City of Memphis

Annual Report
October 1, 2015 through September 30, 2016

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering such information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Bobby D. Allen, P.E.

Date

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On September 20, 2012, the United States District Court for the Western District of Tennessee entered a Consent Decree between the City of Memphis (the City) and the United States, the State of Tennessee, and the Tennessee Clean Water Network.

To fulfill the reporting requirements defined in Paragraph VIII.26. of the Consent Decree, the City has prepared this Annual Report, which includes the following information:

- A summary of Management, Operations, and Maintenance (MOM) programs implemented or modified pursuant to the Consent Decree, including a comparison of actual performance with any performance measures that have been established.
- A trend analysis of the number, volume, duration, and cause of sanitary sewer overflow (SSO) events for the previous twenty-four month period.

1. Summary of MOM Programs

The Consent Decree, as shown in Paragraph V.10, describes the following MOM Programs that are required to be developed and/or implemented by the City. These include the following:

- Sewer Overflow Response Plan (SORP)
    - Approved by EPA on March 11, 2011, and implemented for the full reporting period.
- Fats, Oil, and Grease (FOG) Management Program
    - Approved by EPA on April 22, 2014, and implemented for the full reporting period.
    - Performance measures described in the FOG Management Program are presented below, along with the actual performance over the reporting period for those items.
        - Commercial FOG Prevention Measures
            - Number of Notice of Violations (NOVs) issued to failure to comply with Food Establishment Wastewater Discharge permits: 330
            - Number of NOVs per 100 food establishments: 5
            - Number of food establishment grease removal equipment inspections: 6,522
            - Number of follow-up inspections: 701
        - General Public FOG Prevention Measures
            - Number of FOG and “Can the Grease” door hangers distributed: 49,250

        - Number of can lids distributed as part of the "Can the Grease" program: 47,800

    - Number of grease-related SSOs: 240

        - Note that grease-related SSOs are those identified at the time of the SSO as related to grease, although additional causes, such as roots or an offset joint, may also have contributed to the overflow.

- Lift Station and Force Main Operations and Maintenance (O&M) Program
    - Revised version submitted to EPA on April 8, 2015, and awaiting further action.
- Gravity Sewer System O&M Program
    - Revised version submitted to EPA on April 8, 2015, and awaiting further action.
- Inter-Jurisdictional Agreement Program
    - Revised version submitted to EPA on April 8, 2015, and awaiting further action.
- Continuing Sewer Assessment Program (CSAP)
    - Approved on September 10, 2014, and implementation began.
    - As described in Paragraph V.10.f of the Consent Decree, the City is required to assess approximately 10 percent of the wastewater collection and transmission system (WCTS) on average per year following the approval of the CSAP. Also as stipulated in the Consent Decree, the City may include any assessment activity that is conducted after April 1, 2011, as part of the calculation. Through the end of this reporting period, the City has assessed more than 30% of the system's gravity mains and associated manholes which well exceeds the requirements of the CSAP.
    - The CSAP outlines Year 1 and Year 2 Priority Areas for assessment to be completed by deadlines specified in the document. The Year 1 area was completed by the September 10, 2015, deadline and the Year 2 was completed by the September 10, 2016, deadline. Additionally, assessment was conducted on areas outside of these boundaries to complete sewersheds in their entirety.
- Infrastructure Rehabilitation Program (IRP)
    - The IRP was approved by EPA on July 13, 2016. The City continued to prioritize rehabilitation issues in accordance with the IRP.

2. Sanitary Sewer Overflow Trend Analysis

As required in the Consent Decree, a trend analysis of the number, volume, duration and cause of SSO events was performed which includes four graphs (all located at the end of this report).

Figure 1 shows monthly SSO events for the previous twenty-four months as a result of the following causes:

- Blockage
    - Related to FOG
    - Not related to FOG
- Break
- Flooded
- Force Main Failure
- Pump Station Failure
- Other / Unknown

The majority of SSOs (85%) shown in **Figure 1** were the result of blockages within the system. This trend is consistent with the findings in the previous Annual Report. These blockages have been organized by those caused by FOG and those caused primarily by other factors such as roots, debris, mud, sand, rocks, or other foreign material obstructing the pipe. During this reporting period, 240 SSOs were related to FOG blockages which is a 17% reduction of the 280 FOG SSOs from the last reporting period and over a 40% reduction from the 340 SSOs from the reporting period before that.

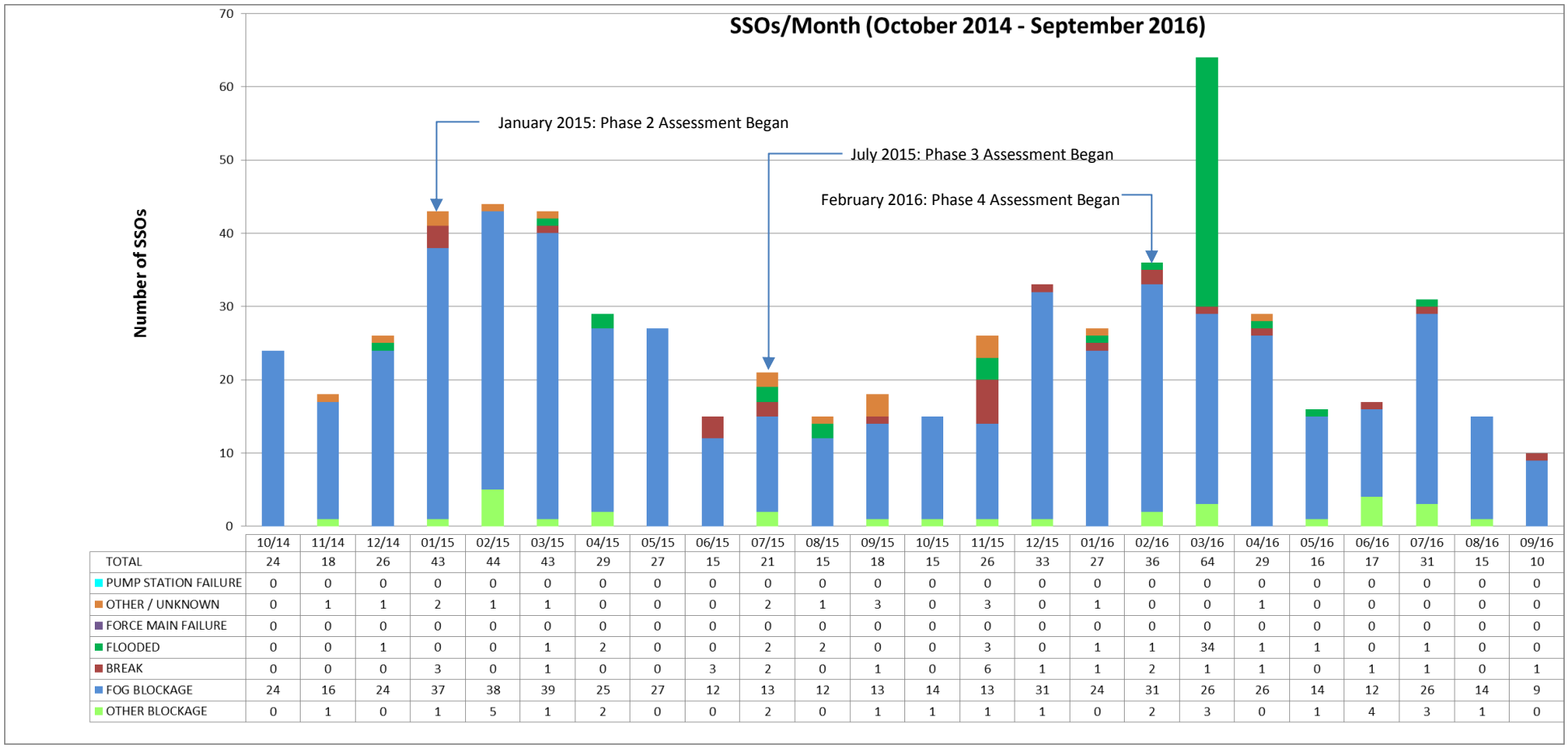
Memphis reportedly experienced the wettest March on record this quarter. Information from the NOAA website* indicates that 7.14" of total rain fell in Memphis between 3/9/16-3/11/16 and 9.08" fell between 3/9/16-3/14/16. Both of these totals exceed the total 10-year average recurrence interval for 3-day and 7-day precipitation totals, respectively. The particularly high number of Flooding related SSOs were possibly caused by these events. Otherwise, the number of SSOs does not correlate to the amount of rainfall.

*http://cp.mcafee.com/d/k-Kr3xEgdEI3zhOYO-PtwSrhhhhovjvspdEEEEIfFK8ECPpISHWGNel9MUzkOrjthh5rCzBdAlgsuKOMYCaA7DChlzXIyF2_KyHzEXni0VWTFI6PpISr01AQamW1yDgHKYhGpMCxiSbeEkNpR2wGHGMHqI9Y3yh0GH4Gte1EFdCS4XCPtPqpJUTsTsSyrh

Figure 2 presents a rolling annual average of SSOs per month for a given 12 month period. The first bar begins with the average number of SSOs per month for the twelve months from October 2012 (the first full month the Consent Decree was in effect) through September 2013. As each successive month is added to the annual average, the first month is dropped, creating the rolling 12 month average. This graph better demonstrates SSO trends by eliminating the inconsistent pattern of SSOs month to month and year to year. Similarly to the trend found in the previous Annual Report, the number of SSOs continues to decrease as evidenced by the trend line.

Figure 3 shows the monthly SSO volumes for the previous twenty-four months, reported in million gallons. In March of 2016, a 96" interceptor failed and caused an estimated 350 million gallon SSO. Because this event contributed to a much larger SSO volume than typical months, the figure is presented on a logarithmic scale to accurately display all of the volume data. The total volume each month is presented above each bar as to avoid any confusion.

Figure 4 shows the monthly SSO duration during the previous twenty-four month period. The durations shown are a summation of the total amount of time overflows were occurring within the system at all overflow locations. This data is provided in the units of overflow equivalent hours. For instance, if two overflows related to blockages occur concurrently for two hours each, the overflow duration for that day is four overflow equivalent hours. Similarly to Figure 3, the large duration in March 2016 was caused by the 96" interceptor break which has subsequently been repaired.



	10/14	11/14	12/14	01/15	02/15	03/15	04/15	05/15	06/15	07/15	08/15	09/15	10/15	11/15	12/15	01/16	02/16	03/16	04/16	05/16	06/16	07/16	08/16	09/16
TOTAL	24	18	26	43	44	43	29	27	15	21	15	18	15	26	33	27	36	64	29	16	17	31	15	10
PUMP STATION FAILURE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTHER / UNKNOWN	0	1	1	2	1	1	0	0	0	2	1	3	0	3	0	1	0	0	1	0	0	0	0	0
FORCE MAIN FAILURE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FLOODED	0	0	1	0	0	1	2	0	0	2	2	0	0	3	0	1	1	34	1	1	0	1	0	0
BREAK	0	0	0	3	0	1	0	0	3	2	0	1	0	6	1	1	2	1	1	0	1	1	0	1
FOG BLOCKAGE	24	16	24	37	38	39	25	27	12	13	12	13	14	13	31	24	31	26	26	14	12	26	14	9
OTHER BLOCKAGE	0	1	0	1	5	1	2	0	0	2	0	1	1	1	1	0	2	3	0	1	4	3	1	0

Figure 1 – SSOs by Cause

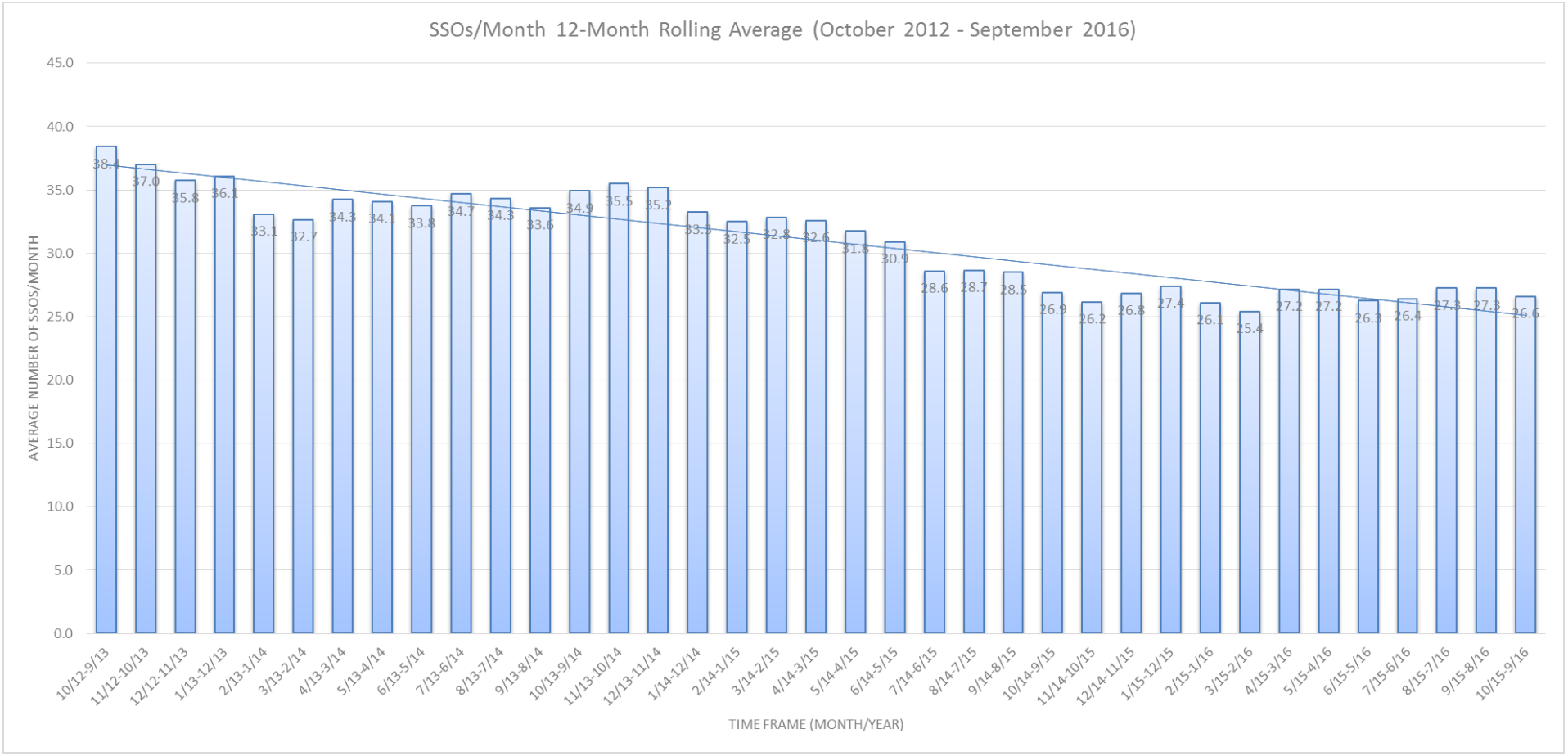
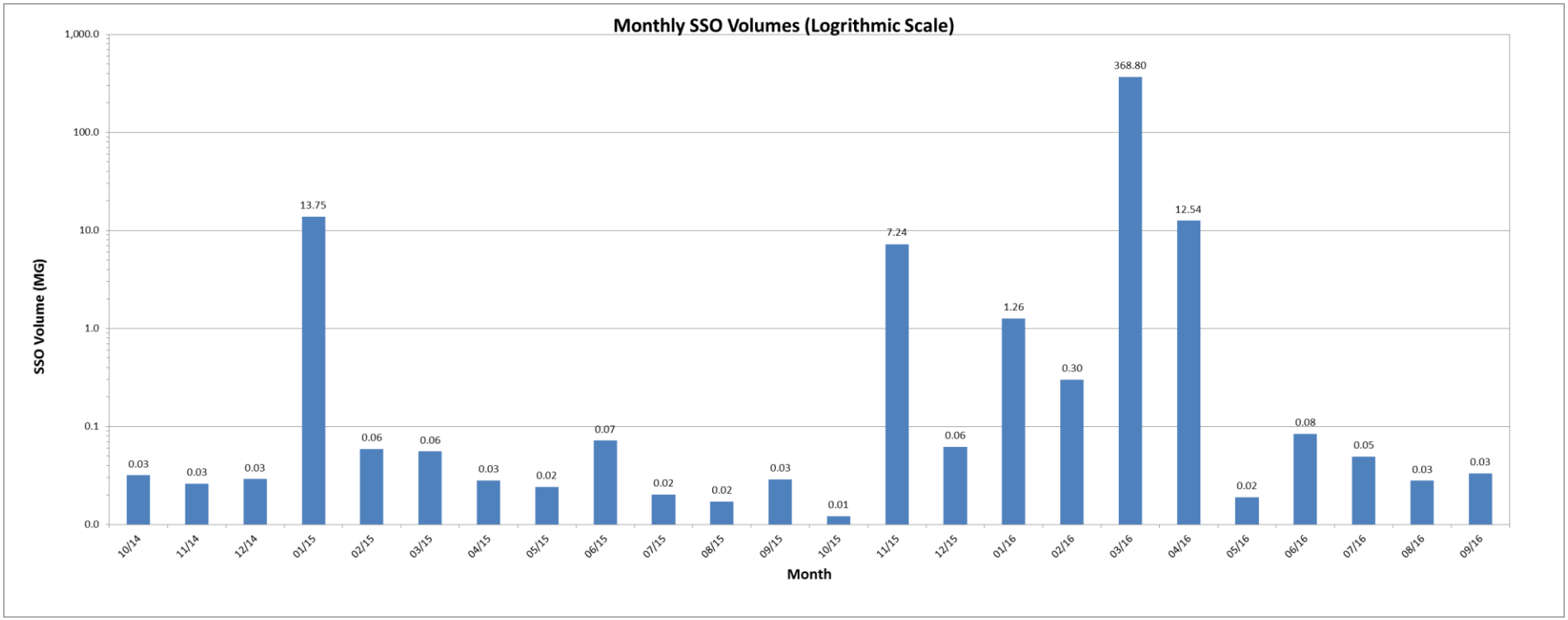
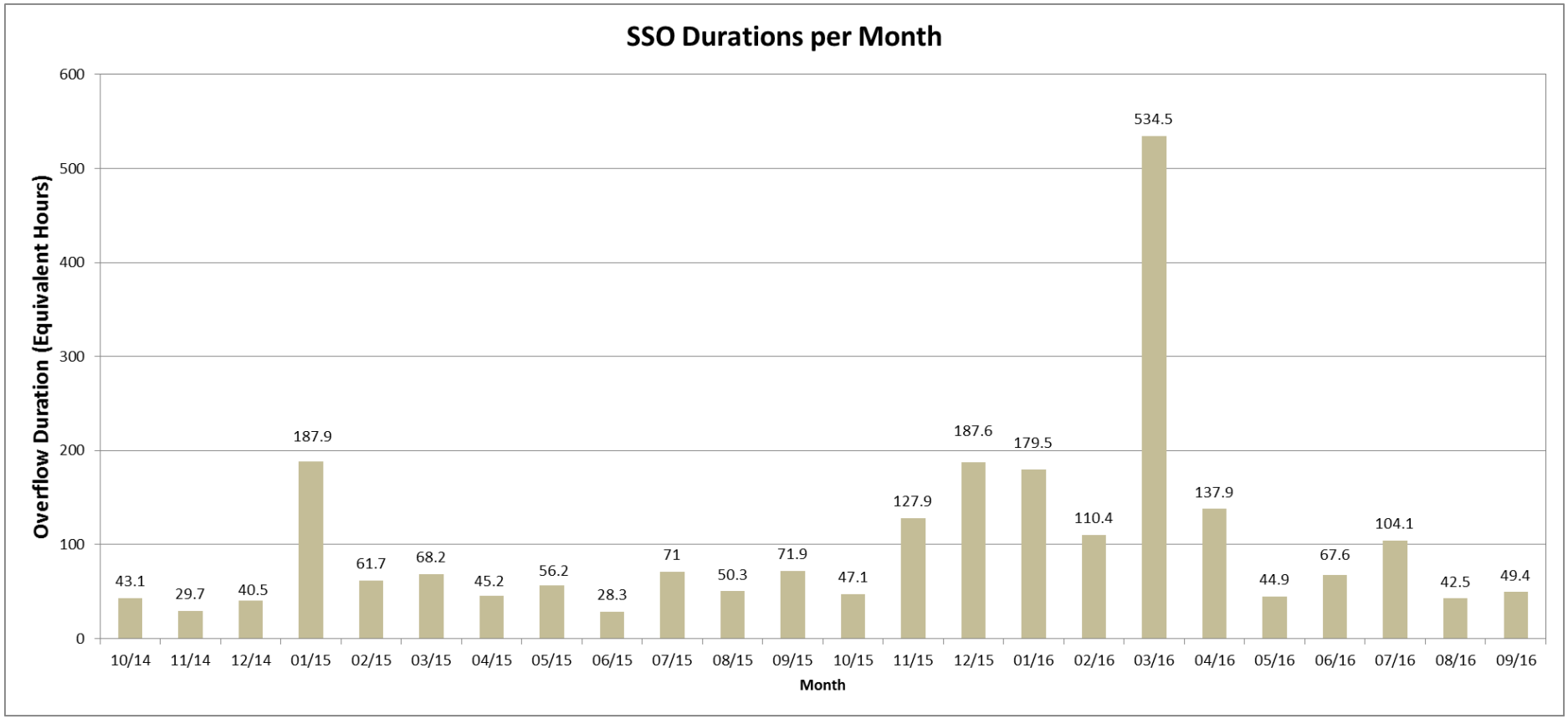


Figure 2 – Rolling Average of SSOs/Month



*A pipe failure on the Nonconnah 96" interceptor was the cause of a 350M gallon SSO in March 2016 and a failure on the Old Loosahatchie was the cause of a 12.5M SSO in April 2016.

Figure 3 – Monthly SSO Volume



*A pipe failure on the Nonconnah 96" interceptor as well as higher-than-average rainfall was the cause of the increased number of hours of SSO duration in March 2016.

Figure 4 – Monthly SSO Duration