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AECOM
500 West Jefferson Street
Suite 1800
Louisville, KY 40202
aecom.com

Project name:
MSD Odor Control Master Plan

Project ref:
60644274

To:
Robin Burch
MSD Project Manager
4522 Algonquin Parkway
Louisville, KY 40211

From:
Maria DeLuca

Reviewed by:
Alex Carciumaru
Amanda Foote
Janet Strickland

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Memo

Subject: Technical Memorandum #5- Current Morris Forman Water Quality Treatment Plant (WQTC), Pumping Station (PSs) and Combined Sewer System Odor Impact Evaluation

1. Introduction

During Phase 1 and Phase 2 of the Odor Control Master Plan (OCMP) Update, AECOM performed a detailed review and evaluation of documentation related to odor control and sampling within the Morris Forman Water Service Area. The background document review process was broken down into three (3) study areas and summarized in **Table 1-1**.

Table 1-1 Background Documentation Overview

Study Area		Background Document(s)
1	Morris Forman Water Quality Treatment Center (WQTC)	**TM #1-** Background Document Review **TM #4**- Process Modifications
2	Combined Sewer Collection System	**TM #2**- Collection System Background Document Review
3	Pumping Stations	**TM #3**- Pump Stations Background Document Review

The purpose of this memorandum is to consolidate the findings from the background document review process, develop a gap list of available documentation and establish a comprehensive list of potential odor sources within the study areas. For each potential odor source, available qualitative and quantitative data was used to characterize the current odor impact and to identify areas where additional documentation or sampling is required to fully understand the existing odor conditions.

2. Existing Odor Impact Evaluation

Major odorant sources were identified, and associated odor impacts were evaluated within the Morris Forman Service Area using the following process:

1) Potential odor sources at Morris Forman WQTC, the selected pumping stations, and within the collection system were compiled from previous reports (**TM#1**, **TM#2**, **TM#3**, and **TM#4**) into a comprehensive list.

2) Available sampling data was obtained from available reports and consolidated for the following parameters:
    - Average odor concentration (D/T)
    - Average hydrogen sulfide (H_2S) concentration
    - Average Reduced Sulfur Compound (RSC) concentrations – Carbonyl Sulfide (COS), Methyl Mercaptan (MM), Dimethyl Sulfide (DS)

3) Where applicable, qualitative odor observation descriptions were assigned to each potential odor source (refer to **TM#3**).

4) Information from Steps 1-3 was used to determine a relative “priority rating” for each potential odor source, which was used to represent the relative odor impact across the community. The priority ranking process involved a subjective analysis based on quantitative and qualitative factors including available sampling data and proximity to identified odor hot spots (refer to **TM#2**). Only the existing odor impact was considered in determining priority, regardless of whether the identified source will be impacted by future odor control improvements.

Findings from the existing odor impact evaluation are presented in summarized in **Table 2-1**. Note that these potential sources were identified based on previous sampling and planning reports dated from 2008 through 2020 and may not accurately represent existing conditions.

Table 2-1 : Morris Forman Service Area Odor Impact Evaluation

	Potential Odor Source	Odor Sampling Data	H_2S Data	RSC Data	Date(s) of Sampling	Planned Improvements ?	Odor Conditions Description (1)	Priority Rating (2)	Action Item(s)/ Notes
Morris Forman WQTC Process Areas									
1	Biological Odor Control System (Bioway) **(3)**	X	X	X	2008	Y	-	High	Re-evaluate priority following ongoing odor control improvements and performance testing
2	Solids Handling Odor Control System (Biorem) **(3)**	X	X	X	2008-2009	N	-	High	Working with equipment vendor to replace media
3	Regenerative Thermal Oxidizers (RTOs) **(3)**	X	X	-	H_2S 2001, Odor 2004	Y	-	Low	Re-evaluate priority following ongoing odor control improvements
4	Dissolved Air Floatation Thickening (DAFT) **(3)**	X	X	X	2008	N	-	Low	Re-evaluate priority following ongoing odor control improvements
5	West “Old” Headworks	X	X	X	2008	N	-	High	Re-evaluate priority using June 2021 sampling program results
6	East “New” Headworks	X	X	X	2008	N	-	High	Re-evaluate priority using June 2021 sampling program results
7	Aerated Influent Channel & Junction.	X	X	X	2020	Y	-	High	Ongoing design –will evaluate performance following construction completion
8	Aerated Grit Channels	X	X	X	2008	N	-	High	Ongoing design –will evaluate performance following construction completion
9	Sedimentation Basins (Primary Clarifiers)	X	X	X	2020	Y	-	High	Ongoing design –will evaluate performance following construction completion
10	Main Equipment Building Solids Exhaust	X	X	X	2008	Y	-	Low	Ongoing design –will evaluate performance following construction completion
11	Main Equipment Building Dryer Area Exhaust Fans	X	X	X	2008	Y		Moderate	Ongoing design –will evaluate performance following construction completion
12	Sludge Holding Tanks	-	X	-	2008-2009	N	-	Moderate	Re-evaluate priority following sludge dryer construction completion
13	Solids Receiving Tanks	-	X	-	2008-2009	N	-	N/A	Currently out of service
14	Digesters	X	X	X	2008	N	-	High	Re-evaluate priority using June 2021 sampling program results; Will be reconfigured following thermal-hydrolysis pre-treatment project
15	Bioroughing Towers	X	X	X	2008	N	-	N/A	Currently out of service
Collection System									
16	Ohio River Force Main	-	X	-	2018-2020	Y	-	Low	Oxygen injection odor control system currently in service
17	Ohio River Force Main Discharge Manhole	-	X	-	2018-2020	N	-	Low	Oxygen injection odor control system currently in service
18	Grand Avenue Force Main	-	X	-	2018-2020	N	-	Moderate	Recommend sampling at higher priority locations prior to sampling at this location
19	Ohio River Interceptor	-	X	-	2017	N	-	High	Evaluate using sampling program results for selected study areas (Shawnee, Chickasaw) – currently in RFQ process
20	Northwestern Interceptor	-	-	-	-	N	-	High	Evaluate using sampling program results for selected study areas (Shawnee, Chickasaw) – currently in RFQ process

	Potential Odor Source	Odor Sampling Data	H_2S Data	RSC Data	Date(s) of Sampling	Planned Improvements ?	Odor Conditions Description (1)	Priority Rating (2)	Action Item(s)/ Notes
21	Western Outfall	-	-	-	-	N	-	Moderate	Evaluate using sampling program results for selected study areas (California, Shawnee, Chickasaw) – currently in RFQ process
22	Southern Outfall	-	-	-	-	N	-	High	Evaluate using sampling program results for selected study areas (Park DuValle, Chickasaw) – currently in RFQ process
Pumping Stations									
23	Pump Station 5- Splitter Structure #1	-	X	X	2020	N	Moderate	High	Evaluate using MSD sampling results (ongoing)
24	Pump Station 5 Screen Room	-	-	-	-	N	Slight	High	Evaluate using MSD sampling results (ongoing)
25	Pump Station 1 Equalization Basin	-	-	-	-	N	Moderate	High	Evaluate using sampling program results at Pump Station 1– currently in RFQ process
26	Pump Station 1 High Rate Treatment Basin	-	-	-	-	N	Moderate	High	Evaluate using sampling program results at Pump Station 1– currently in RFQ process
27	Pump Station 1 Splitter Structure #2/ Grit Tanks	-	-	-	-	N	Moderate	High	Evaluate using sampling program results at Pump Station 1– currently in RFQ process
28	Pump Station 1 Dumpster Room	-	-	-	-	N	Moderate	Low	Evaluate using sampling program results at Pump Station 1– currently in RFQ process
29	Pump Station 2 Wet Wells	-	-	-	-	N	Slight	Low	Recommend sampling in Park DuValle neighborhood prior to sampling at this location
30	Pump Station 2 Dumpster Area	-	-	-	-	N	Moderate	Low	Recommend sampling in Park DuValle neighborhood prior to sampling at this location

H_2S= Hydrogen Sulfide
RSC= Reduced Sulfur Compound
COS= Carbonyl Sulfide
MM= Methyl Mercaptan
DS= Dimethyl Sulfide

Notes:
(1) AECOM performed a qualitative analysis of odor conditions at selected pumping stations in March 2021. Refer to **TM#3** for details.
(2) **Priority Rating** based on subjective analysis of available odor concentration (D/T), H_2S, RSC concentration data, and proximity to customer odor complaints.
(3) Outlet Concentration Data was used to determine odor emissions following odor control system treatment.

3. Conclusions and Recommendations

3.1 Conclusions

A detailed evaluation was performed to understand current odor impacts from potential odor sources within the OCMP Study Areas based on the available information and documentation. The odor impact to the surrounding communities will need to be validated by a dispersion model using updated results from sampling programs and documentation on modifications to the odor treatment systems. The findings from this report will be used to identify major odor sources which will be targeted for odor control improvements in the OCMP Update.

Table 3-1provides a summary of the three (3) priority groups and associated odor sources based on available documentation.

Table 3-1 OCMP Priority List

Priority Group	Potential Odor Sources
High / Tier I	Morris Forman WQTC
	• BOCs (Bioway) • SHOC (Biorem) • West “Old” Headworks • East “New” Headworks • Aerated Influent Channel & Junction • Sedimentation Basins (Primary Clarifiers) • Digesters
	Collection System
	• Ohio River Interceptor • Northwestern Interceptor • Southern Outfall
	Pumping Stations
	• Pump Station 5- Splitter Structure #1 • Pump Station 5 Screen Room • Pump Station 1 Equalization Basin • Pump Station 1 HRTB • Pump Station 1 Splitter Structure #2/ Grit Tanks
Moderate / Tier II	Morris Forman WQTC
	• MEB Dryer Area Exhaust Fans • Sludge Holding Tanks
	Collection System
	• Grand Avenue FM • Western Outfall
Low / Tier III	Morris Forman WQTC
	• RTOs • DAFT • MEB Solids Exhaust

Priority Group	Potential Odor Sources
	Collection System
	• ORFM • ORFM Discharge Manhole
	Pumping Stations
	• Pump Station 1 Dumpster Room • Pump Station 2 Wet Wells • Pump Station 2 Dumpster Area

3.2 Recommendations

Potential odor sources which have been assigned high priority, or Tier I, should be considered critical areas for odor impact reduction as part of the Odor Control Master Plan Update. Tier II and Tier III sources will also be evaluated for additional odor reduction. This approach will allow MSD to maximize capital investment efforts by focusing on areas which will result in significant potential odor reduction across the impacted community.

For several potential odor sources, further action is required to understand current odor conditions. These action items are summarized as follows:

1. **Morris Forman WQTC:** Re-evaluate priority rankings for impacted Morris Forman WQTC process areas following ongoing sampling program results and ongoing odor control improvements currently being performed as part of the Rehabilitation and Replacement of Primary Sedimentation Basins (Contract No. 1646), Dryer Replacement Project (Contract No 16453) and thermal-hydrolysis pre-treatment project at the Digesters.
2. **Collection System**: Evaluate current odor conditions using sampling program results for selected study areas (California, Shawnee, Chickasaw, Park DuValle).
3. **Pump Stations**: Evaluate current odor conditions using ongoing sampling program results at Pump Station 5 and Pump Station 1.

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