



# **Metropolitan St. Louis Sewer District**

## **Review of the Capacity, Management, Operations, and Maintenance (CMOM) Program**

**Fiscal Year 2015**

**July, 2015**

**This report is intended solely for the use of The Metropolitan St. Louis Sewer District (“MSD”) and is not intended to be and should not be used by any other parties without the prior written consent of MSD.**

**The St. Louis Metropolitan Sewer District  
Review of the Capacity, Management, Operations,  
and Maintenance (CMOM) Program**

**July, 2015**

**Table of Contents**

Introduction and Scope ..... 1

Objectives and Methodology ..... 2

Overall Conclusion and Results ..... 3

Opportunities for Improvement ..... 4

Acknowledgements ..... 9

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## INTRODUCTION AND SCOPE

The Risk Assessment and Internal Audit Plan for Fiscal 2013 developed by MSD Internal Audit (IA) provides for the performance of an engagement to review the processes and related internal controls around the District's Capacity, Management, Operations, and Maintenance (CMOM) program. This report details and summarizes the execution and results of that engagement.

A Consent Decree between the United States of America, the Missouri Coalition for the Environment Foundation and Metropolitan St. Louis Sewer District ("MSD") in the matter of *The United States et al. v. The Metropolitan St. Louis Sewer District*, No. 4:07-CV-01120 (E.D. Mo.) was entered with an Effective Date of April 27, 2012. Pursuant to sections V.G.31, 32, and 33 of the Consent Decree (the Decree), MSD was required to submit a Capacity, Management, Operations, and Maintenance (CMOM) Program Plan. The formal submission of the CMOM Program Plan was submitted on October 27, 2012, within six months of the Consent Decree Effective Date of April 27, 2012, as required by the Decree.

The District's CMOM Program Plan is designed to minimize service interruptions such as building backups and non-capacity sanitary sewer overflows (SSOs) resulting from blocked sewers or lines with capacity limitations or infiltration/inflow (I&I). Understanding capacity, and appropriately managing, operating, and maintaining the collection system is a central objective of this program. The program incorporates preventive and predictive maintenance processes to properly maintain the wastewater collection system, ensuring compliance with the requirements of the Consent Decree and assisting in the effort to meet service-level goals established by Management.

The system consists of gravity sewers, pump stations, force mains, etc. MSD is the fourth largest sewer agency in the country based on sanitary and combined sewer system miles. The system addressed by CMOM consists of approximately 162,000 manholes, 271 sewer pump stations and approximately 6,226 miles of piping and 128 miles of force mains.

The current CMOM program was initially developed, documented and implemented during 2012. The procedures have continued to progress and mature in subsequent years. The program excludes storm water assets.

### Scope

The engagement was conducted during portions of February through June, 2015.

The scope of the engagement was comprised of a review of the various components of the District's CMOM program.

The process areas of focus were as follows:

- Inspection of Gravity Sewers
- Sewer Line Cleaning and Root Control
- Manhole Inspections and Repairs
- Repair, Rehabilitation, and Replacement (RRR)
- Standard Asset Management Procedures
- Pump Station Asset Management Standards and Procedures
- Force Main Asset Management Performance Standards and Procedures

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## OBJECTIVES AND METHODOLOGY

### Objectives

The overall objectives of this engagement were to ensure:

- Each CMOM-related requirement of the Consent Decree is completed, scheduled, or on track to be completed before the deadlines imposed in the Consent Decree.
- District CMOM procedures and controls are adequately designed:
  - Process risks are adequately mitigated.
  - No gaps in controls exist.
  - Duties are properly segregated.
  - Procedures are efficient. (i.e., there is no duplication of effort.)
- District CMOM procedures and controls are operating effectively:
  - Controls are implemented and operating as intended.
- The District is operating in a manner that complies with the CMOM requirements of the Consent Decree and the requirements of CMOM Program Plan document.

### Methodology

To accomplish the above objectives, Internal Audit (IA):

- Obtained a copy of the Consent Decree. IA reviewed and identified the specific requirements of the CMOM Program Plan, which are contained in sections G.31 through G.33 of the Decree.
- Obtained a copy of the District's CMOM Program Plan, which was submitted to the EPA in October of 2012. IA thoroughly reviewed the document in an effort to gain an adequate understanding of the District's program.
- Reconciled the District's program plan with the requirements contained in the Consent Decree. IA identified any Consent Decree CMOM requirements not adequately addressed by the District's program plan.
- Reviewed the design of each process and identified the risks and controls within each process. IA reviewed for process and control design deficiencies by:
  - reviewing the plan document, which includes process flows that document the various process steps and the related controls,
  - performing interviews of process owners to gain a better understanding of each process and control design, and
  - reviewing the setup, design, and operation of the CMMS (Computerized Maintenance Management System, a.k.a. Maximo).
- Performed tests of controls and substantive testing by:
  - making inquiries and performing interviews,
  - performing walkthrough procedures,
  - inspecting and reviewing supporting documentation, system screens, and system data, and
  - analyzing and testing system (CMMS, GIS) data.

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## OVERALL CONCLUSION AND RESULTS

In the opinion of Internal Audit, in all significant respects, the controls and procedures utilized for the CMOM program are effectively designed and implemented. However, IA did note matters that are opportunities for strengthening processes and improving the District's ability to comply with the requirements of the Consent Decree. These opportunities are discussed in detail in the *Opportunities for Improvement* section of this report.

### Initial Inherent Business Process Risk: Moderate Risk # Overall Assessment of Engagement Results: Satisfactory \*\*

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#### DEFINITIONS

##### How Results Are Assessed

\*\* Engagement results are evaluated as *Satisfactory*, *Generally Satisfactory* or *Unsatisfactory*.

- **Satisfactory** (*clean opinion*) – No significant engagement findings<sup>2</sup> or material weaknesses<sup>3</sup> were noted. Engagement findings<sup>1</sup> may have been noted.
- **Generally Satisfactory** (*qualified opinion, i.e. “except for”*) – Results contain significant engagement findings<sup>2</sup>. No material weaknesses<sup>3</sup> were noted.
- **Unsatisfactory** (*adverse opinion, immediate Management attention required*) – Significant engagement findings<sup>2</sup> and/or material weaknesses<sup>3</sup> were noted.

##### Types of Findings

1. Engagement Finding (#Low Risk): An engagement finding is a condition that could adversely affect the organization but is less severe than a significant engagement finding or significant deficiency. Classification includes process or control deficiencies that are not significant deficiencies as well as includes other low risk or low impact conditions.

2. Significant Engagement Finding (# Moderate to High Risk): A significant engagement finding is a condition that could adversely affect the organization. Definition includes all types of findings, such as irregularities, waste, ineffectiveness, conflicts of interest, illegal acts, errors, and significant deficiencies in internal control over financial reporting as well as other significant internal control weaknesses. A significant deficiency is defined as a deficiency, or a combination of deficiencies, in internal control over financial reporting that is less severe than a material weakness, yet important enough to merit attention by those charged with governance.

3. Material Weakness (# High Risk): A material weakness is a deficiency, or a combination of deficiencies, in internal control, such that there is a reasonable possibility that a material misstatement of the financial statements will not be prevented or detected and corrected in a timely basis. For internal audit purposes, the definition also includes material and/or severe irregularities, waste, ineffectiveness, conflicts of interest, illegal acts, errors, and other material control weaknesses, etc.

(The term “material weakness” should be thought of as a serious category of significant engagement findings and/or significant deficiencies. However, not all significant engagement findings and significant deficiencies are material weaknesses.)

^ - Definitions are based on guidance from the IIA Standards, GAAS, and the PCAOB.

# - Risk is assessed at the District (Entity) Level. (Risk to the District as a whole)

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## OPPORTUNITIES FOR IMPROVEMENT

### **Issue 1 – Training Program**

#### **Condition:**

IA noted a weakness in the District's training program as required by the Consent Decree (See sections V.G.31.e-i. of Consent Decree). Specifically:

- Training materials have not been updated and systematically maintained. Efforts to properly update and maintain the materials were initiated in June of 2014 and currently are ongoing.

#### **Recommendation:**

IA recommends that:

- Management continues the initiative to update the training materials and takes the steps necessary to establish a protocol that ensures all training materials are systematically maintained and updated in a timely manner.

**Risk Rating at District (Entity) Level: Low**

**Risk Rating at Business Process Level: Moderate**

#### **Process Owner Response:**

Training Material revisions for the Collection System Operator Training (CSOT) program began in June of 2014. The revisions include updates to procedures, computer system information (including Maximo) and safety practices.

The revision process includes extensive reviews, which includes accuracy reviews from Subject Matter Experts (SMEs) and ends with final approval from Yard Managers. After the training is updated and approved, annual reviews of program materials will be included in our Standard Operating Procedures (SOPs)

**Date of Implementation:** *March 31, 2016*

## OPPORTUNITIES FOR IMPROVEMENT

### Issue 2 – Force Mains: Ratings and Repair Kits

#### Condition:

IA noted the following regarding force mains:

- Sections 5.2, “Force Main Visual Inspections” and 5.3, “Force Main Non-Destructive Testing (NDT), of the CMOM Program Plan (Program Plan) require certain force main assets to be inspected or tested and assigned a condition rating.
  - In addition to inspection/testing and condition rating requirements, the Program Plan provides for the creation and completion of follow-up and corrective maintenance work orders for any force main appurtenances receiving a condition rating of ‘4’ or ‘5’ (rate 1 – 5). Actual force main (non-appurtenance) defects that result in a condition rating of ‘5’ are to be included in an expedited one-year repair process.

At this point (June, 2015), inspections have been performed but the assignments of the condition ratings have not been completed. Operations is working in conjunction with specific contractors to complete these procedures.

- Section 5.4, “Force Main Inspection Follow-Up Repairs”, of the Program Plan, requires the development of Force main Emergency Response Plans (ERP) and emergency repair kits. At this point (June, 2015), the ERPs and the related emergency repair kits have only been partially implemented.

#### Recommendation:

IA recommends that Management take the following steps:

- Continue to work in conjunction with designated contractors to rate the conditions of the various force mains, including related appurtenances such as air release valves, isolation valves, valve junction boxes, etc... Establish a timeline or completion date for this process.
- Continue to develop and implement the Emergency Response Plans (ERP) along with the pre-staged or pre-stocked emergency repair kits. Establish a timeline or completion date for this process.

**Risk Rating at District (Entity) Level: Low**

**Risk Rating at Business Process Level: Moderate**

## OPPORTUNITIES FOR IMPROVEMENT

### Issue 2 – Force Mains: Ratings and Repair Kits (Cont'd)

#### **Process Owner Response:**

For force main non-destructive testing, the Consent Decree and CMOM plan allow 3 years for all high risk and 6 years for all medium risk assets. Only certain types of force main non-destructive testing will lead to actual condition rating of only the high and medium risk force main assets. These ratings have not as yet been assigned but will be once standards based on testing results are developed for them.

A replacement program has also begun to standardize air relief valves to a model that is easier to maintain. Air release valves most in need of repair or replacement have already been addressed. However, ratings have not as yet been assigned to these and other appurtenances but will be. Development of specific emergency response plans for high and medium risk force mains will be continued.

**Date of Implementation:** *June 30, 2017 - all high risk force mains; June 30, 2019 - all medium risk force mains; June 30, 2016 - force main appurtenances; June 30, 2017 - emergency response plans and repair kits for all high risk force mains.*



## OPPORTUNITIES FOR IMPROVEMENT

### Issue 3 – Manhole Inspections and Follow-Up Work Orders

#### Condition:

Regarding manhole inspections and follow-up work orders, Sections 3.3.3, “Follow-Up Repair and Re-Inspection” and 3.4.1., “RRR Process Overview”, of the CMOM Program Plan (Program Plan) require that manholes receiving a rating of a ‘4’ or ‘5’ (rate 1 – 5) through the inspection process be addressed with a follow-up RRR (Repair, Rehabilitation, and Replacement) work order. Repairs performed through the RRR process are designed to bring the asset condition rating up to a minimum of ‘3’.

From reviewing and testing controls, IA noted the following:

- Because the inspection/assessment process could result in several different approaches to remediating identified issues, the process to generate the required follow-up work order is not automated. It is a purely manual process. Because of the manual nature of the process, an effective control or process mechanism needs to be in place to ensure that follow-up work orders are generated when manhole inspections result in a condition rating of ‘4’ or ‘5’. The system does issue engineering referral work orders to the yard engineers for manholes rated ‘5’ but not ‘4’. In addition, reports have been developed; however, the reports are not always reviewed and processed in a timely manner at established intervals.
- IA tested ten manhole assets with ratings ‘4’ or ‘5’. For one of the assets tested, a follow-up RRR work order was not issued as required.

#### Recommendation:

IA recommends the following:

- Management include manholes that receive a condition rating of a ‘4’ in the referral work order process and implement a process in which reports of manhole assets rated at ‘4’ and ‘5’ are reviewed and addressed in a timely manner at scheduled intervals to ensure follow-up RRR work orders are generated and attached to such assets.

**Risk Rating at District (Entity) Level: Low**

**Risk Rating at Business Process Level: Moderate**

#### **Process Owner Response:**

A report has been developed and sent out (and will be sent out quarterly) on manholes with condition rating 4 or 5 including those that do not have a follow-up work order and those which have older follow-up work not yet completed. Engineering referral work orders are currently being generated for yard engineers to ensure that appropriate repairs are being done on all 5 rated manholes. Manholes rated 4 will be added.

**Date of Implementation:** *July 30, 2015*

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## OPPORTUNITIES FOR IMPROVEMENT

### Issue 4 – Service Levels

#### Condition:

Section 2.2, “Service Levels and Assess Risk”, of the CMOM Program Plan (Program Plan) contains service level goals as follows.

1. *One Basement Backup per one thousand homes (customer accounts), annually, excluding greater than five-year rain events.*
2. **2.5 non-capacity related SSO’s per one hundred miles of sewer system pipe annually.**
3. *Emergency response within four hours at least 85% of the time for priority 9 building backup and manhole overflow calls, with the exception of greater than five year rain events or other extenuating circumstances.*
4. *96% compliance in completing gravity sewer cleaning and pump station preventive maintenance (PM) inspections.*

To account for “weather-driven” fluctuations from year to year, the service goals are measured and reviewed over a three-year period. IA noted that for service level goal number two above, the District, based on 2014 results, is trending in the direction of falling short of the Program Plan goal by more than 20%. Specifically, for 2014, the District fell short of the goal by 49%.

The Program Plan provides for a review of the results and the potential development of modifications to the Asset Management Performance Standards when goals are missed by predesignated percentages. For goal number two, that percentage is 20%.

#### Recommendation:

IA recommends that Management:

- Continue to monitor the performance metrics for the various service level goals.
- Begin considering and planning potential modifications to the Asset Management Performance Standards affecting the service levels for non-capacity related SSO’s (sanitary sewer overflow). Any modifications to Asset Management performance Standards would be implemented in an effort to improve results and meet the requirements of the service level goals.

**Risk Rating at District (Entity) Level: Low**

**Risk Rating at Business Process Level: Moderate**

#### **Process Owner Response:**

Operations has and will continue to make changes in its work in an effort to meet the service level goal of 2.5 non-capacity related SSO’s per hundred miles of sewers. The 2 major areas of emphasis to date are interceptor inspection and cleaning (not a CMOM performance standard), how we respond to force main breaks, and expediting replacement of aging force mains such as Caulks A.

**Date of Implementation:** *Completed (Ongoing process)*

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***MSD Internal Audit:***

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