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August 30, 2019

Diana Washington
Water Quality Program
Washington State Department of Ecology
4601 North Monroe
Spokane, WA 99205

Re: City of Spokane Combined Sewer Overflow (CSO) Annual Report – 2018

Dear Ms. Washington:

Enclosed for review and approval is the City of Spokane's 2018 CSO Annual Report as required in Section S.13B of the City's 2011 NPDES Permit (WA-002447-3). The 2018 annual CSO overflow volume to the river of approximately 41 million gallons is below average despite heavier than average precipitation in April and December 2018. There were no CSO overflows to Latah Creek in 2018. This report will be posted within a few weeks to the City's Wastewater Management website: https://my.spokanecity.org/publicworks/wastewater/cso

Annual progress on the City's CSO Reduction Plan, required in S.13D, is reported in Table 3-3 on page 3-4 of the enclosed Annual Report. Appendix A presents the CSO Maintenance and Inspection Plan update for review and approval, per Section S.13E.

If you have any questions or need additional information about this report, please contact Ivie Hayes at 625-7919.

Sincerely,

Chuck Conklin
Director – Wastewater Treatment

Enclosure (1): 2018 CSO Annual Report (1 Copies)

cc: (W/O Enclosure):
Scott Simmons, Director of Public Works
Mike Taylor, Program Manager – RPWRF NLT
Dan Kegley, Director – Water & Wastewater Collection
Mike Coster, Plant Manager – RPWRF
Bill Peacock, Principal Engineer – Wastewater Management
Raylene Gennett, Operations Superintendent – Wastewater Management
Bruce Brurud, Instrumentation & Data Supervisor – Wastewater Management
Lars Hendron, Principal Engineer – RPWRF NLT
Sibyl Spence – Sewer Department Files
Michelle Dorgan – RPWRF Files

COMBINED SEWER OVERFLOW ANNUAL REPORT - 2018

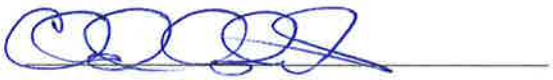
Protecting the Spokane River

SPOKANE
Water Quality Improvement Program

CITY OF SPOKANE

CERTIFICATION STATEMENT

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 the 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.



Signature of Official

8-27-2019

Date

Chuck Conklin
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Section 1: Introduction

The City of Spokane's 2018 Annual CSO Report is submitted to meet two sets of regulations: the National Pollutant Discharge Elimination System (NPDES) permit program, as authorized by the Clean Water Act (CWA) under Title 33 United States Code, Section 1251, and the Washington State Department of Ecology (WSDOE) Water Pollution Control Law under Chapter 90.48 Revised Code of Washington. WSDOE administers the NPDES Permit program under a delegation from the U.S. Environmental Protection Agency (EPA).

This annual report is also submitted to share information with the public on activities that improve the City of Spokane's wastewater collection system and operations with the goal of minimizing pollution of the Spokane River. The report is organized in the following order:

- Section 1: Introduction
- Section 2: Operation and Maintenance Activities
- Section 3: Capital Activities
- Section 4: Monitoring Program and Monitoring Results
- Appendix A: Operations and Maintenance Plan for CSO Regulators and Outfalls

Additional information about the Combined Sewer Overflow Program and Integrated Plan may be found at: https://my.spokanecity.org/publicworks/wastewater/cso/ and https://my.spokanecity.org/publicworks/wastewater/integrated-plan/

1.1 CITY OF SPOKANE COMBINED SEWER SYSTEM

The City of Spokane's wastewater collection system includes sanitary sewers and combined sewers, as shown in Figure 1-1. In areas of the City served by combined sewers, runoff from the street enters the system through catch basins where it is combined with sewage and conveyed to the Riverside Park Water Reclamation Facility (RPWRF). In the downtown area, rainwater from some roof drains also enters the combined system. At the end of 2018, there were approximately 863 miles of sanitary sewers.

In areas of the City that are fully or partially separated, runoff from City streets enters either separated storm sewers that convey stormwater to the Spokane River or Latah (Hangman) Creek, or directly to ground through drywells or bio-infiltration swales. Runoff, which is collected and discharged in a manner *other* than evaporation or a combined sewer system, is regulated under a separate set of regulations, including the 2014-2019 Eastern Washington Phase II Municipal Stormwater Permit and the Underground Injection Control(UIC) regulations.

During storm events, the volume of runoff flowing into the collection system can exceed the capacity of the combined sewer system interceptor pipes and treatment plant. When this occurs, the collection system overflows via outfall pipes to the Spokane River or Latah (Hangman) Creek. As of the end of 2018, there are 22 combined sewer overflow regulators that overflow to 19 combined sewer overflow outfall pipes.

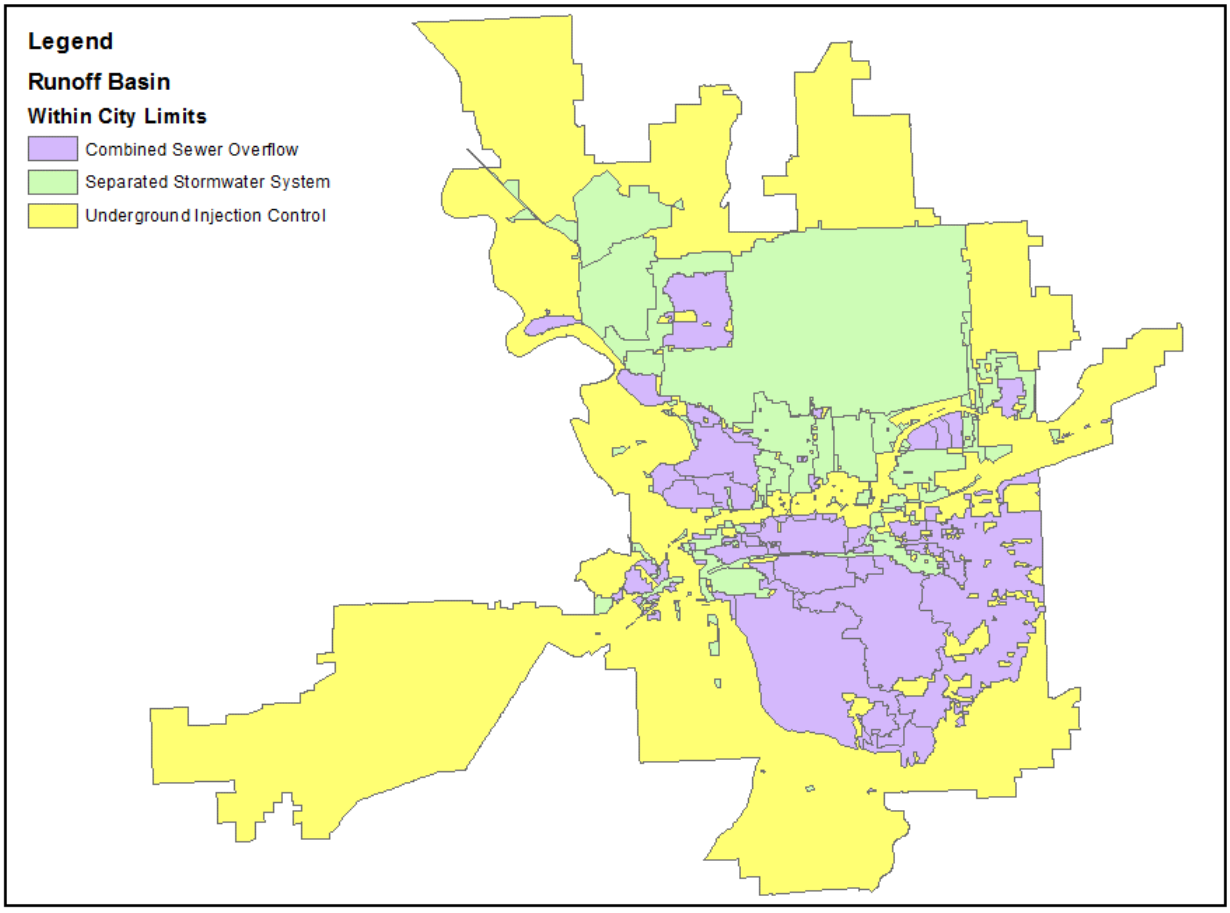


FIGURE 1-1 MAP OF CSO / STORM / UIC AREAS

1.2 SPOKANE'S SEWER SYSTEM HISTORY

The first sewer line in Spokane was built under Howard Street from First Avenue to the Spokane River in June 1888. In the 1890s, the area from the base of the South Hill to the river between Cedar and Division Streets was sewered. Growth of the system paralleled the City's growth through the years as several hundred miles of sewer lines of various sizes and materials were added, all emptying into the Spokane River or Latah (Hangman) Creek.

In 1946, a bond issue was passed to construct intercepting lines to convey sewage to a planned sewage treatment plant. The interceptor system was installed between 1948 and 1958. The system was initially designed to carry 2.3 times the average dry weather flow based on a future population of 258,000 people. This main interceptor capacity was approximately 110 million gallons per day (mgd) and the Hollywood interceptor for the northwest section of the City was 15mgd for a total peak conveyance capacity of 125mgd.

In May 1958, the first phase of a new sewage treatment plant was placed into operation. It was expanded in 1961-1962. The capacity of the sewage treatment plant was 50mgd. During wet weather, flows in excess of 50mgd would flow directly to the Spokane River via 44 CSO outfalls in the system, and through a bypass diversion at the plant. Riverside Park Water Reclaimation Facility is now rated at 56mgd and can treat storm-related flows in excess of 100mgd.

The City of Spokane has been diligently working on a series of projects since 1972 to reduce overflows to the Spokane River. The results and planned goals for reducing the frequency, volume, and number of overflow structures are summarized in Figure 1-2.

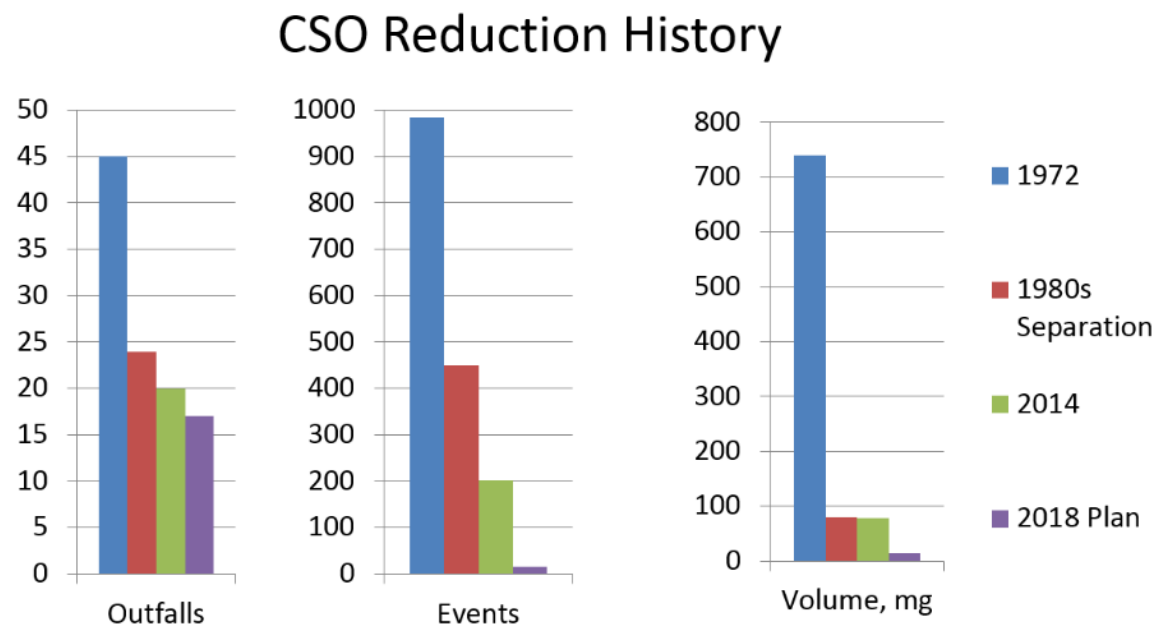


FIGURE 1-2 CSO REDUCTION HISTORY PROGRESS

1.2.1 – 1972 Action Plan

The 1972 Action Plan was published in May 1972, five months *before* the Clean Water Act was passed by Congress on October 18, 1972. This plan laid out the environmental need to upgrade the sewage treatment plant capacity and include secondary biological treatment as part of the process. It also laid out a plan for screening and disinfection of wet weather overflows in five regional treatment areas, combined with the construction of separated storm sewer systems in some areas. During an average year, it was estimated that just under 1,000 overflow events occurred from 44 overflow points totaling 447 million gallons of combined sewage, along with approximately 280 million gallons bypassed at the sewage treatment plant.

1.2.2 – 1977 Sewer Overflow Abatement Plan

The 1977 Sewer Overflow Abatement Plan further laid out several alternatives for reducing Combined Sewer Overflows to the Spokane River. rowth in the southeast corner of the City combined with river inflow during periods of high river levels were contributing to dry weather overflows from three discharge points. This report selected an alternate for separation of the north side of the City. This alternate also allowed for the City's future sanitary sewer service to Spokane Valley. During an average year, it was estimated that over 929 overflow events occurred from 33 overflow points totaling 565 million gallons of combined sewage, and an estimated 560 million gallons of bypasses at the sewage treatment plant.

1.2.3 – 1979 Sewer Overflow Abatement Plan Update

The 1979 Sewer Overflow Abatement Plan update amends the 1977 plan to further clarify areas to separate with storm sewers and explore which areas outside the City can be added to the sewer system. The original primary treatment plant was upgraded to an advanced secondary wastewater treatment plant in the mid-1970s and was achieving greater than the 85 percent phosphorus removal required by the NPDES permit. A computational analysis for calculations of flow in tandem with flow monitoring at key points along the interceptor system further refined the allocation of flow capacity for each CSO basin. Suggested overflow settings were detailed for each basin after the proposed separation of the north side of the City to storm sewers.

1.2.4 – 1994 Combined Sewer Overflow Reduction Plan

The 1994 Combined Sewer Overflow Reduction Plan put in place a program for reducing Combined Sewer Overflows to the Spokane River with a 20-year schedule. As a result of the storm sewer separation of 64 percent of the City's sewer service area, the CSO volume to the Spokane River had been reduced by 491 million gallons per year, or 86 percent, for a cost of roughly $50 million.

The 1994 plan called for an integrated approach to CSO pollutant reduction to achieve Ecology's requirement of just one overflow event per outfall per year. This included the following: street surface cleaning, catch basin cleaning, infiltration and inflow control, water use reduction, storage facilities, optimization of existing control structures, and additional storm separation. A computational Storm Water Management Model (SWMM) was created and calibrated to existing dry and wet weather conditions. An iterative phased approach of constructing a few different facilities, monitoring the results, and constructing the next phase from those results was proposed. During an average year, it was estimated that over 467 overflow events occurred from 24 overflow points totaling 79 million gallons of combined sewage.

1.2.5 – 2005 Combined Sewer Overflow Reduction Plan Amendment

The 2005 Combined Sewer Overflow Reduction Plan Amendment recalibrated the SWMM model using historical rain data, improved modeling capability and increased flows from recent growth in parts of the City. The plan also began looking system-wide for adjustments in interceptor controls and storage volume, as well as creating six CSO reduction alternatives and their probable costs. The plan referenced a 5-year moving average for frequency compliance, a 2-year design storm, with snowmelt, and a beta factor to accommodate differences in rainfall correlated to spatial distances from rain gauges. Several facilities from the 2005 plan were constructed and monitored for performance before constructing more facilities.

1.2.6 – 2008 Sierra Club Settlement Agreement

The City of Spokane and the Sierra Club entered into a settlement agreement in 2008 regarding dry weather overflows. The elements of the Agreement have been completed. Pursuant to the Agreement, eleven CSO regulators prone to dry weather overflows were modified or Control Facilities installed. The final regulator was addressed by a project completed in late 2011. Also, improving CSO-related training and maintenance procedures and enhancing public information and notification were undertaken. Information about CSOs has been added to the City's website and major river access points for the public. Warning flags and special signage are deployed at major river access points if a dry weather overflow occurs. The CSO O&M Plan is updated annually, additional precautions during maintenance have been established, and training is ongoing.

1.2.7 – 2014 Combined Sewer Overflow Reduction Plan Amendment

In March 2014, the City filed a CSO Reduction Plan Amendment maintaining the December 31, 2017 compliance schedule as mandated by the NPDES permit. The CSO Reduction Plan Amendment reflects a change in circumstances which include more accurate long term meteorological records and data to effectively size the CSO control facilities; the valuable experience the City has gained with its completed weir modifications and CSO control facilities; the 20-year moving average for annual CSO reporting; and EPA and Ecology's recommendations to incorporate an integrated approach to managing municipal stormwater, municipal wastewater, and CSOs. Baseline conditions were updated and are reflected in Table 4-2 of this report.

The City analyzed all CSO basins and incomplete separation areas and classified each according to a risk profile that included options for more storage, anticipated growth, and other factors. The risk profile was then used in conjunction with basin-level continuous simulation modeling to select a facility size based on a selected number of overflows per year from each basin. This was validated by a system-wide continuous simulation model and from flow monitoring data. Where the model and the flow monitoring disagreed, further analysis was used to select a facility size.

Another input to the facility sizing was a re-optimization of the flow control to the interceptor from each CSO basin. The re-optimization had two goals. The first goal was to limit peak flows resulting from the "CSO design event" in the A.L. White Interceptor to 120mgd versus its theoretical full-pipe capacity of about 130mgd. The second goal was to convey more peak flow from basins where it is infeasible or more expensive to construct a CSO facility and to convey less peak flow and construct more storage for basins where more feasible and less expensive. The City's design basis for sizing CSO facilities was revised from a 2-year, 24-hour SCS Type II storm event with snowmelt to a 1.2-year, 24-hour SCS Type II storm event. The other factor in re-sizing CSO facilities was Ecology's extending the five-year rolling average standard to a 20-year rolling average standard as stated in the current NPDES permit. The result was that the control volumes for CSO storage were reduced from a total of 28.6mg of storage in the system in the 2005 CSO Plan Amendment to between 11.3mg and 13.0mg of storage in the system in the 2014 CSO Plan Amendment.

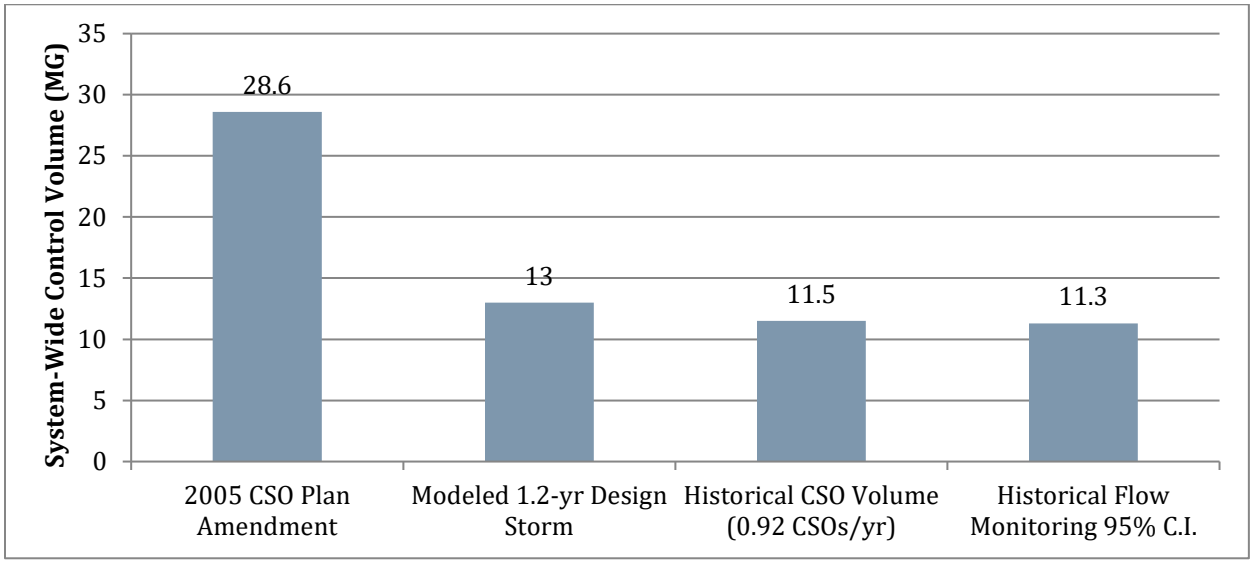


FIGURE 1-3: COMPARISON OF CSO FACILITY SIZING IN 2005 VS. THREE METHODS USED IN THE 2014 CSO PLAN AMENDMENT.

1.3 CITY OF SPOKANE NPDES PERMIT

The City of Spokane's Combined Sewer System (CSS) is operated under two sets of regulations: The National Pollutant Discharge Elimination System (NPDES) permit program, as authorized by the Clean Water Act (CWA) under Title 33 United States Code, Section 1251, and the Washington State Department of Ecology (WSDOE) Water Pollution Control Law under Chapter 90.48 Revised Code of Washington. WSDOE administers the NPDES Permit program under a delegation from the Environmental Protection Agency (EPA). Because of the two sets of regulations, there are various reporting requirements that must be fulfilled to comply with both laws. As a result, this report is organized to fulfill both reporting requirements with respect to the CSS and CSOs. The current NPDES permit WA-002447-3 was due to expire on June 30, 2016, but has been administratively extended pending issuance of a new permit. The current permit can be found on the City's website: https://static.spokanecity.org/documents/publicworks/wastewater/treatmentplant/reclamation-facility-permit.pdf

1.4 ORGANIZATION OF THIS REPORT

TABLE 1-1: 2011 PERMIT CSO ANNUAL REPORTING REQUIREMENTS

Source	Requirement	Report Location
NPDES S13.A	Locations of Combined Sewer Outfalls.	Table 4-1
NPDES S13.B	Demonstrate compliance with performance standards of WAC 173-245 on a 20-year moving average period.	Table 4-9
NPDES S13.C	Implement and document nine minimum controls for CSOs.	Section 2.1
NPDES S13.D	Submit a progress report of the progress made implementing the CSO Reduction Plan.	Section 3.3
NPDES S13.E	Submit annually a plan for maintaining the operation, monitoring and function of CSOs.	Appendix A
NPDES S13..3	Continue the CSO discharge monitoring plan.	Section 4.2, Section 4.3
NPDES S13..4	Continue use and maintenance of public notification system of CSO impacts during wet and dry weather conditions.	Section 2.1.8
NPDES S13.H	Maintain records of all CSO-related bypasses at the treatment plant.	Table 4-8, Table 4-10
WAC 173-245-090(1)(a)	Detail the past year's frequency and volume of combined sewage discharged.	Table 4-8, Table 4-10
WAC 173-245-090(1)(b)	Explain the previous year's CSO reduction accomplishments.	Section 3.1
WAC 173-245-090(1)(c)	List the projects planned for the next year.	Section 3.2

Section 2: Operations and Maintenance Activities

This section describes the Operation and Maintenance (O&M) activities the Spokane Wastewater Department undertakes to reduce the number and volume of Sanitary Sewer Overflows (SSOs), Dry Weather Overflows (DWOs), and Combined Sewer Overflows (CSOs).

2.1 NINE MINIMUM CONTROL ACTIVITIES

Section S13.C of the City's NPDES Permit Requires compliance with US EPA CSO control policy (59 FR 18688) that states: "permittees with CSOs should submit appropriate documentation demonstrating implementation of the nine minimum controls…" The NPDES Permit requires annual reporting on the City's ongoing efforts to comply with these controls. The following describes the work performed in 2018 on each of these nine minimum controls.

2.1.1 Control 1: Proper Operation and Regular Maintenance Programs for the Sewer System and the CSOs

> *"Implement proper operation and maintenance programs for the sewer system and all CSO outfalls to reduce the magnitude, frequency, and duration of CSOs. The program must consider regular sewer inspections; sewer, catch basin, and regulator cleaning; equipment and sewer collection system repair or replacement, where necessary; and disconnection of illegal connections."*

Every year the City's Wastewater Management (WWM) Department performs O&M activities to reduce the frequency and volume of preventable overflows. In 2018, the following activities were performed to ensure proper operation of the collection system:

TABLE 2-1: SUMMARY OF 2018 O&M ACTIVITIES

Activity	Quantity
Miles of sewer and storm lines cleaned.	550 miles cleaned
Miles of sewer and storm lines CCTV inspected.	218 miles inspected
Number of catch basins inspected.	15,359 inspections
Number of catch basins cleaned.	2,485 cleanings
Number of catch basins modified to add floatables control.	595 modified
CSO weir and facility inspections.	944 inspections
CSO weir and facility cleanings.	33 cleanings
Number of lift station inspections.	470 inspections
Number of lift station cleanings.	276 cleanings

The City's WWM Department routinely inspects sewer and storm lines using Closed Circuit Television (CCTV) equipment. To assist in identifying trouble areas in the collection system, the department uses the National Association of Sewer Service Companies (NASSCO) Pipeline Assessment and Certification Program (PACP) defect coding system.

The WWM Department has an aggressive inspection program for the collection system. Inspections often identify trouble spots in the collection system before backups occur, which otherwise can cause SSOs. When a sewer is inspected and identified as having a maintenance-related problem, the sewer is placed on a cleaning schedule to prevent future maintenance-related backups. For other than the interceptors and larger trunks, the routine maintenance frequencies vary from as short as a month to approximately two years. Routine maintenance activities include:

- Hydro for flushing light to medium debris.
- Hydro-sawing for root control and grease.
- Rodding or balling for clearing active blockages like roots and debris.
- Chemical root treatment to mitigate growth of roots.

The WWM Department performs routine electrical and mechanical system preventative maintenance on all lift stations to ensure proper operation of the parts of the collection system that require pumping uphill to gravity mains. Most of these lift stations have backup generators to prevent CSO and SSO events during a power failure. By the end of 2015, the City completed the installation of backup generators on all but two lift stations, which have adequate storage capacity for a response by WWM crews with a portable generator. Only two lift stations convey combined sewage: Elm Street and Clarke Avenue.

In 2006, the City's WWM Department developed and implemented its first municipal CSO Operations and Maintenance Plan (O&M Plan), with annual revisions beginning in 2010. The goal of the O&M Plan is to protect water quality and reduce the discharge of pollutants via CSOs into receiving waters. The O&M Plan includes names and contact information of designated responsible staff with specific procedures clearly detailed; a list of the critical elements in the CSS: facilities (control tanks, CSO regulator structures, weirs, and so forth) included under this Plan; frequency of routine inspections; wet and dry weather procedures; emergency notification procedures; and record keeping procedures. Repairs and necessary modifications are made to broken or malfunctioning CSS components. A copy of the City's O&M Plan is submitted under Appendix A.

2.1.2 Control 2: Maximize Use of the Collection System for Storage

> *"Implement procedures that will maximize use of the collection system for wastewater storage that can be accommodated by the storage capacity of the collection system in order to reduce the magnitude, frequency, and duration of CSOs."*

Current CSO regulator settings correspond to the maximum allowable flow conditions in the main influent interceptor (I02) entering the Riverside Park Water Reclamation Facility (RPWRF). As part of the O&M Plan, WWM has a regular preventive inspection program to ensure that trapped sedimentation or debris is cleaned out of catch basins and CSS pipes that could otherwise restrict proper flow. Visual and remote inspections by a Wastewater Specialist or a CSO Instrument Technician are completed for each uncontrolled CSO regulator structure every week. In some cases, up-sized in-line storage is used to help reduce overflows. The City's program includes infiltration & inflow (I/I) reduction projects such as grouting, short-line and full-length cured-in-place pipe (CIPP) lining. In 2018, the City installed 12 CIPP short-liners.

2.1.3 Control 3: Review and Modification of Pretreatment Requirements to Assure CSO Impacts are Minimized

> *"Review and modify, as appropriate, its existing pretreatment program to minimize CSO impacts from the discharges from nondomestic users."*

The City routinely surveys existing and new businesses connected to its collection system. As a result, non-domestic customers with the potential to adversely impact the treatment system are identified and managed. At the end of 2018, there were four listed Categorical Industrial Users, thirteen listed Significant Industrial Users, and eleven listed Non-Significant Categorical Industrial Users.

Part of the Pretreatment Program is the Fats, Oils, and Grease (FOG) Program, which implements the City's Municipal Code requirement to remove FOG from wastewater through the use of grease traps or other methods. FOG has a detrimental effect on the City's sewers and is a significant cause of obstructions. Each time a sewer line is observed by CCTV to be partially or fully obstructed with grease, an investigation is conducted upstream to identify potential sources and enforce the municipal code.

2.1.4 Control 4: Maximization of Flow to the POTW for Treatment

> *"Operate the POTW treatment plant at maximum treatable flow during all wet weather flow conditions to reduce the magnitude, frequency, and duration of CSOs. The Permittee must deliver all flows to the treatment plant within the constraints of the treatment capacity of the POTW."*

RPWRF has sufficient capacity to provide full treatment for wet weather flow during all but the most extreme storm events. Peak flow up to 100 million gallons per day (mgd) is fully treated on a real-time basis within the duration of most storms. When flows exceed 100mgd, up to 4 million gallons (mg) of excess flow volume can be diverted to on-site storage and receives full treatment after the storm. On very rare occasions when more than 4mg is diverted, the excess volume above 4mg receives primary treatment and disinfection prior to discharge, and is reported as a CSO-related bypass. As part of the CSO Reduction Plan Amendment submitted in early 2014, the main I02 interceptor flows will be limited to 120mgd during the "CSO design event" through the use of upstream CSO storage. In addition, the treatment plant is being upgraded with a fifth primary clarifier to provide full primary and secondary treatment for up to 125mgd of wet weather flows. This will enable nearly all flows to RPWRF to receive full primary and secondary treatment. In 2018, the flow controls settings were adjusted for CSOs 23-1, 23-2, 24-1, and 34 interim.

2.1.5 Control 5: Prohibition of CSOs During Dry Weather

> *"Dry weather overflows from CSO outfalls are prohibited. The Permittee must report each dry weather overflow to the permitting authority as soon as it becomes aware of the overflow. When it detects a dry weather overflow, the Permittee must begin corrective action immediately and inspect the dry weather overflow each subsequent day until it has eliminated the flow."*

The City's CSO dry weather program, as outlined in the O&M plan, is both proactive and reactive. The plan includes visual and remote inspections with specific procedures outlined; early warning and overflow alarm monitoring and coordinated response protocols; combined sewer system (CSS) mapping; crew training to avoid overflows from CSS maintenance; and a public notification hotline (344-FISH) which is displayed on a variety of public education materials and on the CSO notification/information signs on the shore at each CSO outfall and at the three major river public access points. The WWM Department conducts regular cross-training of other City departments such as Water & Hydroelectric Services, Streets, Parks and the Fire

Department to prevent dry weather overflows from hydrant flushing, reservoir draining, water line flushing, fire-fighting activities, and the draining of Park department pools. In 2018, there was one construction-related dry weather overflow of potable water at CSO 23-1.

2.1.6 Control 6: Control Solids and Floatable Materials in CSOs

"Implement measures to control solid and floatable material in CSOs."

The control of solid and floatable materials is an inherent part of the City's O&M plan. Many existing and all new catch basins in CSS areas have 90 degree down-turned elbows that retain floatables within the catch basins. Heavier solid materials settle to the bottom of the catch basins and oils and greases float above the elbow. This serves as a preliminary treatment system and captured trash and sediment are pumped out, decanted, and landfilled on a routine basis by maintenance crews. In 2018, 595 bends were installed or modified in catch basins.

As each CSO regulator is modified to add storage in compliance with the CSO Long Term Control Plan, floatable controls are included in the CSO storage facilities and overflow points to largely eliminate any floatable material discharge.

2.1.7 Control 7: Pollution Prevention

"Implement a pollution prevention program focused on reducing the impact of CSOs on receiving waters."

The City conducts a regular street sweeping schedule that aids in keeping trash and debris out of the CSS. In addition, catch basins are pumped regularly as a preventive maintenance measure. Leaves are swept and removed from City streets in the fall. Since 2010, the City has been placing markers near curb drain inlets and basins to inform and remind the public about where wastewater goes. The curb markers installed in CSS areas read: "*Dump No Waste – Drains to River*" and include a hotline phone number to report dumping. In 2018, 198 curb markers were installed by WWM crews.

The MS4 program includes an illicit discharge complaint program. Any illicit discharge complaints are investigated by the WWM stormwater inspectors. The WWM inspectors also ensure construction projects follow BMPs and manage stormwater on site to ensure dirt and other debris does not enter the storm or sewer collection systems. In 2018, there were 22 investigations into illicit discharge complaints and 126 inspected commercial construction sites.

2.1.8 Control 8: Public Notification to Ensure that the Public Receives Adequate Notification of CSO Occurrences and CSO Impacts

"Implement a public notification process to inform the citizens of when and where CSOs occur. The process must include (a) mechanism to alert persons of the occurrence of CSOs and (b) a

system to determine the nature and duration of conditions that are potentially harmful for users of receiving waters due to CSOs."

Real-time CSO status updates can be viewed by the public on the department's website, https://my.spokanecity.org/publicworks/wastewater/cso/. The website includes the CSO number, location with map, and the date/time of any overflow event within the past 48 hours. It also informs the public and recreational visitors that Spokane River water activities should be avoided in these areas during and after heavy rainfall or snowmelt. In 2018, there were approximately 2,142 views of this page on the department's website.

Information kiosks regarding CSOs are located at three popular river access points: Water Avenue, T.J. Meenach Bridge, and Plese Flats. If a dry weather overflow occurs, warning signs with orange flags are opened at these three locations to warn the public. When there is a dry weather overflow event, the City also notifies the Spokane Regional Health District and the Washington State Department of Ecology in accordance with the O&M Plan.

2.1.9 Control 9: Monitoring to Effectively Characterize CSO Impacts and the Efficacy of CSO Controls

"Monitor CSO outfalls to characterize CSO impacts and the efficacy of CSO controls. This must include the collection of data that it will use to document the existing baseline conditions, evaluate the efficacy of the technology-based controls, and determine the baseline conditions upon which it will base the long-term control plan. This data must include:

a) Characteristics of the combined sewer system including the population served by the combined portion of the system and locations of all CSO outfalls in the CSS.
b) Total number of CSO events and the frequency and duration of CSOs for a representative number of events.
c) Locations and designated uses of receiving water bodies.
d) Water quality data for receiving water bodies.
e) Water quality impacts directly related to CSO (for example, beach closing, floatables, wash-up episodes, fish kills)."

The City's CSS serves approximately 100,000 citizens; the rest are in areas with separated storm systems, bioinfiltration swales, or evaporation ponds. The Spokane River and Latah Creek are the only two water bodies that receive CSO discharges, with 17 outfalls and two outfalls, respectively. All outfalls are mapped in GIS, marked with signs, and each regulator leading to an outfall is equipped with flow monitoring and telemetry. The City operates the flow monitoring/telemetry for timely alarms, public notification, compliance data, and operation and performance of CSO facilities. In 2018, the City achieved a 99.96% uptime with its CSO monitoring system. The CSO flow monitoring team continues to work hard to mitigate impacts of the ongoing CSO construction projects to maintain the integrity and quality of the telemetry data during construction.

Through the mid-2000s, the City sampled the receiving water bodies during and after large wet weather overflows to determine how quickly fecal coliform levels returned to background. The CSO river sampling program is now focused on dry weather events. Following any dry weather overflow during the high river use season, the City conducts river sampling to determine when fecal coliform levels downstream of the affected

outfall have returned to background. The Spokane Regional Health District is informed by the City of any dry weather overflows and is responsible for any public health alerts.

2.2 OTHER MAINTENANCE ACTIVITIES

2.2.1 Sewer Cleaning Activities

The City of Spokane undertakes an extensive cleaning maintenance program. These activities include flushing, balling, rodding, hydroing and other activities. When CCTV video analysis or customer complaints indicate that there is a problem or a potential future problem with a sewer line, it is placed on a scheduled maintenance list in the maintenance management system to ensure timely cleaning occurs. If the problem becomes worse, the scheduled maintenance time is shortened, and the line is flagged for replacement or lining.

TABLE 2-2: SUMMARY OF 2018 SCHEDULED SEWER CLEANING

Schedule	Work Orders Done in 2018
Bi-monthly	44
Monthly	587
Every 2 Months	53
Every 3 Months	187
Every 4 Months	20
Every 6 Months	137
Every 9 Months	4
Annually	7
Total # of Work Orders	**1,039**

2.2.2 Repair, Rehabilitation, and Replacement Activities

The City maintains two construction crews that replace, rehabilitate, and repair sewer and stormwater lines. These crews respond to emergency situations, but also replace or repair lines and catch basins identified by citizens, crews, and CCTV reports. The City also contracts out large line cured-in-place pipe (CIPP) rehabilitation most years for identified lines that have excess infiltration or are found to be structurally deficient.

TABLE 2-3: SUMMARY OF 2018 SEWER REPAIR AND REPLACEMENTS

Activity	Number
New Storm / Sanitary Line	13
Repair Storm / Sanitary Line	40
Replace Storm / Sanitary Line	28
New Catch Basin	4
Catch Basin Repairs	7
Catch Basin Replacement	10
New Manhole	6
Manhole Repairs / Modifications	19
Total # of Assets	**127**

2.2.3 Sanitary Sewer Overflow Response and Prevention Activities

A small number of Sanitary Sewer Overflows (SSOs) do occur every year and are promptly reported to Ecology, along with the proposed remedy for preventing a similar overflow in the future. Due to the average age of pipes in the City's collection system, the City has an aggressive CCTV inspection program to prevent SSOs through routine and unscheduled maintenance activities. The two most common causes of SSOs are weather-related surcharges of (private) side sewers and tree roots plugging a City sewer main. Other activities can cause SSOs as well. The most common is City large line water main breaks that can overwhelm parts of the collection system. Other causes are construction activities and vandalism. In 2018, there were a total of two SSOs: one SSO was caused by weather-related activity, and one SSO was as a result of tree roots.

TABLE 2-4: SUMMARY OF SANITARY SEWER OVERFLOWS BY CAUSE, 2012 - 2018

Cause	2012	2013	2014	2015	2016	2017	2018
Weather-Related	24		9				1
Tree Roots	2	2	3	4	1	3	1
Water Main Break				4			
Crushed Line							
Construction Activity			1	1		6	
Vandalism				1			
Grease	1					1	
Other		1		1			
Total # of SSOs	**27**	**3**	**13**	**11**	**1**	**10**	**2**

2.2.4 Inflow and Infiltration Reduction Activities

The City has worked tirelessly in removing Inflow and Infiltration (I/I) from the sewer collection system. Several methods are used to reduce I/I in the system including CIPP lining, stormwater separation or redirection, plugging of abandoned sewer lines, and other methods.

One of the main causes of I/I within the collection system is high river flows that increase the groundwater level around some of the older pipes along the river. The City has lined large sections of the interceptors along the river and many downtown smaller lines which resulted in the reduction of approximately 10mgd of I/I. Another successful I/I elimination project was the lining of many pipes and upgrading the Springfield lift station in the area south and east of Gonzaga University. As a commitment to optimizing the capacity of the upcoming tertiary membrane treatment installation at the treatment plant, another 10mgd needs to be removed during extended times of high river.

2.3 ANNUAL REVIEW OF OPERATIONS & MAINTENANCE MANUAL

The CSO Operations and Maintenance Manual (O&M) was reviewed on July 11, 2019. The O&M plan is attached with Appendix A of this report. As new CSO facilities come online, facility inspection checklists are created. CSO crews are also trained in CSO inspections on an annual basis. Training includes a review of normal and abnormal conditions within facilities, and what preventive maintenance is required in each area of a CSO facility, along with checking safety and a gas detection system. Procedures and checklists for Dry Weather Overflows (DWOs) responses are reviewed. Design standards for CSO Facilities are reviewed during the design phase of new facilities based on maintenance feedback to minimize maintenance frequency and effort.

Section 3: Capital Activities

3.1 – 2018 CSO SYSTEM IMPROVEMENTS

Below is a list of CSO projects completed in the 2018 year:

TABLE 3-1: CSO CONTROL PROJECTS COMPLETED IN 2018

City Project #: 2013212 **CSO Basin #:** 14/15 **Location:** West Central Neighborhood **Description:** Construction of bioretention facilities to treat and infiltrate runoff, disconnecting streets from the combined sewer system. **Estimated Cost:** $2.0m **Estimated Completion:** 2018 – Q3	
City Project #: 2010076 **CSO Basin #:** 23 (Facility 23-1 & 23-2) **Location:** Ash Street & Bridge Ave., Cedar Street & Summit Parkway **Description:** Construction of a 38,000 gallon CSO Control facility and a 13,000 CSO Control facility. **Estimated Cost:** $1.5m **Estimated Completion:** 2018 – Q3	 
City Project #: 2010087 **CSO Basin #:** 24 **Location:** 1st Ave. & Adams Street **Description:** Construction of a 2,400,000 gallon CSO Control facility. **Estimated Cost:** $16.3m **Estimated Completion:** 2018 – Q4	

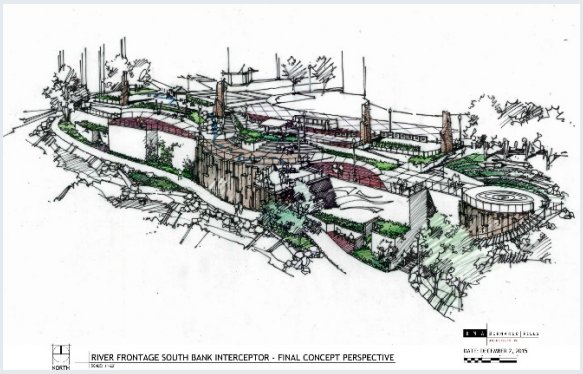
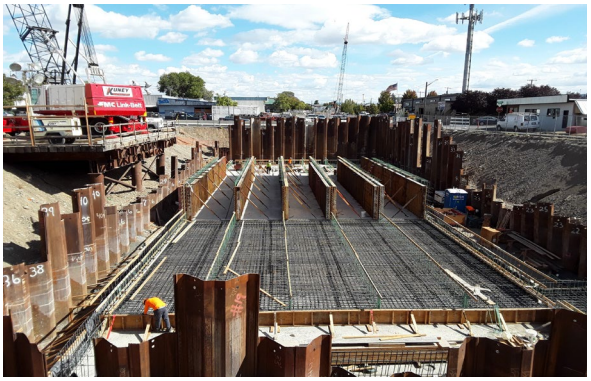
TABLE 3-1: CSO CONTROL PROJECTS COMPLETED IN 2018

City Project #: 2015178 **CSO Basin #:** 25 **Location:** Peaceful Valley **Description:** Construction of a 43,000 gallon CSO Control facility and associated partial disconnection and stormwater swales. **Estimated Cost:** $1.0m **Estimated Completion:** 2018 – Q4	
City Project #: 2013213 **CSO Basin #:** 33-1 **Location:** Liberty Park **Description:** Construction of 2,000,000 gallon CSO Control facility. **Estimated Cost:** $12.0m **Estimated Completion:** 2018 – Q4	

3.2 PLANNED CSO PROJECTS FOR 2019

Below is a list of CSO projects scheduled for construction in the 2019 year:

TABLE 3-2: CSO CONTROL PROJECTS SCHEDULED FOR CONSTRUCTION IN 2019

City Project #: 2010088 **CSO Basin #:** 26 **Location:** Spokane Falls Blvd. from Monroe Street to Lincoln Street **Description:** Construction of a 2,200,000 gallon CSO Control facility and associated plaza above tank. **Estimated Cost:** $33.2m **Estimated Completion:** 2019 – Q3	
City Project #: 2012088 **CSO Basin #:** 34-1 and I07 **Location:** Riverside Avenue & Crestline **Description:** Construction of a 1,500,000 gallon CSO Control facility and a 200,000 Interceptor Protection facility. **Estimated Cost:** $15.5m **Estimated Completion:** 2019 – Q3	
City Project #: 2013214 **CSO Basin #:** I03 **Location:** T.J. Meenach and Northwest Blvd. **Description:** Construction of 1,200,000 gallon interceptor protection control facility #I03. **Estimated Cost:** $9.85m **Estimated Completion:** 2019 – Q4	

3.3 CSO PROJECT SCHEDULE

Below is an adjusted CSO project schedule. The schedule was first published in the 2014 CSO plan amendment and reflects the revised project schedule as it stands at the end of 2018.

TABLE 3-3: CSO CONTROL PROJECT SCHEDULE

		2018				2019				2020			
Tank Name		**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**
CSO Projects													
6	Shadle Bluff - Complete												
7	Downriver – Complete												
12	Doomsday Hill - Complete												
14	Summit	C	C	C									
15	Summit	C	C	C									
20	Hatch – Complete												
23	Maple Regulators	C	C	C									
24	Jefferson	C	C	C	C								
25	Main Ave	C	C	C	C								
26	Spokane Falls	C	C	C	C	C	C	C					
33-1	Liberty Park	C	C	C	C								
33-2	E. U-District - Complete												
34-1	Lee	C	C	C	C	C	C	C					
34-2	Underhill – Complete												
34-3	20th & Ray – Complete												
41	Minnehaha - Complete												
I-03	TJ Meenach NW Blvd	C	C	C	C	C	C	C	C				
I-04	Bosch's Lot - Complete												
I-07	Napa	C	C	C	C	C	C	C					

Legend: P Planning Phase; D Design phase; C Construction phase

Section 4: Monitoring Programs and Monitoring Results

This section provides an overview of the City of Spokane's precipitation and flow monitoring programs, and presents results for 2018, including a summary of precipitation, CSO overflow details, a history of overflow frequencies, volume, and duration, and also a summary of the CSO outfalls that meet the CSO control standard.

4.1 CSO SYSTEM BASELINE CONDITIONS

As of 2000, there were 24 permitted outfalls associated with the City of Spokane's combined sewer collection system. As of the end of 2018, there are 19 outfalls remaining. These are identified in the City's NPDES Permit No. WA-002447-3 and are listed as follows:

TABLE 4-1: 2018 CSO OUTFALLS FROM THE NPDES PERMIT

Outfall Number	Overflow Structure & Regulator Location Description	Outfall Location Reference
Discharges to Spokane River (North Bank)		
002	A.L. White @ Hartley (Extended)	0.5 miles downstream of WWTP
006	Kiernan @ NW Blvd	0.25 miles upstream of WWTP
007	Columbia Cir @ Downriver Park Dr	0.4 miles upstream of WWTP
010	Cochran @ Buckeye	At T.J. Meenach Bridge
~~012~~	~~Nora @ Pettet Dr~~	~~0.55 miles upstream of T.J. Meenach Bridge~~ (Combined with outfall 010 in March 2017)
014	Sherwood @ Summit	2.0 miles upstream of T.J. Meenach Bridge
015	Ohio @ Nettleton	2.5 miles upstream of T.J. Meenach Bridge
Discharges to Spokane River (South Bank)		
016	'A' @ Linton – Geiger	1.45 miles downstream of Monroe St Dam
Discharges to Latah Creek		
019	Seventh @ Inland Empire Way	At High Bridge (East Side)
020	High Drive between 33rd and 37th	2.65 miles upstream of Avista Bridge
Discharges to Spokane River (South Bank)		
022	Main @ Oak	0.7 miles downstream of Monroe St Dam
Discharges to Spokane River (North Bank)		
023	Cedar @ Ide	0.3 miles downstream of Monroe St Dam
Discharges to Spokane River (South Bank)		
024	Cedar @ Riverside	0.3 miles downstream of Monroe St Dam
025	Cedar @ Main	0.3 miles downstream of Monroe St Dam
026	Lincoln @ Spokane Falls Blvd	At Monroe St Bridge
033	~~Fifth @ Arthur~~ ~~3rd @ Perry~~ Third @ Arthur Sprague Ave @ Sprague Wy Liberty Park (West End)	0.15 miles upstream of J. Keefe Bridge
034	~~Crestline @ Riverside~~ Temporarily Moved to Magnolia north of Riverside (October 2017)	At Trent Bridge
038	Magnolia @ S Riverton	0.15 miles upstream of Mission
~~039~~	~~Altamont @ S Riverton~~	~~0.75 miles downstream of Greene~~ (Eliminated December 2012)
~~040~~	~~Regal @ S Riverton~~	~~0.25 miles downstream of Greene~~ (Eliminated December 2012)
Discharges to Spokane River (North Bank)		
041	Rebecca @ Upriver Dr	0.5 miles upstream of Greene
Discharges to Spokane River (South Bank)		
042	Surro Dr	1.1 miles upstream of Greene

In the March 2014 CSO Plan Amendment, baseline conditions were updated using a 20-year precipitation dataset and flow monitoring data. Table 4-2 includes the original baseline conditions, and the updated baseline conditions generated from flow monitoring during the ten-year period of 2003 through 2012.

TABLE 4-2: BASELINE AVERAGE ANNUAL CSO VOLUMES AND FREQUENCIES ORIGINAL 1979-1988 AND REVISED 2003 – 2012

CSO No.	CSO Location	1979 – 1988 Average Annual Overflow Volume (M) [1]	2003-2012 Average Annual Overflow Volume (M)	1979-1988 Average Annual Overflow Frequency	2003-2012 Average Annual Overflow Frequency
2	NW Blvd. @ Hartley	1.72[2]	0[2]	40[2]	0[2]
3b	NW Blvd. @ Assembly	0.00[2]	N/A[2]	1[2]	N/A[2]
3c	NW Blvd. @ Assembly	1.94[2]	N/A[2]	51[2]	N/A[2]
6	Kiernan @ NW Blvd.	14.12	4.81	34	27
7	Columbia Circle	0.81	0.32	13	11
10	Cochran @ Buckeye	0.27	0.15	7	10
12	Nora @ Pettet	9.65	3.50	35	28
14	Sherwood @ Summit	0.86	0.11	17	14
15	Nettleton @ Ohio	4.47	0.20	34	9
16a	"A" St. @ Linton	0.01[3]	N/A[3]	0[3]	N/A[3]
16b	"A" St. @ Linton	0.50[3]	0.21[3]	12[3]	6[3]
18	1st St. @ "A" St.	0.00[3]	N/A[3]	1[3]	N/A[3]
19	Under FW Bridge	0.00	0.00	0	<1
20	High Dr. near 33rd	0.55	0.03	3	<1
22	Main @ Oak St.	0.00	0.03	0	1
23	Cedar @ Ide	1.69	1.07	18	16
24a	Cedar @ Riverside	2.12	8.00	3	20
24b	Cedar @ Riverside	0.00	0.10	0	10
25	Cedar @ Main	0.35	0.42	19	22
26	Lincoln @ Spokane Falls	19.73	16.41	15	24
33a	5th @ Arthur	0.00	0.04	0	8
33b	3rd @ Perry	2.30	6.72	5	7
33c	3rd @ Arthur	0.12	0.04	11	6
33d	Sprague Ave @ Sprague Wy	2.03	0.42	42	23
34	Riverside @ Napa/Crestline	11.78	13.82	13	19
38	Magnolia @ S. Riverton	0.28[4]	0.08[4]	10[4]	10[4]
39	Altamont @ S. Riverton	1.06[4]	0.06[4]	34[4]	4[4]
40	Regal @ S. Riverton	1.45[4]	0.06[4]	32[4]	7[4]
41	Rebecca @ Upriver Dr.	0.52	0.39	11	12
42	Surro @ S. Riverton	0.31	0.02	7	2
Total		78.64	**56.99**	467	**296**

[1] With snowmelt.

[2] CSO 2 & 3c flows are consolidated and regulated at CSO 2&3c Control Facility to overflow no more than once per year on average via Outfall 2. CSO 3b regulator is physically eliminated and outfall is now separated storm only.

[3] CSO 16a, 16b & 18 flows are consolidated and regulated at CSO 16/18 Control Facility to overflow no more than once per year on average via Outfall 16b. Outfalls 16a and 18 are physically disconnected.

[4] CSO 38, 39 and 40 flows are consolidated and regulated at the CSO 38/39 Control facility to overflow no more than once per year on average via Outfall 38. Outfalls 39 and 40 are physically disconnected.

4.2 PRECIPITATION MONITORING PROGRAM

The City of Spokane collects precipitation data from 12 rain gauges around the City. Five of those gauges have been in place since 1996, and provide a 20-year basis for precipitation modeling and validation of sewer models. The data has been collected in a 1-minute resolution since mid-2000. Because of the quality of the rain data, the City has a high degree of confidence in the modeling results and sizing of the CSO facilities.

Overall, 2018 rainfall was average for the region with 15.95 inches measured at the Spokane Airport. However, 2018 had two wetter than average months: April and December. These two wet months contributed 45% of the total volume of Combined Sewer Overflows for an otherwise relatively dry year.

- In April 2018, five storm events contributed to a combined 11.5 million gallons of sewage that overflowed into the Spokane River.
- In December 2018, eight storm events contributed to a combined 7.4 million gallons of sewage that overflowed into the Spokane River.

TABLE 4-3: 2018 PRECIPITATION BY GAUGE BY MONTH (INCHES)

Rain Gauge	January	February	March	April	May	June	July	August	September	October	November	December
343	3.11	1.20	1.64	2.78	0.98	0.86	0.09	0.39	0.05	1.97	2.77	2.66
344^	2.75	1.34	1.38	2.45	1.13	0.79	0.02	0.28	0.05	1.72	2.47	2.67
Shadle	2.34	1.42	1.23	2.58	1.17	0.56	0.00	0.3	0.07	1.82	2.22	1.84
Hartson^	2.13	1.29	1.13	2.29	0.31P	0.76	0.02	0.36	0.03	1.7	2.17	2.01
City Hall^	2.61	1.52	1.20	2.60	0.79	0.58	0.00	0.33	0.12	1.58	2.19	2.55
Joe Albi^	3.04	1.63	1.29	2.47	1.20	0.48	0.09	0.26	0.06	1.84	1.87P	2.06
Rockwood Vista^	3.28	2.04	1.70	3.36E	1.25E	1.23E	0.02	0.49E	0.06	2.67E	3.08E	3.17E
Station 8^	2.99	1.75	1.31	2.75	0.71	0.62	0.03	0.36	0.05	1.75	2.12	1.83
West Drive^	3.22	1.57	1.34	2.69	1.52	0.90	0.04	0.29	0.12	1.68	2.29	2.93
Nora & Pettet	3.11	1.50	1.30	2.67	0.87	0.44	0.00	0.33	0.10	1.69	2.17	2.48
Lincoln	X	X	X	X	X	X	X	X	0.26	1.89	2.33	1.93
Northeast	X	X	X	X	X	X	X	X	0.10	1.78	2.22	1.81
GEG	2.55	1.60	1.30	2.03	1.45	0.55	0.06	0.17	0.02	1.64	1.96	2.62
NWS - Spokane	2.5	1.59	1.25	2.83	1.33	1.11	0.37	0.18	0.03	1.95	1.9	2.65
Felts Field	2.15	1.64	1.22	2.66	0.76	0.84	0.00	0.35	0.00	1.89	2.29	2.05
Month Average	**2.75***	**1.55***	**1.33***	**2.57***	**1.08***	**0.71***	**0.06***	**0.30***	**0.07**	**1.78***	**2.24***	**2.29***

X – Rain gauge out of service for part or whole month.

P – Rain gauge missing partial data.

E – Rain gauge value for part of the month in error; under-reporting or over-reporting.

* - Rain gauge service interruptions and errors not included in monthly average.

^ - Rain gauge is heated.

4.3 FLOW MONITORING PROGRAM AND SUMMARY OF RESULTS

During 2018, Spokane's flow monitoring employees operated and maintained 29 CSO flow monitoring sites, 4 stormwater and CSO sampling sites, and 50 other flow monitoring sites for a total of 83 sites throughout the collection system.

A team of monitoring staff regularly reviews the flow monitoring results and evaluates the quality of the incoming data and the performance of each flow monitor site. The team performs maintenance when a flow monitor indicates erroneous data or is not reporting data on a timely schedule. Early warning alarms are monitored 24 hours per day by the Operations group at RPWRF. If conditions are dry, the alarms are referred to the flow monitoring team and sewer maintenance crews for potential maintenance. Overflow alarms are monitored 24 hours per day, and confirmed alarms are posted to the City's public notification web site.

On a monthly basis, an analyst and the flow monitoring team review the monthly report data. False positives are eliminated from the data, and data that is missing or in error is estimated or adjusted using information from alternative or redundant monitoring points. Any problematic rain gauges and flow monitoring sites with an increase in missing or erroneous data are reviewed by the team to suggest improvements to the flow monitoring site to increase the quality of the data.

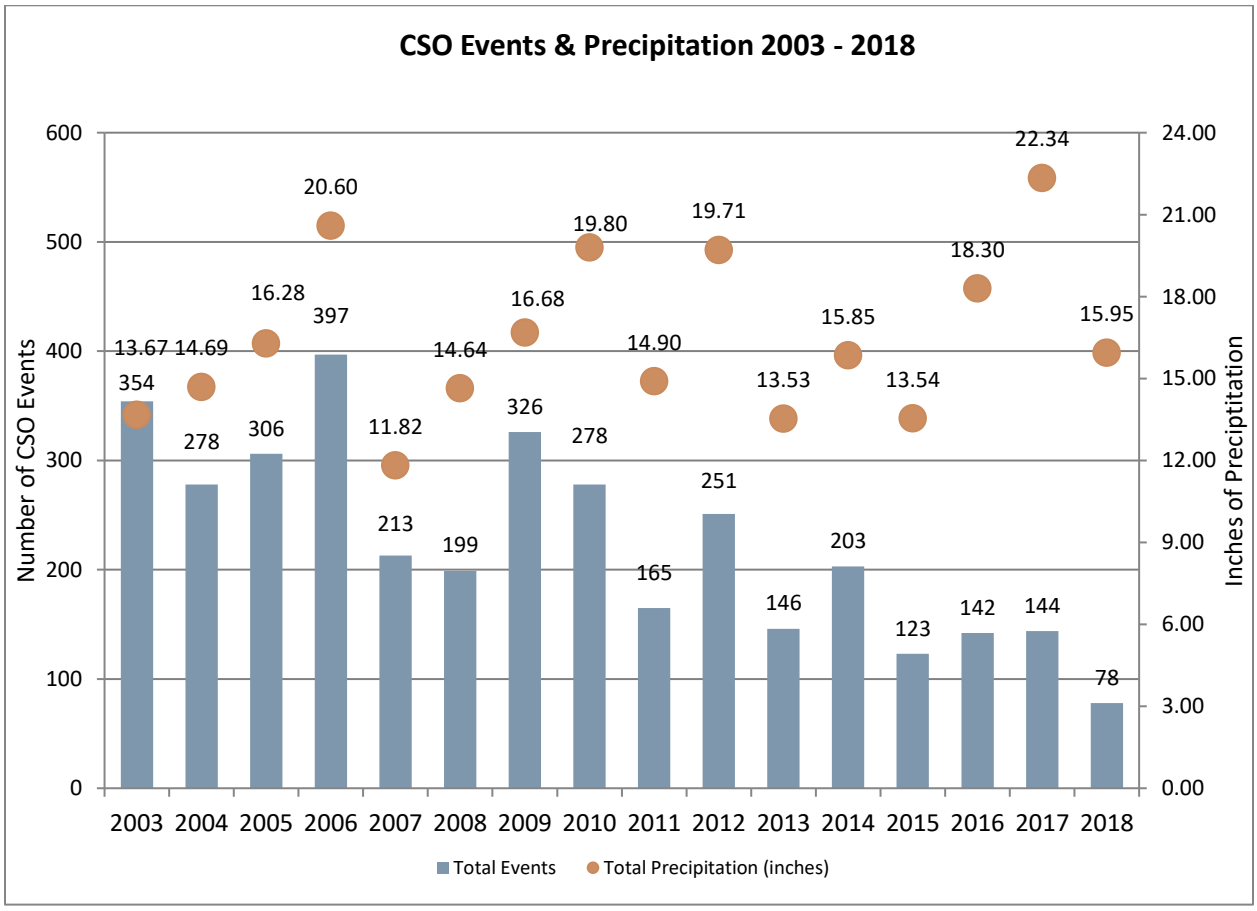


FIGURE 4-4: 2003 – 2018 CSO EVENTS & PRECIPITATION

As the City of Spokane's rainfall varies from year to year, the amount of rain and the variability in the intensity of rainstorms introduce a high degree of variability in the number of CSO overflow events. As the City of Spokane continues to install control facilities, the number of overflow events have generally been reduced as shown in Figure 4-4. In 2018, rainfall was average and the the annual number of overflow events was below the 2003-2012 baseline.

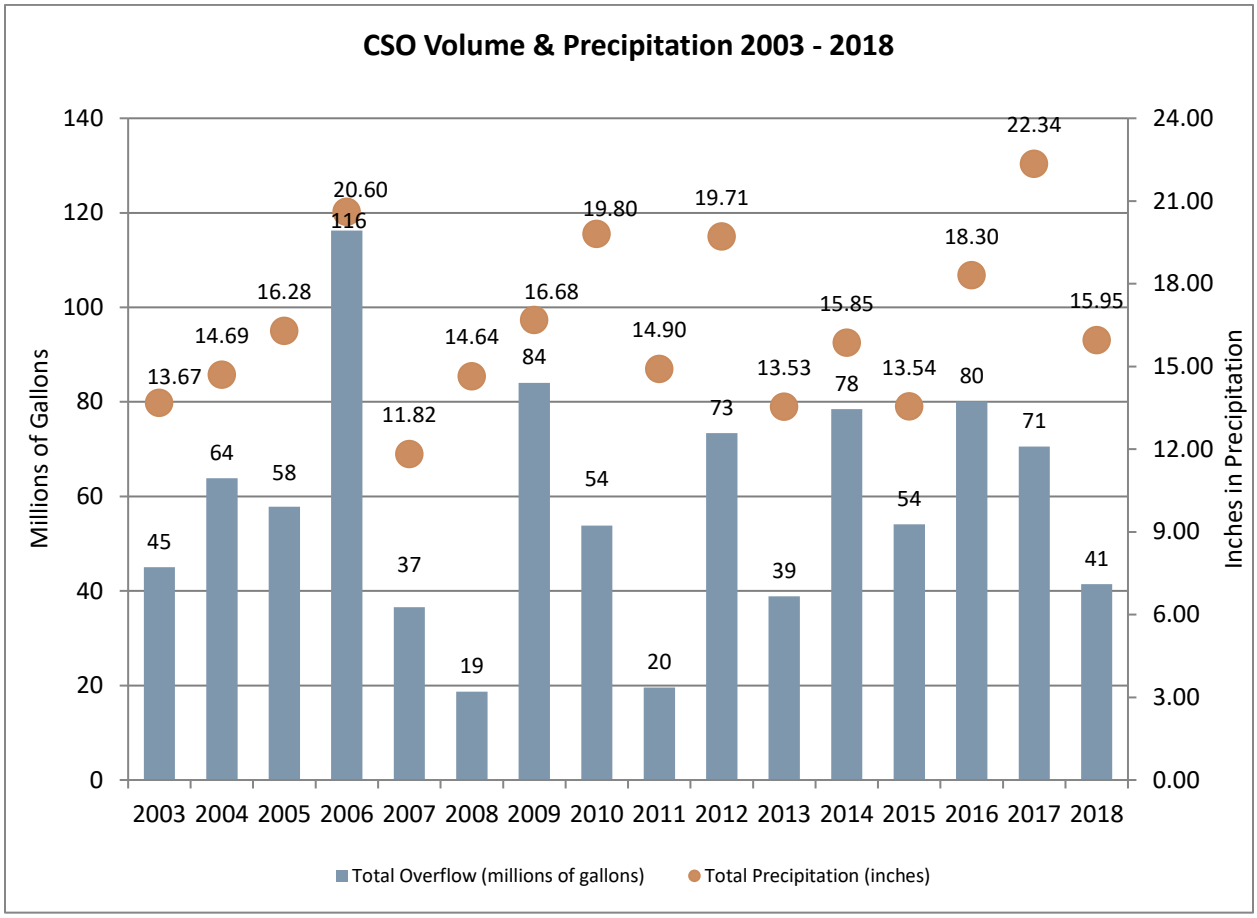


FIGURE 4-5: 2003 – 2018 CSO VOLUME & PRECIPITATION

As the City of Spokane's rainfall varies from year to year, the amount of rain and the variability in the intensity of rainstorms introduce a high degree of variability in the volume of CSO overflows. As the City of Spokane continues to install control facilities, the amount of overflow volume has generally been reduced as shown in Figure 4-5. In 2018, overall rainfall was average, and the volume of overflows was below the 2003 – 2012 baseline average. The volume of overflows appear to have declined as new CSO tanks came online in 2018.

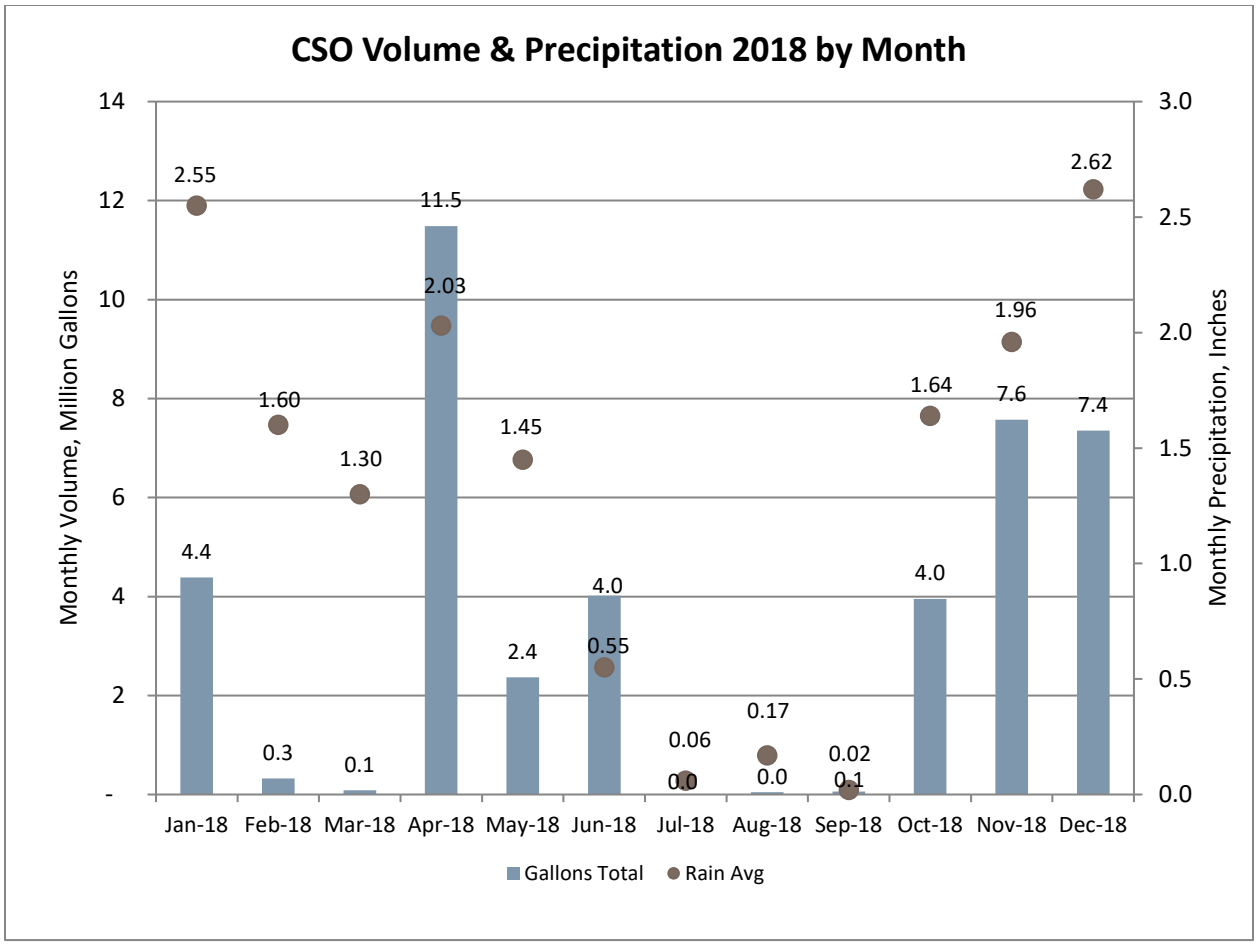


FIGURE 4-6: MONTHLY CSO VOLUMES & PRECIPITATION FOR 2018

In accordance with the requirements of the City of Spokane's NPDES Permit concerning combined sewer overflow discharges, summarized below are the frequencies, volumes and durations of CSO events recorded from January 1 through December 31, 2018. It is estimated that a **total of 41.4 million gallons** of combined sewage discharged to local receiving waters over these twelve months. All of these discharges were associated with snowmelt and/or rain events and distributed across 8 of the 19 permitted CSO outfalls. Discharges at the remaining seven (7) priority CSO regulator sites accounted for 89 percent of the total overflow volume measured.

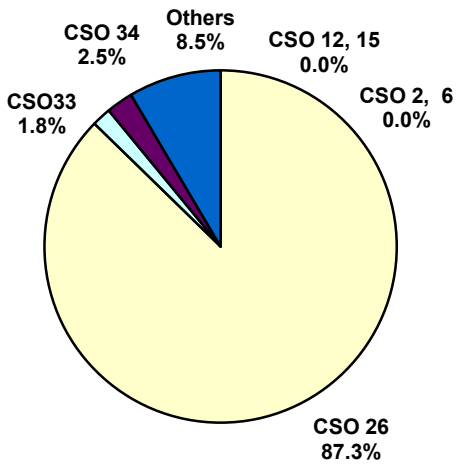


FIGURE 4-7: PERCENTAGE OF FLOW THROUGH SEVEN REMAINING PRIORITY SITES

TABLE 4-8: SUMMARY OF MONITORED CSO FREQUENCIES & VOLUMES FOR 2018

CSO OUTFALL	UPSTREAM REGULATOR ID[1]	MONITORED CSO VOLUME (Gallons)	MONITORED CSO FREQUENCY (Occurrences)	MONITORED CSO DURATION (Minutes)
02	**02**	0	0	0
06	**06**	0	0	0
07	07	72,140	4	80
10	10	0	0	0
12	**12**	0	0	0
14	14	8,354	3	70
15	**15**	0	0	0
16	16	0	0	0
19	19	0	0	0
20	20	0	0	0
22	22B	0	0	0
23	23-1	28,919	4	160
24	24A	3,233,886	12	2025
	24B	177	1	10
	24-1	0	0	0
	Total[2]:	3,234,063	12	
25	25	171,640	7	345
26	**26**	36,140,143	34	8840
33	33A	817	1	35
	33B	708,835	3	105
	33C	17,188	3	80
	33-1	0	0	0
	33-2	0	0	0
	Total[2]:	726,840	5	
34	**34**	1,020,798	9	2,030
38	38	0	0	0
~~39~~	~~**39**~~	Outfall Eliminated December 2012		
~~40~~	~~**40**~~	Outfall Eliminated December 2012		
41	41	0	0	0
42	42	0	0	0
RPWRF[3]	RPWRF[3]	0	0	0
TOTAL:		**41,402,897**	**78**	**13,780**

1. *Nine (9) priority flow monitoring sites identified in **BOLDFACE** type. CSO 03C was formerly a priority site, but is now associated with CSO Outfall 02.*
2. *Frequency reflects any simultaneous overflows from multiple regulators to a common outfall.*
3. *NPDES Permit Section 13.H requires reporting date, duration, and volume of CSO-Related bypasses at RPWRF.*

TABLE 4-9: CSO OVERFLOWS CURRENTLY MEETING ANNUAL OVERFLOW FREQUENCY PERFORMANCE STANDARD

Outfall NPDES Number	Reported Number of Overflows per Year																			Average Annual Overflow Frequency			Meets Annual Overflow Frequency Performance Standard Since Controlled	Has Facility	Operational Since	Controlled Since	Outfall Eliminated	Comments
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2003 - 2012 Baseline	Overflow Frequency Before Controlled (up to 20 years)	Overflow Frequency Since Controlled (up to 20 years)						
02	0	3	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.06	0.00	Yes	Yes	2003	2003		
~~03~~	0	8	16	0																0			N/A				2003	
06	3	17	27	24	32	23	35	23	21	27	30	21	30	22	28	17	2	2	0	27	21.17	--	No	Yes	2015			Final regulator setting not in place
07	NM	8	10	14	11	15	18	9	6	13	11	5	7	3	6	6	3	1	4	11	8.33	--	No	Yes	2015			Final regulator setting not in place
10/12	0	8	11	10	7	13	17	8	6	12	13	8	1	0	0	0	0	0	0	10	6.33	0.14	Yes	Yes	2011	2012		Events for CSO 10; Outfall shared with CSO 12
10/**12**	10	23	29	34	31	26	39	25	22	32	33	15	23	15	19	11	19	3	0	28	22.17	0.00	Yes	Yes	2017	2018		Events for CSO 12; Outfall shared with CSO 10
14	NM	NM	11	20	11	21	36	17	16	18	1	0	3	0	2	5	6	4	3	14	10.24	--	No					Weir modified in 2009
15	1	5	9	11	10	14	17	5	9	12	2	3	2	0	2	0	0	0	0	9	5.61	--	No					Weir modified in 2009
16	NM	0	6	11	9	14	16	5	0	0	0	0	0	0	0	0	0	0	0	6	3.39	0.00	Yes	Yes	2007	2008		
~~18~~																				N/A			N/A				pre-2000	
19	NM	0	0	0	1	0	1	2	0	1	0	0	0	0	0	0	0	0	0	<1	0.28	0.00	Yes	Yes	2010	2011		
20	NM	NM	NM	NM	1	0	0	0	0	1	0	0	2	0	2	1	0	0	0	<1	0.47	0.00	Yes	Yes	2016	2016		
22	0	1	5	2	3	1	1	1	2	0	0	0	0	0	1	1	0	0	0	1	1.00	0.22	Yes			2009		Influenced by CSO 25
23	3	16	20	20	17	18	28	18	16	17	16	0	12	1	7	6	5	3	4	16	12.44	--	No		2018			
24	5	15	33	33	19	27	31	16	15	20	28	22	29	18	24	12	17	28	12	24	22.17	--	No		2018			Tank 24-1 came online 9/2018; 24A & B were decommissioned in 12/2018
25	NM	0	5	44	19	18	31	15	17	20	20	16	22	15	20	10	18	15	7	22	17.33	--	No	Yes				
26	4	16	20	24	20	20	33	16	20	27	30	21	33	21	28	16	26	32	34	24	24.28	--	No					Weir modified before 2000; Influenced by CSO 24
33	7	34	38	38	22	36	33	21	14	24	25	19	29	18	25	15	14	17	5	25	23.72	--	No					Includes tanks 33-1 and 33-2; 33A was plugged 3/2018; 33B was plugged 11/2018
34	2	15	18	18	19	14	27	11	16	24	17	17	24	21	22	12	15	25	9	19	18.00	--	No					
38	1	9	10	14	12	6	8	7	4	14	16	3	17	0	0	0	0	0	0	10	6.67	0.00	Yes	Yes	2012	2013		
~~39~~	1	3	2	5	5	9	4	3	2	4	8	1	2							4			N/A				2012	
~~40~~	5	17	19	21	17	9	6	4	4	6	6	1	0							7			N/A				2012	
41	NM	0	9	10	12	12	13	7	7	13	22	13	15	12	17	11	16	13	0	12	11.22	0.00	Yes	Yes	2017	2018		
42	0	1	0	0	0	10	3	0	2	0	0	0	0	0	0	0	0	0	0	2	0.89	0.00	Yes	Yes	2009	2009		

LEGEND	
NM	= Not Monitored
	= Controlled Since (Begins with first full year of control)
	= Outfall Eliminated
	= Monitored Less Than Full Year
	= Meets 20-year Average Since Controlled

TABLE 4-10: 2018 CSO DETAILS BY REGULATOR AND DATE

Regulator Number	Receiving Water	Start Date	Volume (Gallons)	Duration (Hours)	Precipitation (Inches)	Storm Duration (Hours)
02	Spokane River	*There were no Combined Sewer Overflows from regulator 02 during 2018.*				
06	Spokane River	*There were no Combined Sewer Overflows from regulator 06 during 2018.*				
07	Spokane River	04/07/2018	8,734	0.50	0.33	34.12
		04/10/2018	4,444	0.17	1.09	166.00
		04/29/2018	1,257	0.08	0.26	52.73
		05/23/2018	57,705	0.58	0.11	15.67
		Total	*72,140*	*1.33*	*1.79*	*268.52*
		Average	*18,035*	*0.33*	*0.45*	*67.13*
10	Spokane River	*There were no Combined Sewer Overflows from regulator 10 during 2018.*				
12	Spokane River	*There were no Combined Sewer Overflows from regulator 12 during 2018.*				
14	Spokane River	04/07/2018	3,993	0.75	0.33	34.12
		04/10/2018	3,566	0.25	1.09	166.00
		04/29/2018	795	0.17	0.26	52.73
		Total	*8,354*	*1.17*	*1.68*	*252.85*
		Average	*2,785*	*0.39*	*0.56*	*84.28*
15	Spokane River	*There were no Combined Sewer Overflows from regulator 15 during 2018.*				
16	Spokane River	*There were no Combined Sewer Overflows from regulator 16 during 2018.*				
19	Latah Creek	*There were no Combined Sewer Overflows from regulator 19 during 2018.*				
20	Latah Creek	*There were no Combined Sewer Overflows from regulator 20 during 2018.*				
22B	Spokane River	*There were no Combined Sewer Overflows from regulator 22B during 2018.*				

TABLE 4-10: 2018 CSO DETAILS BY REGULATOR AND DATE

Regulator Number	Receiving Water	Start Date	Volume (Gallons)	Duration (Hours)	Precipitation (Inches)	Storm Duration (Hours)
23-1	Spokane River	04/07/2018	16,397	1.25	0.33	34.12
		04/10/2018	333	0.25	1.09	166.00
		04/29/2018	10,488	0.75	0.26	52.73
		05/23/2018	1,701	0.42	0.11	15.67
		Total	*28,919*	*2.67*	*1.79*	*268.52*
		Average	*7,230*	*0.67*	*0.45*	*67.13*
24A	Spokane River	01/09/2018	448,681	7.67	1.25	205.08
		01/18/2018	430,259	4.25	0.35	74.92
		01/23/2018	67,790	3.58	0.51	124.83
		02/02/2018	2,883	0.42	0.41	68.77
		03/14/2018	267	0.33	0.17	27.23
		04/05/2018	310	0.25	0.47	32.97
		04/07/2018	973,074	2.67	0.33	34.12
		04/10/2018	537,262	7.00	1.10	166.00
		04/29/2018	129,504	2.42	0.26	52.73
		05/06/2018	36,604	1.67	0.30	65.83
		05/18/2018	11,982	0.75	0.35	48.60
		06/21/2018	595,270	2.75	0.29	40.52
		Total	*23,272,628*	*170.43*	*17.66*	*2,100.82*
		Average	*861,949*	*6.31*	*0.65*	*77.81*
24B	Spokane River	04/30/2018	177	0.17	0.26	52.73
		Total	*1,183*	*0.76*	*0.88*	*263.78*
		Average	*296*	*0.19*	*0.22*	*65.95*
24-1	Spokane River	*There were no Combined Sewer Overflows from regulator 24-1 during 2018.*				
24 (Total)	Spokane River	*Total*	*3,234,063*	*33.75*	*5.79*	*941.60*
		Average	*248,774*	*2.61*	*0.47*	*76.49*

TABLE 4-10: 2018 CSO DETAILS BY REGULATOR AND DATE

Regulator Number	Receiving Water	Start Date	Volume (Gallons)	Duration (Hours)	Precipitation (Inches)	Storm Duration (Hours)
25	Spokane River	01/18/2018	11,088	0.92	0.35	74.92
		04/07/2018	36,671	1.25	0.33	34.12
		04/10/2018	28,227	1.17	1.10	166.00
		04/29/2018	37,895	0.92	0.26	52.73
		05/07/2018	5,937	0.42	0.30	65.83
		05/17/2018	8,473	0.42	0.35	48.60
		06/21/2018	43,349	0.67	0.29	40.52
		Total	*171,640*	*5.75*	*2.98*	*482.72*
		Average	*24,520*	*0.82*	*0.43*	*68.96*
26	Spokane River	01/09/2018	691.379	7.25	1.25	205.08
		01/18/2018	1,247,515	4.08	0.35	74.92
		01/23/2018	753,105	7.42	0.51	124.83
		01/29/2018	433	0.25	0.06	4.67
		02/02/2018	123,868	2.42	0.41	68.77
		02/17/2018	156,593	1.75	0.65	96.17
		03/01/2018	7,263	0.33	0.30	184.10
		03/14/2018	11.989	0.50	0.17	27.23
		03/17/2018	2,882	0.33	0.14	33.75
		03/22/2018	60,047	1.25	0.19	16.52
		04/05/2018	137,454	1.75	0.47	32.97
		04/07/2018	1,563,240	2.50	0.33	34.12
		04/10/2018	4,871,616	16.33	1.10	166.00
		04/28/2018	256,578	1.25	0.12	3.22
		04/29/2018	2,098,549	4.00	0.26	52.73
		05/06/2018	1,513,195	3.58	0.30	65.83
		05/11/2018	98,184	0.42	0.07	38.27
		05/17/2018	631,629	3.08	0.35	48.60
		06/09/2018	42,474	1.50	0.26	47.08
		06/21/2018	3,159,072	3.67	0.29	40.52
		08/27/2018	43,871	1.17	0.28	17.78
		09/11/2018	62,536	0.42	0.05	3.17
		10/09/2018	140,400	2.58	0.31	17.85
		10/25/2018	1,634,073	5.33	0.53	17.02
		10/28/2018	1,317,610	4.42	0.35	10.83
		10/31/2018	856,691	7.75	0.49	53.10
		11/04/2018	139,641	0.92	0.16	15.72
		11/22/2018	5,449,161	18.17	1.48	182.07

TABLE 4-10: 2018 CSO DETAILS BY REGULATOR AND DATE

Regulator Number	Receiving Water	Start Date	Volume (Gallons)	Duration (Hours)	Precipitation (Inches)	Storm Duration (Hours)
		11/30/2018	1,717,895	4.92	0.31	33.22
		12/11/2018	716,236	6.17	0.36	49.45
		12/13/2018	9,259	0.58	0.10	8.57
		12/16/2018	5,535,796	19.42	0.87	57.92
		12/20/2018	572,187	3.00	0.11	7.02
		12/29/2018	517,722	8.83	0.25	42.47
		Total	*36,140,143*	*147.33*	*13.23*	*1,881.57*
		Average	*1,062,945*	*4.33*	*0.39*	*55.34*
33A	Spokane River	01/16/2018	817	0.58	0.35	74.92
		Total	*817*	*0.58*	*0.35*	*74.92*
		Average	*817*	*0.58*	*0.35*	*74.92*
33B	Spokane River	04/07/2018	292,378	0.83	0.33	34.12
		04/16/2018	252,075	0.50	1.10	166.00
		06/21/2018	164,382	0.42	0.29	40.52
		Total	*708,835*	*1.75*	*1.72*	*240.64*
		Average	*236,278*	*0.58*	*0.57*	*80.21*
33C	Spokane River	04/16/2018	2,769	0.58	1.10	166.00
		04/29/2018	4,221	0.33	0.26	52.73
		06/21/2018	10,198	0.42	0.29	40.52
		Total	*17,188*	*1.33*	*1.65*	*259.25*
		Average	*5,729*	*0.44*	*0.55*	*86.42*
33-1	Spokane River	*There were no Combined Sewer Overflows from regulator 33-1 during 2018.*				
33-2	Spokane River	*There were no Combined Sewer Overflows from regulator 33-2 during 2018.*				
33 (Total)	Spokane River	*Total*	*726,840*	*1.33*	*1.65*	*259.25*
		Average	*103.834*	*0.52*	*0.53*	*82.12*

TABLE 4-10: 2018 CSO DETAILS BY REGULATOR AND DATE

Regulator Number	Receiving Water	Start Date	Volume (Gallons)	Duration (Hours)	Precipitation (Inches)	Storm Duration (Hours)
34	Spokane River	01/09/2018	306,969	8.83	1.25	205.08
		01/18/2018	177,850	4.00	0.35	74.92
		01/23/2018	249,199	10.50	0.51	124.83
		02/02/2018	39,781	2.92	0.41	68.77
		04/07/2018	106,101	1.75	0.33	34.12
		04/15/2018	73,792	2.67	1.10	166.00
		04/29/2018	34,836	1.58	0.26	52.73
		06/21/2018	382	0.25	0.29	40.52
		11/23/2018	31,888	1.33	1.48	182.07
		Total	*1,020,798*	*33.83*	*5.98*	*949.04*
		Average	*113,422*	*3.76*	*0.66*	*105.45*
38-1	Spokane River	*There were no Combined Sewer Overflows from regulator 38-1 during 2018.*				
41	Spokane River	*There were no Combined Sewer Overflows from regulator 41 during 2018.*				
42	Spokane River	*There were no Combined Sewer Overflows from regulator 42 during 2018.*				
RPWRF	Spokane River	*There were no bypasses at RPWRF during 2018.*				

APPENDIX A: CSO O&M MANUAL

City of Spokane

OPERATIONS & MAINTENANCE PLAN
For
CSO Regulators and OUTFALLS

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GOAL:

The goal of this operations and maintenance plan is to properly manage the CSO regulator structures and prevent combined sewer dry weather overflows (DWO).To accomplish that we have eliminated most of the dam and leaping weir methods of control and upgraded to hydroslides and tanks for storage. Dam and leaping weir overflow occurs within the same manhole as the active sewer line. This style has potential to plug and overflow immediately to the river.
The modified weirs and tanks have storage areas before the overflow weir. This allows for some response time prior to the actual overflow. See comprehensive 6 year sewer program for future tank construction schedules.

AWARENESS AND PREVENTION:

- Wastewater Maintenance Atlas has the CSO regulator basin areas identified by shading and labeling, as to the immediate impact on the regulator through various maintenance procedures.
- Wastewater Crew member training to include these designated areas of immediate impact shall take place annually.
- All contract documents for our cured in place pipe program and any work upstream of regulator that could affect regulator shall include reference to the regulator and/or control device sites and strict notification to the contractor that mechanical measures must be taken to prevent any type of dry weather over flow from any and all work performed by the contractor.
- Maintenance and Construction procedures have been reviewed to include the feasibility of installing pneumatic plugs / sand bags during the course of routine work to prevent any type of dry weather overflow in designated areas.
- Training of Water Department Staff and other city staff that have the potential to cause a DWO.

FREQUENCY OF INSPECTION:

Routine Inspections:

Visual inspection or remote means by a Wastewater Specialist or CSO Instrument Technician for each CSO structure shall take place once a week, year around; unless maintenance history dictates a more frequent schedule is required. The City's CSO's are geographically split into those located north or south of the Spokane River (see weir check lists). Inspections shall include a visual check for any blockages, plugs, sticks, rocks or debris and be used to assess the overall operating condition. CSO monitoring alarm thresholds have been reviewed and, where feasible, lowered. Remote regular verification of CSO monitoring equipment and telemetry status from RPWRF has been implemented. Weekly visual inspections are accomplished along with continued monitoring. The exception to this schedule shall be on any regulator and/or control device that has been plugged; it is checked daily for five working days, and then checked once a week for a month, before returning to the regular schedule.

- Check all outfall pipes and down stream banks once monthly for signs of overflow.
- Check all sign condition once monthly, if damaged fix as soon as possible.
- As determined by remote monitoring, any CSO structure that overflows following the prior week check will have that outfall pipe checked. Down stream banks will be checked for sewage debris, and cleaned up.

Routine Tank Inspection

See the O & M manual and/or SOP for appropriate tank inspection checklist.

Visual inspection of each tank shall take place annually per each tank O&M procedures.
An intermediate event is when water gets in the flush tanks and/ or the tank. An extreme event is when the tank fills then overflows to the river.
If monitoring indicates the tanks have filled in an intermediate or extreme event, a follow-up visual inspection of tank components will take place within 7 days of the event.

Stage II Snow Event Procedures

Routine weekly visual inspections will be suspended during stage II snow events for access and safety reasons.

- Remote monitoring of CSO's will continue during the stage II event.

High River Procedures

For safety reasons, outfalls and downstream river bank inspections will be suspended when the river flows are above 25,000 cfs.

Dry Weather Procedures:

DWO procedures will be done year around. When notification of a possible dry weather overflow occurs Wastewater maintenance will:

- Inspect affected regulator and/or control device and return to normal operation

DWO MAINTENANCE PROCEDURES:

If the regulator and/or control device is overflowing, the crew will immediately try to dislodge any debris causing the blockage with the service truck pole. If this is unsuccessful, the crew will radio Wastewater Maintenance to get the closest available hydro cleaner to assist in clearing the blockage. The crew will continue to work with the pole to dislodge any debris until the hydro crew arrives. If the blockage is still not 100% clear from the regulator and/or

control device, the crew shall immediately notify the appropriate Supervisor in order to enter the confined space; per the Wastewater Management confined space entry program and remove all foreign objects with hooks and shovels or by using a combination sewer cleaner with vacuum capabilities. (Note: If the debris cannot be removed expediently, it may be necessary to plug the sewer line and by-pass pump all the flow to another sanitary facility in the interim to remove all debris.) This practice shall be continued until the structure is flowing cleanly and there is no doubt that the regulator and/or control device is 100% free of any obstruction.

- Document the DWO on the complaint form.
- Try to identify the debris blocking weir
- Where possible state the size or amount of blockage

CAUTION SIGNS AND FLAGS:

During high river use, between April 15th and November 1, river entry point signage will also be displayed.

Flags and signage will not be displayed between November 2 and April 14th

- Flip open signage and install flags for 24 hrs at Plese Flats, TJ Menach and Water Ave river access points.
- Remove any sewage debris in the vicinity of the outfall within three days of any dry weather overflow,
- Check signage at outfall

INTERNAL NOTIFICATION PROTOCOL:

Notification of any plugged regulator and or control device shall be directed immediately, 24 hours a day, to Wastewater Maintenance (625-7900) and passed on to the appropriate Supervisor;

After hours Supervisor will contact RPWRF operator to give a point of contact. When resolved, Supervisor will contact RPWRF operator on weir status.

- Dan Duffey Radio #326,
- Mal Lund Radio #330,
- Jim Montague Radio #350,
- Mike Lowdon #331.

SUPERVISOR PROCEDURES:
In any Dry Weather Overflow (DWO) event, the Wastewater Maintenance and Collection Superintendent, Raylene Gennett, or responsible person shall notify external personnel as defined in the following section and notify the Director of Wastewater Management, Dan Kegley and the Director of Public Works, Scott Simmons.

- Minimum information needed by Supervisors for initial (24-hour) DWO notification is:
- Location and Regulator Number
- Time of notification to Wastewater Maintenance and/or time DWO was discovered
- Notify RPWRF Operator of overflow, as to activate public notification on the city website.

Additional information needed by Supervisors for follow-up report due to DOE within 5 business days includes:

- Start and end times of DWO
- Duration of DWO (cumulative recorded overflow time)
- Estimated gallons of DWO calculated from a review of information provided by programmer analyst
- Pipe and weir sizes involved
- Description of Wastewater Management response, including timeline (alarm, validation, maintenance crew arrival, return to normal operation)
- Cause of DWO, if it can be determined
- Any special circumstances, such as vandalism, firefighting, water main break, damaged monitors or telemetry, etc.
- How we might prevent in the future, as applicable

24 HOUR PHONE NOTIFICATION TO ECOLOGY:

Wastewater Maintenance and Collection Superintendent, Raylene Gennett or responsible person shall verbally notify the Dept. of Ecology within 24 hours of the city becoming aware of a possible DWO event. **Such notification shall be to Ecology's 24-hour phone number 329-3400.** If during business hours, attempt to also notify the NPDES permit manager and enforcement coordinator at Ecology via that same phone number or by e-mail.

24 HOUR PHONE NOTIFICATION TO SPOKANE REGIONAL COUNTY HEALTH:

Wastewater Collection Supervisor, Raylene Gennett or responsible person shall verbally notify **Spokane Regional County Health (SRCH) 8am to 5:00 pm call 324-1560. After hours call 624- 4146.** During business hours attempt to notify Mike LaScuola at the 324-1574 within 24 hours of the city becoming aware of a possible DWO event.

POST EVENT INSPECTION:

Any regulator and/or control device that has been plugged;

- Check daily for five working days,
- Then check once a week for a month,
- If no signs of issues with regulator during the post inspections then return to the regular schedule.

5 DAY WRITTEN REPORT TO ECOLOGY:

Wastewater Maintenance and Collection Superintendent, Raylene Gennett or responsible person shall submit a written report documenting the DWO event. The written report shall be sent to the NPDES permit manager at Department of Ecology within five (5) business days per the notification plan.

RECORD KEEPING:

All monthly inspection reports shall be kept on file at Wastewater Maintenance. Regarding dry weather overflow events, a log of all radio communications during the event will be kept on file. All 5 day written reports for DWO events submitted to Ecology and shall be placed on file. When development of the Maintenance Management System is complete, the monthly CSO regulator inspection information shall be recorded electronically. The data shall reference the manhole identification number (I.D.) and CSO regulator number.

SUBMISSION DATES:

Previous year's weir, sign and outfall inspection reports shall be submitted by March 1st each year. (Reference NPDES Permit S.13.F)

Annual review of the CSO O&M Plan shall be submitted on October 1st of each year. (Reference NPDES Permit S.13.E)