CERTIFIED MAIL NO. 7013 2630 0000 9994 0173
RETURN RECEIPT REQUESTED

April 25, 2016

Water Quality Submittals Center
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155-4194

Subject: ***Combined Sewer Bypasses and Overflows: Annual Report - 2015***
Metropolitan Council/City of Minneapolis Combined Sewer Overflow (CSO)
NPDES/SDS Permit No. MN0046744

To Whom It May Concern:

As required by Part II.A.3 of the above-referenced permit, enclosed is the Annual Report on the Combined Sewer System in Minneapolis.

Should you have any questions, please feel free to contact Ms. Mary Gail Scott, Environmental Compliance Manager, at (651) 602-1073.

Sincerely,

Leisa Thompson
General Manager

LT/tg

Enclosure

cc: FILE (Interceptors Submittal)
Lisa Cerney, City of Minneapolis
Kelly Moriarty, City of Minneapolis
Tim Keegan

2015 Annual Report

Combined Sewer System in Minneapolis

April, 2016

METROPOLITAN COUNCIL

Table of Contents

Section I. Summary

A. *Purpose of Report*

The purpose of this report is to meet the requirements of Part II.A.3 of the National Pollutant Discharge Elimination System/State Disposal System (NPDES/SDS) Permits issued to the City of Minneapolis, and Metropolitan Council, (Permit No. MN0046744).

The report contains information regarding permit administration, regulator monitoring results, maintenance of the regulators, outfalls, and combined sewers, improvements to the interceptor system, optimization of combined sewer overflow control, city sewer separation programs, rain leader elimination programs, progress in meeting other permit requirements, and a summary of special problems encountered during this reporting year. The report is intended to consolidate the activities of each of the joint Permittees.

B. *NPDES/SDS Permits*

The Combined Sewer Overflow (CSO) NPDES/SDS Permits MN0046744 and MN0025470 were reissued on February 26, 1997; these permits expired on June 30, 2001. Applications for reissuance of the permits were submitted on December 28, 2000 and to date have not been acted on by the Minnesota Pollution Control Agency (MPCA). MN0025470 was terminated in October, 2014 at the request of both the City of St. Paul and the Metropolitan Council.

C. *Metropolitan Council Environmental Services*

Metropolitan Council Environmental Services (MCES) monitored seven regulators in Minneapolis during this year. Additionally, MCES continued with previously required interceptor and regulator maintenance functions during 2015. Overflow duration and volume at the regulators and overflow sites, as well as the interceptor and regulator maintenance activities, are reported monthly and summarized herein. Substantial efforts have been made to rehabilitate the Interceptor System in Minneapolis during 2015 thereby reducing I/I intrusion into the system, maximizing conveyance capacity and reliability.

D. *City of Minneapolis*

See Section III of this Report for the complete portion detailing the Combined Sewer Overflow (CSO) Program in the City of Minneapolis.

Section II. Metropolitan Council Environmental Services Activities and Progress

A. *Operational Plan*

General operation of the Combined Sewer System is described in the operational plan, which was approved by the MPCA on May 11, 1987. An amendment to the plan was submitted to MPCA in April 1991. A second amendment to the plan was submitted to MPCA on May 11, 2004. This Plan remains in effect under the continuing NPDES/SDS permits.

B. *Regulators Eliminated in 2015*

No regulator was eliminated in 2015, but work was initiated on regulators R06, Northwest Meters, R10 Southwest Meters and R12 East Meters. The work being done will eliminate the passive overflows and replace with gates that must be opened for an overflow to the river to occur.

C. *Monitoring Summary*

All regulators in Minneapolis are monitored continuously by means of level sensing systems and are visually inspected during rain seasons and after every 0.2" rainfall event. Given the performance of the collection system and these regulator sites over the past several years it is the intention of the MCES to reduce the inspection intervals to once per month March through November and after every 0.26" rainfall event. A list of the monitored sites is provided below:

Minneapolis

1. R04 (1-37) Minnehaha Parkway & 39th Ave. S.
2. R06 (5-34) Northwest Meters
3. R07 (20-17) Portland Ave. S. & Washington Ave
4. R08 (7-33) E. 26th & Seabury
5. R10 (4-34) Southwest Meters
6. R12 (6-48) East Meters
7. R14 (2-35) East 38th St. & 26th Ave.

Telemetry systems at the remotely monitored regulators send the level signal to a computer system located at the MCES Regional Maintenance Facility (RMF) in Eagan. Data is stored, collected, and analyzed at RMF to compute overflow duration and volume for each event. Estimated overflow volume is computed using hydraulic formulas applicable to the geometry of each regulator. Monthly regulator reports have been submitted to the MPCA in accordance with Part I.C.1 of the Minneapolis CSO permit.

Caution is advised regarding use of the flow data. The instrumentation and weir configurations at the monitored sites are hydraulically unsuitable for highly accurate flow measurement; the error at any site may therefore be in the magnitude of 10% to 15%. Reported volumes are approximate calculations.

Ten (10) recording-type rain gauges are operated in the area tributary to the respective regulators. Rainfall data from these sites are telemetered to the computer system at RMF.

D. *Maintenance Program*

Each NPDES/SDS permit requires routine inspection of regulators and/or outfalls. Attachment A to each permit specifies inspection frequency and responsible party (MCES or City). Inspection frequency for the regulators and/or outfalls is based on a combination of factors including overflow volume, overflow frequency, and maintenance history.

Every MCES regulator is inspected after each 0.2-inch rainfall event but not less every other month: inspections made during 2015 are indicated in Table 1, below. During each inspection, the level-sensing instrument in the monitored regulators is inspected. Repairs and/or removal of obstructions are completed as needed.

Table 1. Inspections Completed in 2015

January	February	March	April	May	June
1/9/2015	2/5/2015	3/4/2015	4/2/2015	5/4/2015	6/4/2015
1/23/2015	2/13/2015	3/27/2015	4/10/2015	5/11/2015	6/8/2015
			4/13/2015	5/15/2015	6/12/2015
				5/26/2015	6/23/2015
July	**August**	**September**	**October**	**November**	**December**
7/6/2015	8/17/2015	9/8/2015		11/6/2015	
7/13/2015	8/19/2015	9/17/2015			
7/20/2015	8/25/2015				
7/29/2015					

E. *Inflow/Infiltration(I/I) Surcharge Program*

The Metropolitan Council has established I/I goals for all communities discharging wastewater to the Metropolitan Disposal System (MDS) based on the design peak-hour capacity of the interceptor(s) serving the community. Communities that have excessive I/I in their sanitary sewer systems are required to eliminate the excessive I/I within a reasonable time period.

Since June of 2004, each community that experienced flow rates in excess of its maximum allowable rate in any of its metersheds has received a surcharge payable to MCES under this program. The communities had the option to commit to I/I reduction programs and expend funds, equal to or greater than the amount of the surcharge they were assigned. All

communities deemed to have excessive I/I chose to commit to perform I/I reduction in lieu of paying MCES.

F. Capital Improvements and Studies

A number of capital improvements and studies were completed during 2013 - 2015 or are currently underway to reduce CSO overflows, as described in this section and the following 'Minneapolis Capital Projects' map and project listing.

(1) Construction was completed on the R20 Regulator and R05 Regulator in 2014, effectively closing them.

(2) Construction was completed on the 3rd and Commercial (R02) regulator in 2013. The work of this project consists of installing new sluice gates, electrical equipment, a standby generator and restoration of concrete surfaces. The R02 overflow weir was closed in 2014. Improvements, similar to the R02 2013 work, are now in construction for regulators R06, R10 and R12 and are projected to be completed by approximately December 2016. Design on the R04 regulator improvements is being re-evaluated in order to protect groundwater resources that feed federally protected Camp Coldwater Springs. This work and upcoming regulator work includes improvements to allow facilities to function effectively as CSO regulators in the near term and as emergency bypass locations in the long term.

(3) Numerous rehabilitation projects involving cured-in-place pipe (CIPP), slip-lining, and manhole rehabilitation were planned, designed, or constructed to reduce Inflow/Infiltration and assure structural reliability.

a. Improvements to south Minneapolis interceptors 1-MN-344 including manhole rehabilitation, pipe replacement and CIPP lining were completed in 2015. Work on additional portions of 1-MN-344 will occur in 2016 (under 807628).

b. Also, improvements are in design for CIPP lining portions of 1-MN-320 in Bassetts Creek Valley Park just west of Penn Avenue N. This will include MH 44 through MH 50. Construction will occur in 2017 under Project 807635.

(4) Inspections of deep tunnels in Minneapolis utilizing closed circuit television and sophisticated analysis equipment was performed on 1-MN-300, 1-MN-310,1-MN-340, 1-MN-344, Minneapolis East Interceptor (MEI) tunnel, 1-SP-250 and the Joint Interceptor 1-MS-100 to identify I/I and structural issues. This effort was completed in 2014. Improving access and cleaning stretches of these deep sewers is currently in design with construction in 2017. This will include the following:

a. 1-MN-300 MH 10 to MEI Site 18, shaft 3 to drill hole 2, and upstream of the Eustis St. shaft.
b. 1-MN-310 shaft 7 REM to shaft 4 and upstream of shaft B.
c. 1-SP-250 wye 2 to drop shaft 2, MH 8 to MH 8A, downstream of MH 4 and downstream of MH 3.
d. 1-MN-320 Lyndale to MH 11A and MH 6 to MH 8.
e. Also, some areas of 1-MS-100 and 1-MN-340.

(5) Facility Planning for an interconnect between 1-MN-310/320 on the west side of the river and MEI on the east side was initiated, is currently on hold due to competing priorities. Future construction of

this facility would allow further optimization of conveyance capacity, reliability and allow future rehabilitation of 1-MN-310 and 1-MN-320.

G. 2015 Regulator Performance

Last year there were zero overflows to the river recorded from the seven monitored regulator sites. By comparison, in 1984 at the start of the separation program there were 18 monitored regulator sites, which recorded 77 overflow events and over 1 billion gallons of overflow. An average of 0.25 overflow events from telemetered sites have occurred per year over the last eight years; however, zero overflow events occurred in 2008, 2009, 2011 and 2012, 2013, 2014, 2015. The two overflow events which occurred in 2010 resulted from abnormal conditions associated with storm tunnel breaches allowing storm water to directly enter the sanitary system. These have been corrected.

Based on system performance, maintenance and capital improvements, CSO outfall status has been updated, as shown in Table 2, below.

Table 2. Proposed Regulator Removal Schedule

NPDES Outfall No.	Regulator Code	MCES No.	Name and/or Location	Removal Status
Minneapolis Regulators				
001	1-37	R04	**Minnehaha Tunnel Outfall** Minnehaha Pkwy. & 39th Ave S.	B
002	2-35	R14	**East 38th St. Outfall** East 38th St. & 26th Ave. S.	A
004	4-34	R10	**Southwest Interceptor Outfall** Southwest Meters Diversion	B
005	5-34	R06	**Northwest Interceptor Outfall** Northwest Meters Diversion	B
006	6-48	R12	**Eastside Interceptor Outfall** East Meters Diversion	B
007	7-33	R08	**East 26th St. Outfall** East 26th St. & Seabury Ave.	A, C
020	2-17	R07	**Chicago Ave. S. & N. Mpls Tunnel Outfall** Portland Ave. S. & Washington	B
012	12-28b*	R20	**Oak St. Southeast Outfall** Oak St. & 5th St. SE	Closed in 2014

***Replaced Original 12-28BRemoval Status for Combined Sewer Overflow Regulators: A: Monitoring is required before elimination can be scheduled. B: Additional monitoring is required; may be necessary to remain as an emergency outfall. C: R08, originally scheduled for closure in 2014 but because of some uncertainty it has been decided to continue monitoring R08 prior to closing**

Section III. City of Minneapolis Activities and Progress

Minneapolis
City of Lakes

ANNUAL REPORT ON 2016 MINNEAPOLIS COMBINED SEWER OVERFLOW PROGRAM & 2015 ACTIVITIES

MARCH 28, 2016

I hereby certify that this plan, specification, or report, was prepared by me or under my direct Supervision and that I am a duly Registered Professional Engineer under the laws of the State of Minnesota.

Lisa K. Cerney

Lisa K. Cerney, PE

Minneapolis Public Works, Surface Water & Sewers
Registration No. 42688

NPDES/SDS Combined Sewer Overflow Permit

The 1972 amendments to the Federal Water Pollution Control Act (also known as the Clean Water Act) provided the statutory basis for the National Pollutant Discharge Elimination System (NPDES) permit program. The NPDES program is designed to regulate the discharge of pollutants from point sources to waters of the United States. The Minnesota Pollution Control Agency (MPCA) has issued joint NPDES Combined Sewer Overflow (CSO) permits to the City of Minneapolis (City) and Metropolitan Council Environmental Services (MCES) since 1985.

These permits regulate CSOs by defining certain conditions that should be followed if an overflow event from the sanitary system occur, including:

- Keeping detailed records of the number of CSO events
- Maintaining overflow volume data
- Maintaining operation and maintenance data for overflow events and elimination efforts
- Cooperation of joint permittees

A separate inter-agency agreement between the City and MCES details each permittee's responsibilities with respect to operation of the collection system, and notification in the event of a CSO from the sanitary sewer system. The most recent CSO permit was issued on February 26, 1997 and expired on June 30, 2001 (Permit MN 0046744). The City and MCES applied to renew this permit in December of 2000, and began negotiating with the MPCA regarding the terms for a new permit. The City has continued to operate under the expired permit requirements, and has developed a plan to control CSOs, including an aggressive approach to eliminate connected drainage areas and appropriate operation and maintenance of the system(s).

Sewer Separation History in Minneapolis

The oldest Minneapolis sewers were built in 1870, and were designed to carry both sewage and stormwater. In 1922, construction started for a separate storm drain system around Minneapolis lakes, as well as newly developing areas. Older areas continued to be served by combined sewers. Sewer separation began in earnest in the 1960s, in conjunction with a citywide paving program.

In 1986, the City began an accelerated sewer separation program called *Minneapolis Combined Sewer Overflow Program - Phase I*. CSOs were greatly reduced by Phase I efforts. Phase I included the construction of storm infrastructure to disconnect stormwater runoff from 4,600 acres tributary to the sanitary sewer system. The Phase I program was supported in part by federal and state funds.

The Minneapolis Combined Sewer Overflow Program – Phase II was developed in 2002, based on a 1999/2000 comprehensive planning process and an April 2002 Brown & Caldwell study entitled *Combined Sewer Separation Evaluation*. The study identified inflow, rather than infiltration, as the major contributor to CSOs. The 2002 study recommended that Minneapolis:

- Disconnect public sector inflow sources: isolated catch basins (storm drain inlets), alley drains, and storm drains
- Disconnect private sector inflow sources: rainleader connections, area drains, or other clean water discharges
- Study and implement storage and conveyance improvements

CSO Program - Current Status and Progress

The City of Minneapolis system is a combined system due to the known inflow at catch basin and roof leader connections, and unknown sources of Inflow and Infiltration (I & I). Progress has been made, but separation is not complete (see Figures 1 and 2).

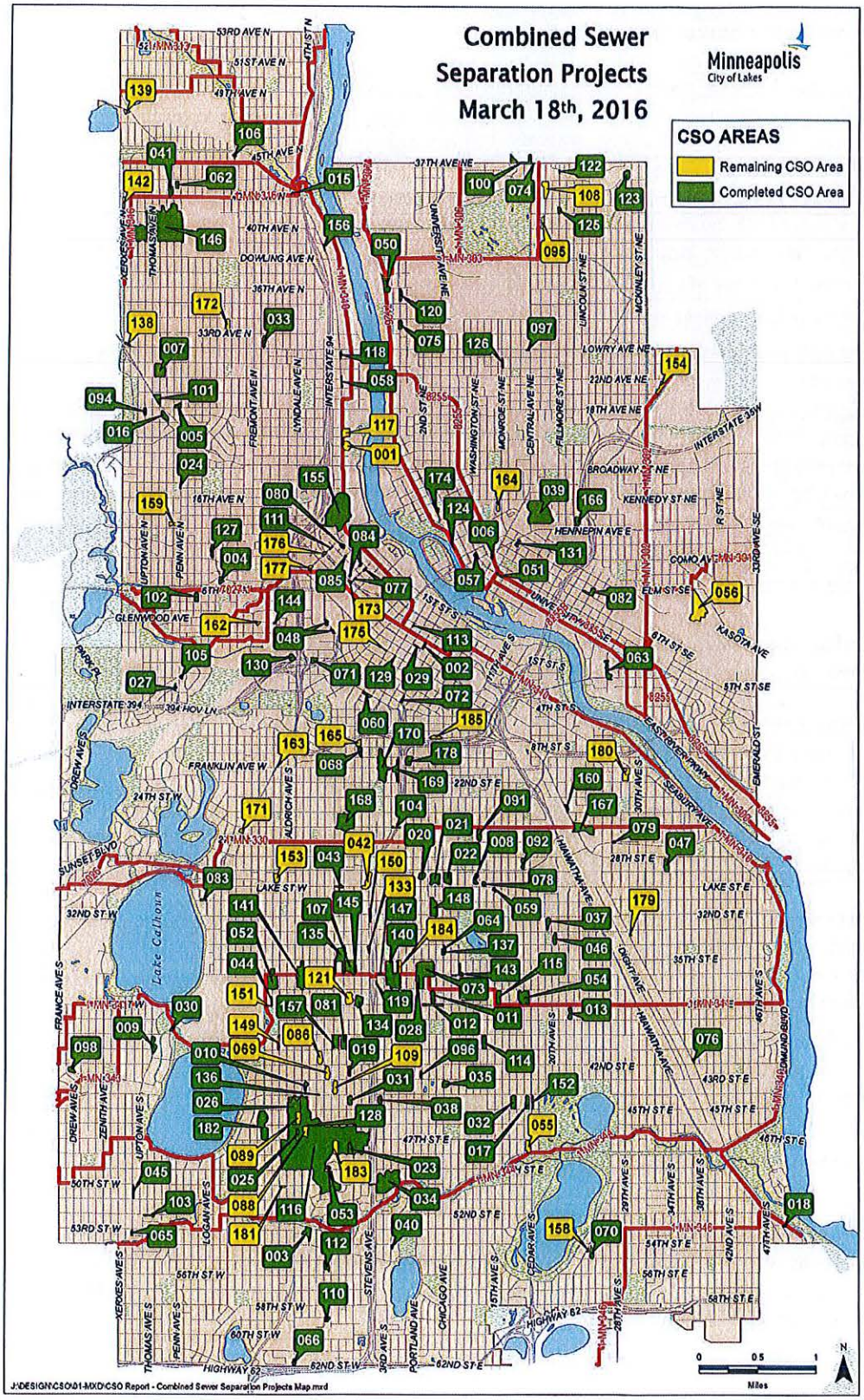

Figure 1 - **Combined Sewer Separation Projects**

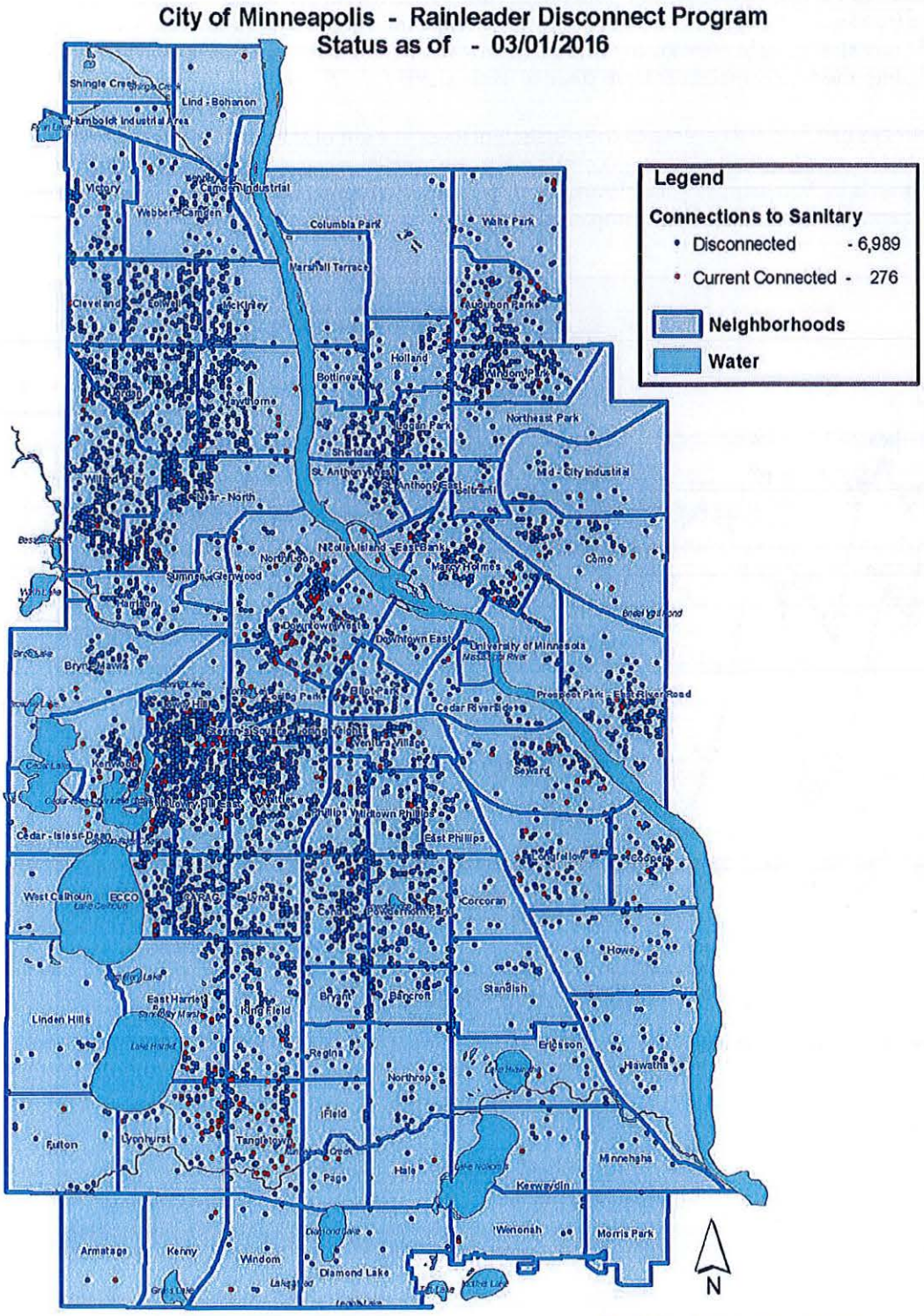

Figure 2 – Rainleader Disconnection Program Status

Progress has been dramatic throughout both Phase I and Phase II as upgrades to the system have been carried out (see Figure 3). Figure 3 indicates a very high percent capture since 1984. Frequency and volume of untreated sewage overflowing into the stormwater system during intense rainstorms and discharging into the Mississippi River have steadily diminished.

Minneapolis has had zero CSO events to the Mississippi River in eight of the past nine years (two very small events occurred in 2010). Although combined sewer overflows can still occur, many years of dedicated efforts by Minneapolis Public Works staff have resulted in fewer CSO events. The remaining separations are the most difficult and complex to resolve.

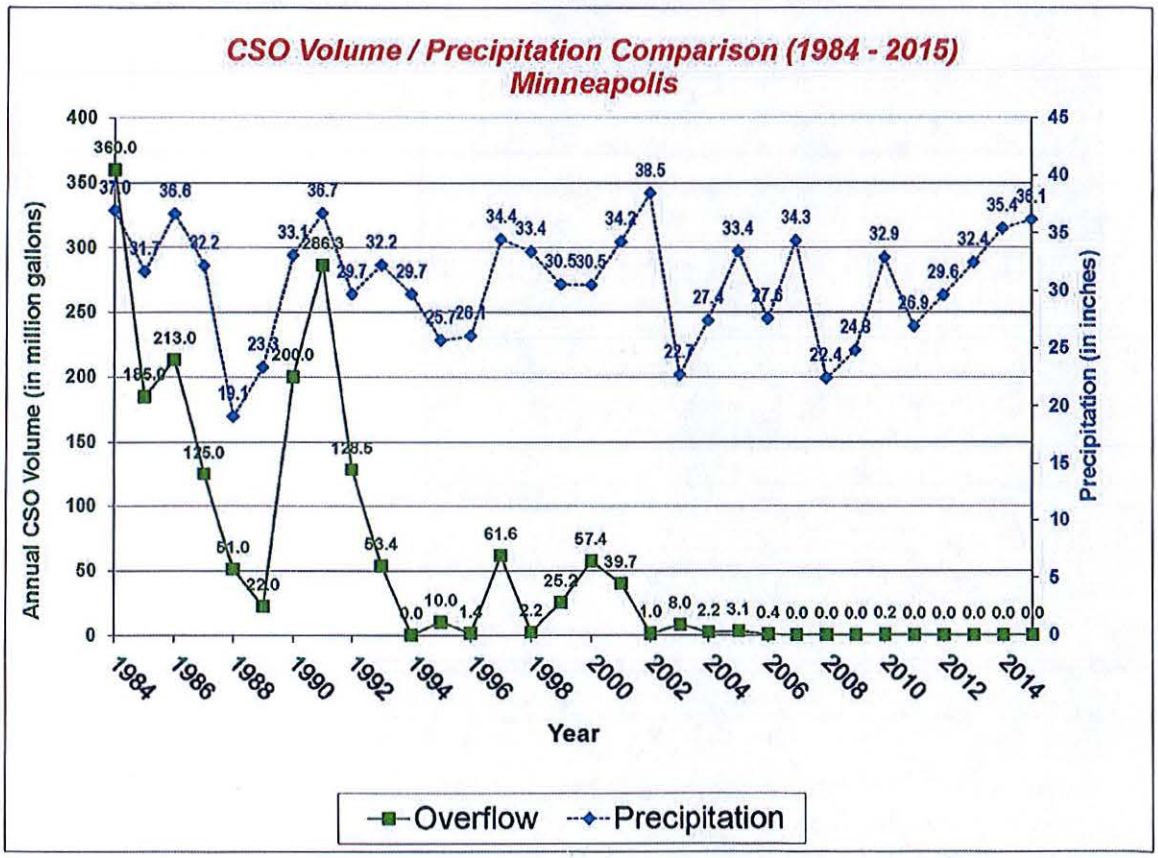

Figure 3 - Annual CSO Volume Precipitation

The following table shows information about the seven regulators remaining in Minneapolis:

Regulator Site Location	Regulator Number	Responsible Party
39th Av S & Minnehaha Parkway	M001	MCES
38th St E & 26th Av S	M002	MCES
Southwest Meters	M004	MCES
Northwest Meters	M005	MCES
East Meters	M006	MCES
26th St E & Seabury Av	M007	MCES
Portland Av & Washington Av S	M020	MCES

Table 1 - CSO Regulators

The elimination of overflow structures may not be feasible in every case without causing a public health or safety hazard. Some overflow regulators may need to remain operational for emergency relief necessitated by extreme storm or flood events, or to minimize damage due to accidents or system failures.

Since its inception in 2002, Minneapolis Combined Sewer Overflow Program, Phase II, Surface Water & Sewers Division personnel have identified, categorized, and prioritized 185 "CSO areas", meaning areas in the right-of-way with a known connection of stormwater drainage to the sanitary sewer system. CSO projects are then programmed to separate these areas. Occasionally, new CSO areas are discovered by City staff. This information is a result of:

- Private sewer and water connection reviews (for possible combined connections) that are done prior to issuing any new/repair permits
- Utility and plumbing inspectors' identification of CSO areas as part of their current activities
- Continued education of City staff on the importance of identifying and disconnecting CSO areas
- Flow metering and smoke testing programs

Completed CSO Projects (public separation work)

PROJECT NAME	PROJECT LOCATION	ACRES
CSO160	Minnehaha Ave & 25th St E	0.9
CSO174	Main St NE & 7th Ave NE	1.26
CSO007	Sheridan Ave N & 29th Ave N	6.8
CSO182	46th St W & Dupont Ave S	10.27
	Total Drainage Area Removed in 2015	19.23

Table 2- Completed CSO Separation Projects

Minneapolis initiated a targeted metering program in 2008. One of the goals of this investigation is to identify sources of unknown Inflow and Infiltration (I & I). The 2015 target metering program included the following components:

- Flow metering installation – 54 sites
- Smoke testing - 92 miles of smoke testing was completed in 2015. Since 2007 446 miles have been tested.
- CSO Investigations – Potential connections between the storm and sanitary sewer system are identified from record drawings as the City reviews and updates the GIS database. 33 CSO investigations were completed in 2015.
- I&I Repairs – repairs to sewers manholes and bulkheads were identified from smoke testing and CSO investigation. 125 I&I repairs were completed in 2015.

The unknown sources of inflow have an effect on the system demonstrated by the following meter data in Figure 4. This metering data reveals an immediate reaction of increased flow in the sanitary system after a rainfall event. This meter is located on the City's system in Minneapolis on 15th Ave S and 37th St E. This is representative of inflow in a sewer shed located in South Minneapolis.

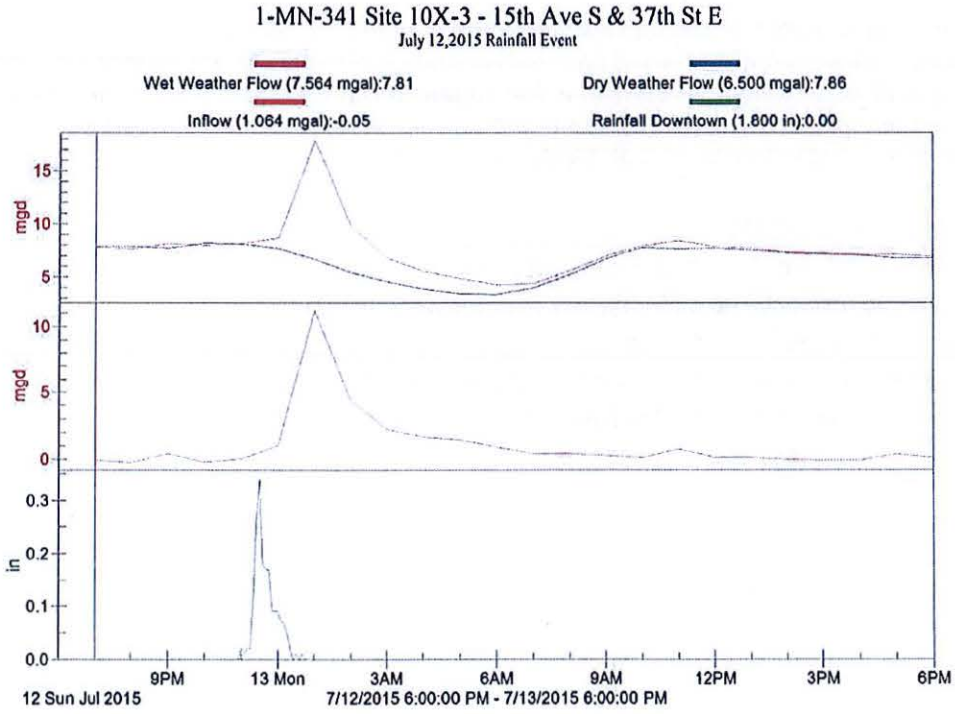

Figure 4 - Flow Metering Data

Additional CSO Program Activities

These activities directly or indirectly benefit the elimination of CSOs:

Sanitary Sewer Collection System

The sanitary sewer system within the City of Minneapolis is 852 miles in length. Of those, 777.2 miles of sewers are owned and maintained by the City, while 74.8 miles are owned and maintained by MCES.

The Sewer Operations section routinely inspects sanitary infrastructure, and performs needed maintenance to ensure proper operation. Staff has divided the City into 100 areas for their sewer main cleaning program. This program is significant to the CSO program because it uncovers and reveals inflow and infiltration (I & I). Sewer mains are cleaned by many different methods, which include jetting, discing and rodding. Annual records are kept that describe the condition, as well as the cleaning that was done for that year. City staff also utilizes GIS to create maps to better track progress.

Each year, sanitary sewers are selected for cleaning on the basis of past experience, pipe size and location in relation to flood-prone areas and poor soil conditions. Some mains are cleaned annually, but occasionally additional cleanings are needed. The 10 sanitary lift stations in the City are cleaned each spring, and then checked on a regular basis to determine if additional cleaning is needed. In addition to cleaning, maintenance in 2015 also included:

- 5 major sanitary sewer repairs
- 6.3 miles of sanitary sewer lined with a cured-in-place
- 229 (requested by residents) possible sanitary backups were inspected.
- 36 minor sanitary repairs were addressed
- 40.1 miles of sanitary sewer were jetted with high pressure forced water
- 16 miles of sanitary sewer were rodded (cleaned)
- 35 miles of sanitary sewer were televised

Storm Drain Collection System

Minneapolis Sewer Operations section routinely inspects storm drain infrastructure, and performs needed maintenance to ensure proper operation. Inspection and maintenance frequency are event-driven, based on experience and inspection results history.

There are currently 145 grit chambers in Minneapolis that are inspected, cleaned and maintained. These grit chambers help to prevent sediment, debris and oil from entering area lakes, rivers and streams. Grit chambers inspection is based on a schedule by Minneapolis Sewer Operation personnel, and cleaned if necessary. Sediment is removed, the presence of floatables is noted, and the grit chamber cleaning dates are logged recorded in a database.

Storm drain outfalls are inspected on a five-year schedule, generating information on:

- Condition of structures
- Significant erosion
- Any necessary repairs

Grit chamber maintenance and repairs are planned within the constraints of resources and budget, as well as the schedules of other operations. Ponds and pump stations are inspected after significant rainfall events; however, other events might require a maintenance response.

Catch basins are cleaned, removing accumulated sediment, trash and debris. This prevents pollution of receiving waters and minimizes flooding problems. Employees from the Public Works division of Street Maintenance section performs annual inspections, during which they clean catch basin grates on summer street sweeping routes, removing debris and sediment from blocked structures.

Statistics from the 2015 Storm Drain Maintenance program include:

- No major repairs to the storm drain system
- Performed 326 minor repairs to storm drain lines, catch basins or manholes
- Responded to 160 plugged catch basins complaints
- Televised and condition assessed 100 miles of storm drain pipe
- Inspected 131 and cleaned 121 grit chambers. A total of 506 cubic yards was removed from the grit chambers.
- Maintained 11 stormwater holding ponds
- Inspected 85 of 387 known storm drain outfalls. Monitored and maintained 26 pump stations
- 2.21 miles of storm drain were jetted with high pressure forced water

System Challenges

The City of Minneapolis has separated a significant amount of clear water out of the sanitary sewer system and is moving it to the stormwater system. The remaining sources of inflow pose both technical and financial challenges. The receiving stormwater system is at or above capacity in many locations, creating structural and operational risks with the infrastructure. Much of the receiving storm system discharges into storm tunnels. During heavy rain events, pressurization occurs, creating various problems that affect the integrity of the storm tunnels. These problems include fracturing of the tunnel liner, which in turn creates voids in the sandstone surrounding the tunnel. Some of the storm tunnel system needs a significant amount of maintenance and rehabilitation prior to adding additional stormwater. The City has identified priority needs in the storm tunnel system and is working actively to address structural deficiencies. In addition, there are discussions to identify funding sources to assist with the design and construction of a parallel I-35W South tunnel to provide the necessary capacity in that tunnel system.

There are also known areas with localized flooding. Moving additional clear water to a system that is causing the flooding exacerbates the problem. In these situations, we cannot just separate the clear water, but must also respond to the risk of property damage.

In some instances, removing additional clear water and routing instead to the storm drain system is met by additional challenges from watershed organization rules or impaired water status.
Operating and maintenance costs are also increasing as a result of sedimentation occurring in the pipes due to inadequate velocities in the combined pipe system. The sedimentation is also causing methane gas build up and increased corrosiveness in the system.

Future Improvements

The City of Minneapolis will continue to make further reasonable progress maintaining and rehabilitating the combined sewer system and the storm sewer system, and increase the performance of those systems keeping in mind the goal of being the highest performing CSO system.