to realize fundamental changes for the DWSD/WWTP and the City Departments it relies upon for support and services. Through the institution of the EECO and the creation and implementation of this Roadmap, Detroit will demonstrate that it is committed to an integrated and proactive strategy that indeed learns from the past so it is not repeated in the future.

Well aware of the challenges we face in the areas of long-term maintenance and the capital planning needs of the Dewatering and Disposal processes, Detroit sees these as opportunities to transform WWTP into one of the best and most sustainable treatment facilities in the world. Our Roadmap is designed to enable Detroit to arrive at this desired destination.

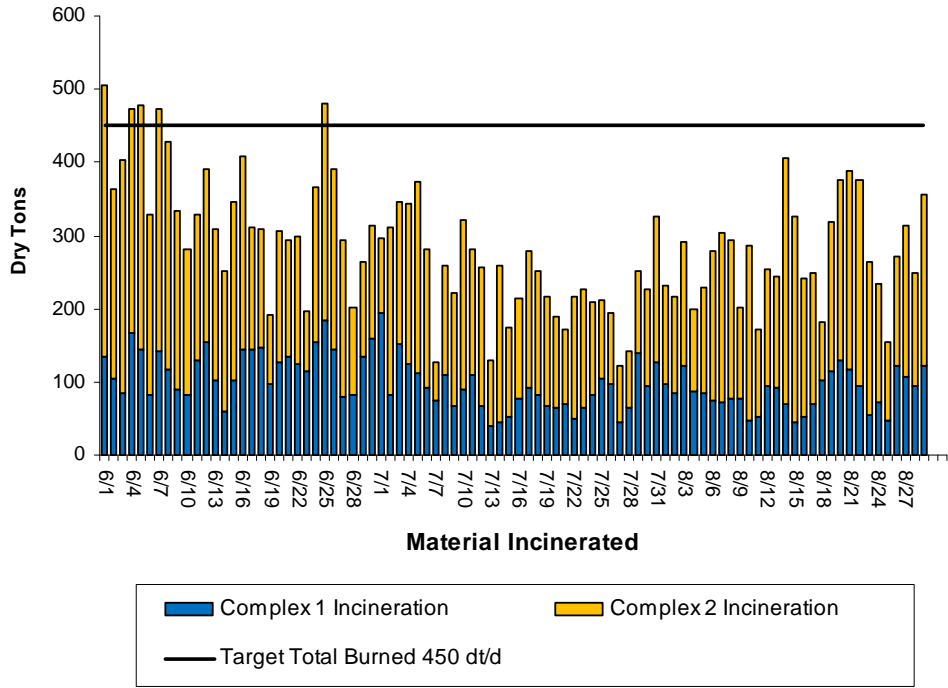
Appendix A



Detroit Wastewater Treatment Plant Unit Process Summary



**Detroit Wastewater Treatment Plant
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