



WASTEWATER MANAGEMENT
909 E. SPRAGUE
SPOKANE, WASHINGTON 99202-2127
(509) 625-7900
FAX (509) 625-7940

DALE E. ARNOLD
DIRECTOR

October 1, 2015

Jim Bellatty, Section Manager
Water Quality Program
Washington State Department of Ecology
4601 North Monroe, Suite 202
Spokane, WA 99205

Re: City of Spokane Combined Sewer Overflow (CSO) Annual Report
Calendar Year 2014

Dear Mr. Bellatty:

Enclosed for review and approval is the City of Spokane's 2014 CSO Annual Report as required in Section S13B of the City's 2011 NPDES Permit. The 2014 annual CSO overflow volume to the river of approximately 78 million gallons and is slightly above average. This report will be posted within a few weeks on the City's Wastewater Management website: www.spokanewastewater.org.

Annual progress on the City's CSO Reduction Plan, required in S13D, is reported in Table 5 on page 18 of the enclosed Annual Report. Appendix C presents the CSO Maintenance and Inspection Plan update for review and approval, per Section S13E.

If you have any questions or need additional information about this report, please contact Christopher W. Kuperstein, at 625-7903.

Sincerely,

Lars H. Hendron, P.E.
Principal Engineer – Wastewater Management

RECEIVED

OCT 01 2015

Department of Ecology
Eastern Regional Office

Enclosure (1): 2014 CSO Annual Report (3 Copies)

cc: (W/O Enclosure):

Rick Romero, Director of Utilities – City of Spokane
Mike Taylor, Program Manager – RPWRF NLT
Dale Arnold, Director – Wastewater Management
Mike Coster, Superintendent – RPWRF Operations & Maintenance
Bill Peacock, Principal Engineer – Wastewater Management
Gary Kaesemeyer, Collection Operations Supervisor – Wastewater Management
Bruce Brurud, Instrumentation & Data Supervisor – Wastewater Management
Christopher Kuperstein, Application Analyst – Wastewater Management
Janet Davey – Wastewater Management Files



City of Spokane

Wastewater Management



Combined Sewer Overflow Annual Report – FY 2014 NPDES Permit No. WA-002447-3

October 1, 2015

City of Spokane
 Combined Sewer Overflow Annual Report – FY 2014
 Wastewater Management Department

1. Introduction

The City of Spokane’s Combined Sewer System (CSS) is operated under two sets of regulations: The National Pollution 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).

2. Compliance with Nine Minimum Controls

Section S13.C of the City’s NPDES permit requires compliance with the Nine Minimum Controls in the EPA’s Combined Sewer Overflow (CSO) policy, and requires the City to report annually on the measures the City is taking to comply with the Nine Minimum Controls. The City’s ongoing efforts to comply with these controls are described below.

1. *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 collections.*

Every year the City’s Wastewater Management (WWM) department performs operation and maintenance (O&M) activities to reduce the frequency and volume of preventable overflows. In 2014, the following activities were performed to ensure proper operation of the collection system:

Table 1: Summary of 2014 O&M Activities

Activity	Quantity
Miles of sewer lines cleaned	744
Miles of sewer lines cctv inspected	241
Number of catch basins inspected	15,212
Number of catch basins cleaned	1,789
Number of catch basins modified to add floatable controls	18
CSO weir and facility inspections	1,091
CSO weir and facility cleanings	10
Number of lift station inspections	482
Number of lift station cleanings	283

The City's WWM department routinely inspects 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 it becomes a backup. When a sewer is inspected and identified as having a maintenance-related problem, the sewer is placed on a routine cleaning schedule to prevent future maintenance-related backups. The routine maintenance frequencies vary from as short as monthly to as long as annually. 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.
- Chemical root treatment to mitigate growth of roots.



On February 19, 2014 a CCTV inspection indicated that there was a side sewer connection to a storm line near the intersection of Erie St. and Front Ave. Sewer construction crews disconnected the side sewer and reconnected it to the nearest sanitary line by February 27, 2014.

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 the event of a power failure. By the end of 2013, the City completed the installation of backup generators on all but two lift stations. The remaining lift stations have adequate storage capacity for a response by WWM crews with a portable generator.

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 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 "C".

- 2. 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 full-pipe 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 2014, the City grouted 11 manholes and installed 23 CIPP short-liners.

- 3. 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. As of 2014, there are 13 listed Significant Industrial Users, and 11 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 obstructed or partially obstructed with grease, an investigation is conducted upstream to identify potential sources and enforce municipal code. In 2014, six obstructed City sewer lines caused by grease were reported to the Pretreatment program for enforcement.

4. *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. 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 is 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. As part of the CSO Plan Amendment submitted in early 2014, the main I02 interceptor flows will be limited to 120mgd through the use of upstream CSO storage. This will help ensure that all flows at RPWRF will receive full primary and secondary treatment.

5. *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 stenciled on a variety of public education materials and on the CSO notification/information signs on the shore at each CSO outfall. 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, water line flushing, and the draining of Park department pools. In 2014, there was one dry weather overflow reported due to a contractor error in the construction of the CSO 34-2 facility.

6. *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. This serves as a pretreatment system and captured trash and sediment are pumped out on a routine basis by

maintenance crews. In 2014, 18 catch basins were modified to accept elbows.

As each CSO control structure 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.

7. *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. At the end of 2014, about 2,363 lane miles of City streets were swept as part of this program. In addition, catch basins are pumped regularly as a preventive maintenance measure. Leaves are swept and removed from City streets in the fall. In 2014, 3,058 cubic yards of leaves were removed from City streets. 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 2014, 1,435 curb markers were installed by WWM crews. Any illicit discharge complaints are investigated by one of the WWM sewer 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.



8. *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 2014, there were approximately 5,900 hits on this page on the department’s website.

Information kiosks regarding CSOs are located at three popular river access points. 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 in accordance with the O&M Plan.

9. *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 Spokane River and Latah Creek are the only two water bodies that can receive CSO discharges, with 18 outfalls and two outfalls, respectively. All outfalls are mapped in GIS, marked with signs, and equipped with flow monitoring and telemetry. The City operates the flow monitoring/telemetry for timely alarms, compliance data, and operation and performance of CSO facilities. In 2014, the City achieved greater than 99.7% uptime with its CSO monitoring system. The CSO flow monitoring team worked especially hard to mitigate impacts of the 2014 CSO construction projects to maintain the integrity and quality of the telemetry data.

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.

3. CSO Reduction Plan

Washington Administrative Code (WAC) 173-245 requires each NPDES permittee to develop a CSO Long Term Control Plan (LTCP) with a goal of “control of each CSO in such a way that an average of one untreated discharge may occur per year” (WAC 173-245-020(22)). This LTCP establishes a schedule of compliance which will “achieve the greatest reasonable reduction of combined sewer overflows at the earliest possible date.” (RCW 90.48.480) The City’s NPDES Permit requires the City to update its LTCP “as necessary” and each year report the status of implementation. The City refers to its LTCP as its “CSO Reduction Plan.”

In 1999, the City of Spokane began implementing its CSO Reduction Plan to bring all remaining CSO outfalls into compliance with WAC 173-245 by December 31, 2017. The City updated its 1994 CSO Reduction Plan most recently in March, 2014. As of the end of 2014, the City of Spokane operates seven CSO control facilities and nine reconfigured CSO regulators (weir modifications), and has eliminated four CSO outfalls. The City has also initiated construction of one up-basin CSO tank and substantially completed another up-basin CSO tank that will increase use of the collection system for storage and reduce wet weather peak flow at the CSO 34 regulator. Construction of a CSO tank in basin 33 has started.

4. 2014 CSO Plan Amendment

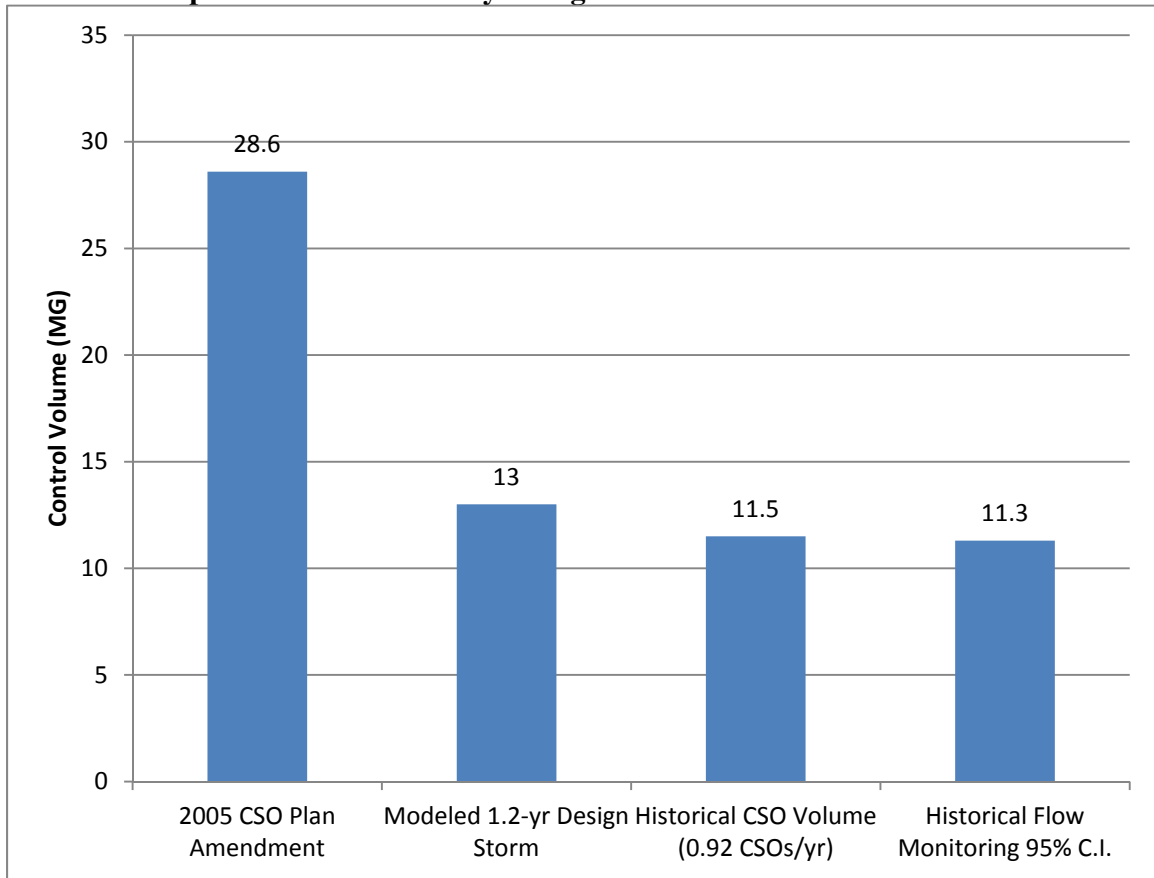
The City filed a CSO Reduction Plan Amendment in March 2014 while maintaining the December 31, 2017 compliance schedule as mandated by the NPDES permit. The CSO Reduction Plan Amendment reflects a change in circumstances which include more accurate long term meteorological records and data to effectively 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 3 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, possibility of growth, and other factors. The risk profile was then used in conjunction with 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 continuous 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 basin. The re-optimization had several goals. The first goal was to limit peak flows to RPWRF to 120mgd versus today's monitored maximums of about 130mgd. The second goal was to convey more flow from basins where it is infeasible or more expensive to construct a CSO facility and to convey less flow and construct more storage for basins that had more feasibility and less expense.

The City's approach for sizing CSO facilities changed from volume generated by a 2-year, 24 hour SCS Type II storm event with snowmelt to a 1.2 year SCS Type II storm event. The other change in sizing CSO facilities was to change 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 13.0mg and 11.3mg of storage in the system in the 2014 CSO Plan Amendment.

Chart 1: Comparison of CSO Facility Sizing in 2005 vs. Three Methods Used in 2014.



5. 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 2014, there were 20 outfalls remaining. These are identified in the City's NPDES Permit No. WA-002447-3 and are listed as follows:

Table 3: Outfalls listed in NPDES Permit No. WA-002447-3

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
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 33 rd and 37 th	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 (2)	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 Third @ Perry Third @ Arthur First @ Arthur	0.15 miles upstream of J. Keefe Bridge
034	Crestline @ Riverside	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

From 1980 to 1992, The City of Spokane completed nearly \$50 million in capital improvements to reduce combined sewer overflows to the Spokane River through separation, mostly on the north side of town, with new storm sewers. That project reduced annual combined sewer overflows from an average of 570 million gallons to an average of 79 million gallons. This 491 million gallon reduction represents an 86% reduction of volume.

The 1979 CSO Abatement Plan and 1994 CSO Reduction Plan did not establish a combined sewer overflow baseline for frequency of occurrence or volume of discharge from each CSO regulator. Instead, the 1994 CSO Reduction Plan provided an average annual volume and frequency, which can be used as a benchmark to compare or evaluate the current outfall performance. The annual frequency and volume shown on Table 4 on the following page is based upon a simulation of actual rainfall data over a ten-year period (1979 through 1988). Precipitation data was used to calibrate the model to the monitored flows recorded for the 1994 Plan. These values are footnoted to reflect elimination of regulators 3b, 16a, 18, 39, and 40 via consolidation of CSO Basins 2 and 3c; 16 and 18; and 38, 39 and 40.

The model was recalibrated in 2005, and again in the March 2014 CSO Plan Amendment using updated 20-year precipitation dataset and flow monitoring data. Table 3 includes the original baseline conditions, and the updated baseline conditions generated from flow monitoring during the ten year period of 2003 through 2012.

At the end of 2014, the CSS was comprised of approximately 400 miles of sewers. Relative to the year 2000, the system now includes 24 of the previous 30 combined sewer overflow regulators, listed in Table 3 on the next page, which can periodically overflow via 20 of the previous 24 outfalls, listed in Table 2 on the previous page. Regulators that overflow to a common outfall are 24a and 24b to CSO outfall 24; and 33a, 33b, 33c, and 33d to CSO outfall 33.

The interceptor system has two pump stations located downstream of CSO regulators. Regulators 16 and 19 are located upstream from the Clarke Avenue pump station, and regulators 22b and 25 are located upstream of the Elm Street pump station.

The NPDES permit requires flow monitoring of each outfall to estimate the duration, frequency, and volume of the overflows. In addition to flow monitoring, the City collects rainfall data from 11 gauges distributed throughout the City and uses records from the Spokane International Airport, Spokane Felts Field Airport, and National Weather Service weather stations. Overflow and rainfall data are collected, analyzed, and reported, and archived for future reference. Some rain gauges are heated, which helps differentiate snow or snowmelt from rain.

**Table 3: Baseline Average Annual CSO Volumes and Frequencies
Original 1979 – 1988 and Revised 2003 – 2012**

CSO No.	CSO Location	1979–1988 Average Annual Overflow Volume (MG) ¹	2003–2012 Average Annual Overflow Volume (MG)	1979–1988 Average Annual Overflow Frequency ¹	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	1 st 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 33 rd	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	5 th @ Arthur	0.00	0.04	0	8
33b	3 rd @ Perry	2.30	6.72	5	7
33c	3 rd @ Arthur	0.12	0.04	11	6
33d	1 st @ Arthur	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.

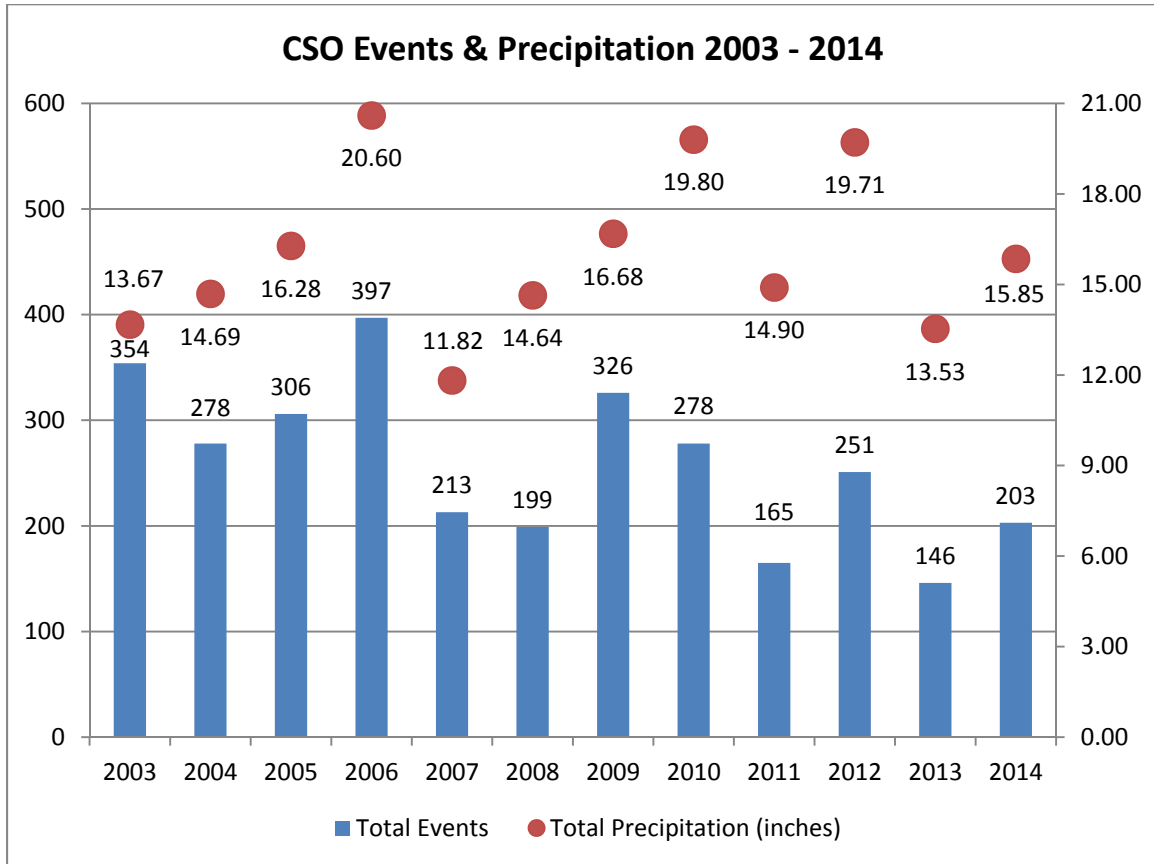
2 CSO 2 & 3c flows are consolidated and regulated at CSO 2&3c Control Facility to overflow no more than once per year on average via Outfall 2. CSO 3b is physically eliminated.

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 eliminated.

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 eliminated.

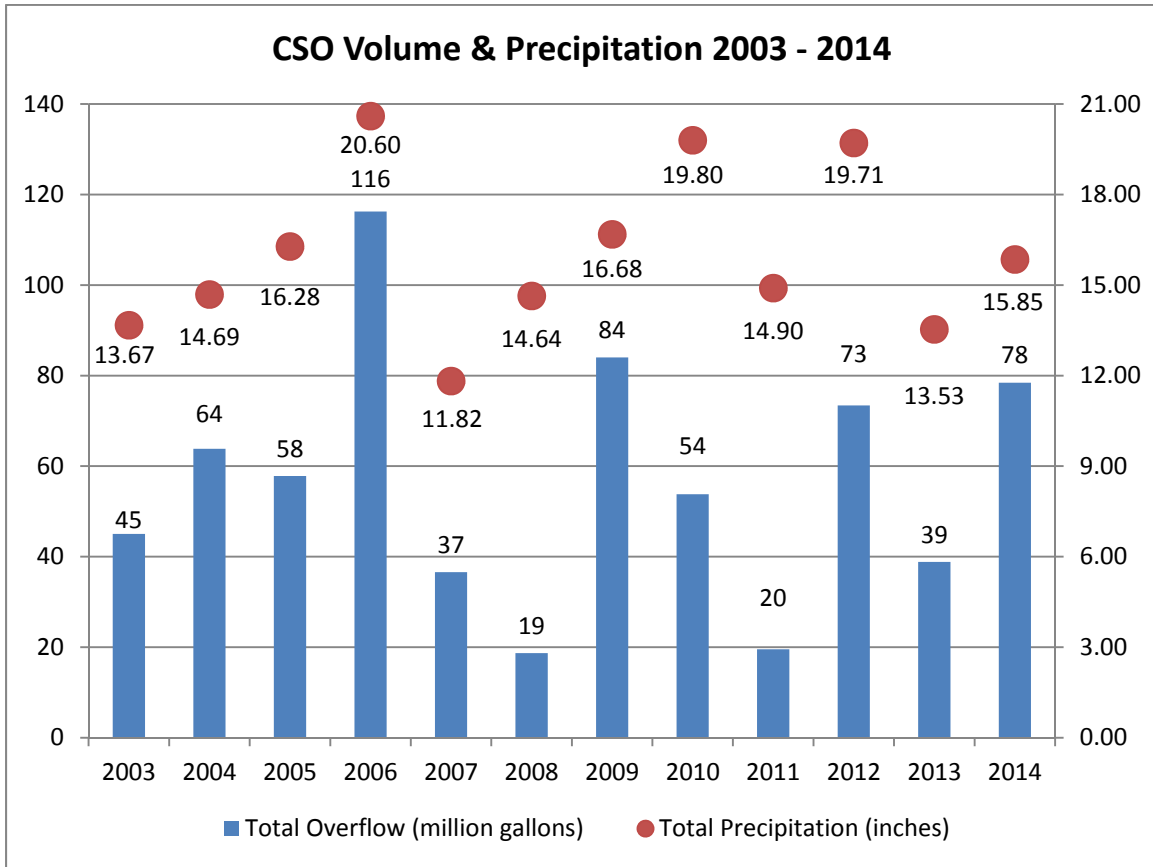
6. Historical Data

Chart 2: CSO Events and Precipitation from 2003 to 2014



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 has generally been reduced. In recent years, there have been three unusually wet years; 2006, 2010, and 2012. In 2014, rainfall was below the annual average and the the annual number of overflow events seems to have been below average.

Chart 3: CSO Volume and Precipitation from 2003 to 2014



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. In 2014, rainfall was slightly below the annual average, but the volume of overflows was slightly above average. 2014 had three significant events that contributed to this additional volume. On February 12, approximately 0.75 inches of rain melted approximately 5 inches of snow which resulted in 8.3 million gallons of overflow. On June 26 and June 27, about 10.5 million gallons overflowed in back-to-back thunderstorms averaging 0.86 inch in rainfall. Also, a thunderstorm on August 22 had an instantaneous rainfall rate in excess of 5.0 inches per hour over the southern portion of the city. The volume of overflows is expected to decline as future system improvements are constructed.

7. 2014 Combined Sewer Overflows Analysis

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, 2014. It is estimated that a **total of 78 million gallons** of combined sewage discharged to local receiving waters over these twelve months. All but one of these discharges were associated with snowmelt and/or rain events and distributed across 14 of the 22 permitted CSO outfalls. Discharges at the nine (9) priority CSO regulator sites accounted for 64 percent of the total overflow volume measured. *Detailed information on individual CSO events is provided in Appendix "A" of this report.*

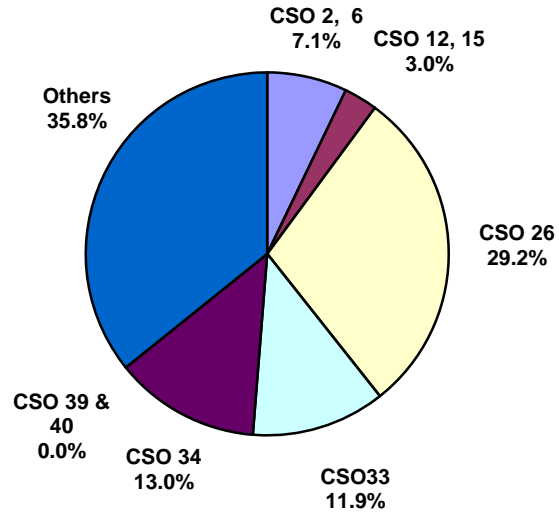


Chart 4: CSO Volume and Precipitation by month for 2014

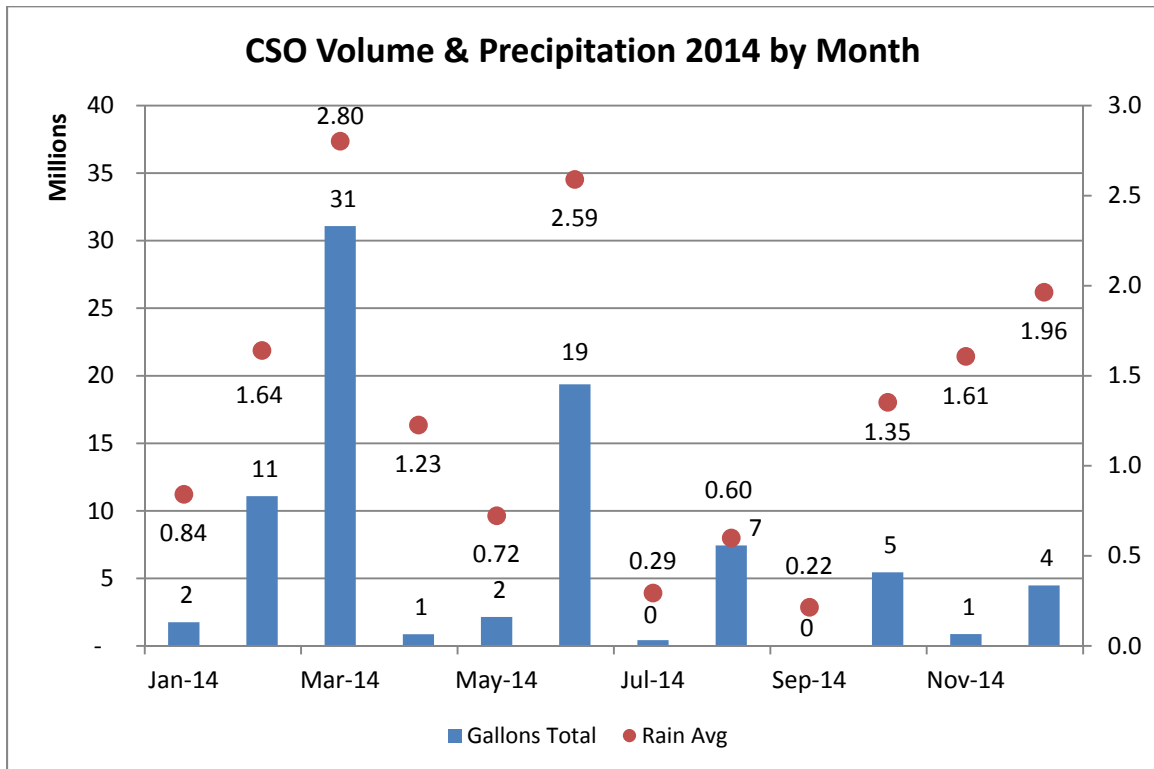


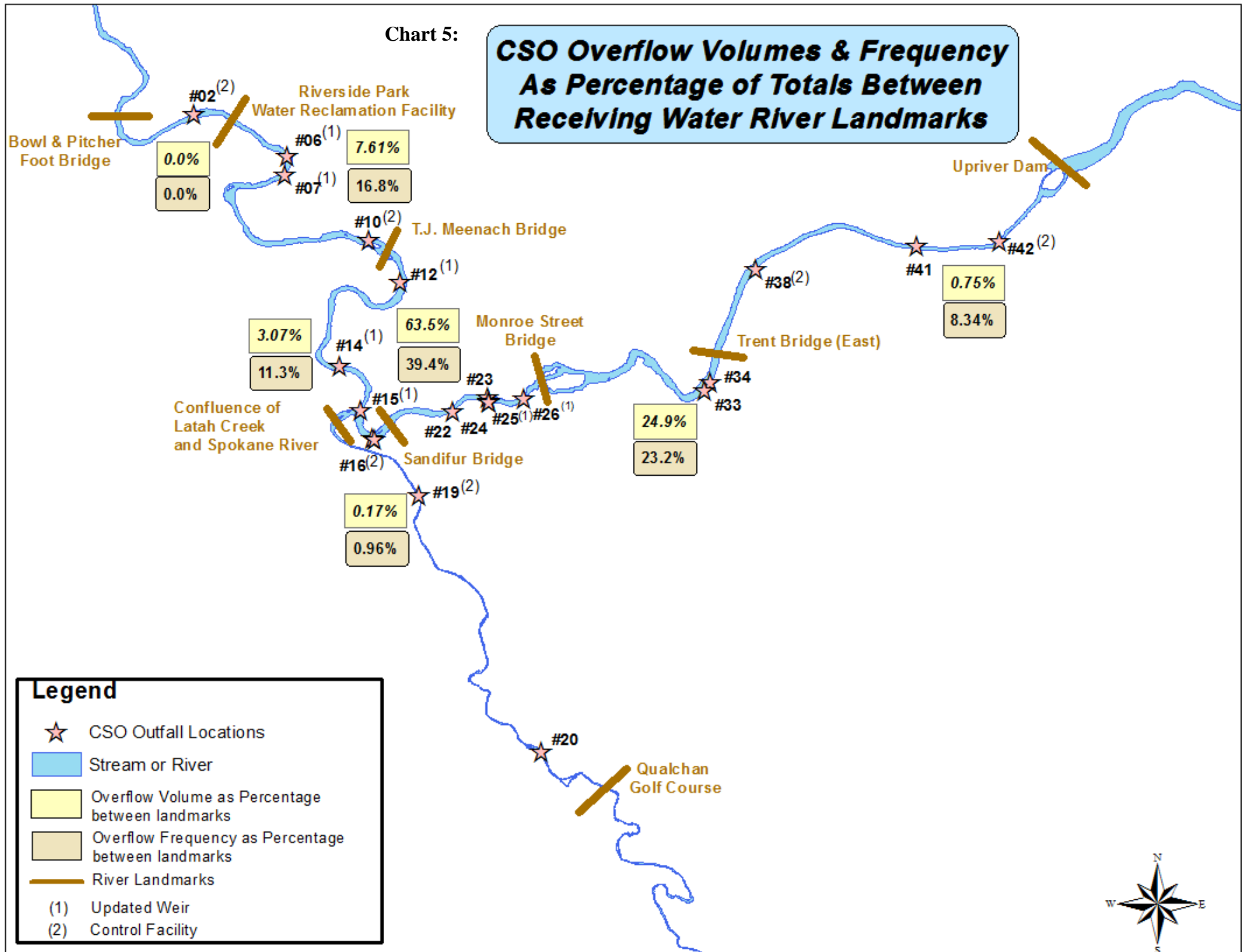
Table 4: Summary of Monitored CSO Frequencies & Volumes for 2014

CSO OUTFALL	UPSTREAM REGULATOR ID²	MONITORED CSO VOLUME (gallons)	MONITORED CSO FREQUENCY (Occurrences)	MONITORED CSO DURATION (minutes)
02	02	0	0	0
06	06	5,586,364	28	5,900
07	07	385,026	6	520
10	10	0	0	0
12	12	2,326,220	19	1,875
14	14	68,370	2	115
15	15	17,653	2	40
16	16	0	0	0
19	19	0	0	0
20	20	133,648	2	60
22	22B	68,433	1	20
23	23	85,498	7	290
24	24A	26,179,734	(23)	4,585
	24B	35,485	(10)	1,260
	Total ³ :	26,215,219	24	
25	25	498,824	20	1,295
26	26	22,927,753	28	5,285
33	33A	64,574	(7)	490
	33B	8,810,619	(7)	530
	33C	51,424	(5)	240
	33D	434,074	(22)	3,815
	Total ³ :	9,360,691	25	
34	34	10,165,894	22	4,050
38	38	0	0	0
39	39	Outfall Eliminated December 2012		
40	40	Outfall Eliminated December 2012		
41	41	597,927	17	1,625
42	42	0	0	0
TOTAL:		78,437,520	203	

1. Tabulated information compiled from flow monitoring data collected between January 2013 and December 2013.
2. Nine (9) priority flow monitoring sites identified in **BOLDFACE** type. CSO 3C was formerly a priority site, but is now associated with CSO Outfall 2.
3. Frequency reflects any simultaneous overflows from multiple regulators to a common outfall.

Chart 5:

CSO Overflow Volumes & Frequency As Percentage of Totals Between Receiving Water River Landmarks



Legend

- ★ CSO Outfall Locations
- Stream or River
- Overflow Volume as Percentage between landmarks
- Overflow Frequency as Percentage between landmarks
- River Landmarks
- (1) Updated Weir
- (2) Control Facility



Table 5: Outfalls Meeting WAC 173-245-020(22) Performance Standard for Controlled CSOs

Outfall NPDES Number	Reported Number of Overflows per Year															Average Annual Overflow Frequency			Currently Meets Annual Overflow Frequency Performance Standard	Comments
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2003 - 2012 Benchmark	Monitored	With Facility		
002	0	3	16	0	0	0	0	0	0	0	0	0	0	0	0	0	1.36	0.00	Yes	Operational since 2003
003	0	8	16	0												0	N/A	N/A	N/A	Outfall eliminated in 2003
006	3	17	27	24	32	23	35	23	21	27	30	21	30	22	28	27	25.71	--	No	Weir modified in 2008
007	NM	8	10	14	11	15	18	9	6	13	11	5	7	3	6	11	9.71	--	No	Weir modified in 2008
010	0	8	11	10	7	13	17	8	6	12	13	8	1	0	0	10	8.14	0.33	Yes	Operational since 2011
012	10	23	29	34	31	26	39	25	22	32	33	15	23	15	19	28	26.14	--	No	Weir modified in 2009
014	NM	NM	11	20	11	21	36	17	16	18	1	0	3	0	2	14	12.00	--	No	Weir modified in 2009; Measurements began in 2002
015	1	5	9	11	10	14	17	5	9	12	2	3	2	0	2	9	7.21	--	No	Weir modified in 2009
016	NM	0	6	11	9	14	16	5	0	0	0	0	0	0	0	6	4.36	0.00	Yes	Operational since 2007
018	NM														N/A	N/A	N/A	N/A	Outfall eliminated before 2000	
019	NM	0	0	0	1	0	1	2	0	1	0	0	0	0	0	<1	0.36	0.00	Yes	Operational since 2010
020	NM	NM	NM	NM	1	0	0	0	0	1	0	0	2	0	2	<1	0.55	--	Yes	Measurements began in 2004
022	0	1	5	2	3	1	1	1	2	0	0	0	0	0	1	1	1.21	--	No	Influenced by CSO 25
023	3	16	20	20	17	18	28	18	16	17	16	0	12	1	7	16	14.71	--	No	
024	5	15	33	33	19	27	31	16	15	20	28	22	29	18	24	24	23.57	--	No	
025	NM	0	5	44	19	18	31	15	17	20	20	16	22	15	20	22	18.71	--	No	Weir modified in 2008
026	4	16	20	24	20	20	33	16	20	27	30	21	33	21	28	24	23.50	--	No	Weir modified before 2000
033	7	34	38	38	22	36	33	21	14	24	25	19	29	18	25	25	26.86	--	No	
034	2	15	18	18	19	14	27	11	16	24	17	17	24	21	22	19	18.79	--	No	
038	1	9	10	14	12	6	8	7	4	14	16	3	17	0	0	10	8.57	0.00	Yes	Operational since 2012
039	1	3	2	5	5	9	4	3	2	4	8	1	2			4	N/A	N/A	N/A	Weir modified in 2010; Outfall eliminated Dec 2012
040	5	17	19	21	17	9	6	4	4	6	6	1	0			7	N/A	N/A	N/A	Weir modified in 2010; Outfall eliminated Dec 2012
041	NM	0	9	10	12	12	13	7	7	13	22	13	15	12	17	12	11.57	--	No	
042	0	1	0	0	0	10	3	0	2	0	0	0	0	0	0	2	1.14	0.00	Yes	Operational since 2009

8. RPWRF CSO-Related Bypasses

NPDES Permit Section 13.H requires reporting the date, duration, and volume of each CSO-related bypass at the RPWRF, as well as the magnitude of the precipitation of the event. Under current system conditions, these bypasses occur only in extreme events, such as an extended rain-on-snow event or an extreme area-wide thunderstorm. In 2014, there were no CSO-Related bypasses at RPWRF.

9. Dry Weather Overflows (See Appendix B)

There was one dry weather overflow that occurred on September 15, 2014. This overflow was caused when the contractor constructing the CSO 34-2 filled the facility with water. While draining the facility, a plug holding back the water for the test deflated, was conveyed downstream, and became lodged in the CSO 34 regulator, causing a partial blockage. The majority of the 1 million gallons stored was conveyed to RPWRF, and 23,600 gallons overflowed for 30 minutes.

10. 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 are completed. Pursuant to the Agreement, eleven CSO regulators prone to dry weather overflows were to be modified. 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 has been added to the City's website and major river access points for the public and warning flags are deployed at major river access points if a dry weather overflow occurs. The CSO O&M plan has been updated, additional precautions during maintenance have been established, and training is ongoing.


11. CSO Control Project Schedule

Table 6: CSO construction schedule included in the 2014 CSO Plan Amendment as updated at the end of 2014.

	Tank Name	2014				2015				2016				2017			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
CSO Projects																	
6	Shadle Bluff	D	D	D	D	D	C	C	C	C							
7	Downriver	D	D	D	D	D	C	C	C	C							
12	Doomsday Hill	P	P	P	D	D	D	D	D	N	C	C	C	N	C	C	
14	Summit	P	P	P	P	D	D	D	D	D	C	C	C				
15	Summit	P	P	P	P	D	D	D	D	D	C	C	C				
20	Hatch	D	D	D	D	D	C	C	C	C							
23	Maple Regulators											P	D	D	C		
24	Jefferson	P	P	P	D	D	D	D	D	D	C	C	C	N	C	C	C
25	Main Ave	P	P	P	D	D	D	D	D	D	C	C	C	N	C	C	C
26	Spokane Falls	P	P	P	D	D	D	D	D	D	C	C	C	N	C	C	C
41	Minnehaha											P	D	D	C		
33-1	Liberty Park	P	P	P	P	D	D	D	D	C	C	C	C	C	C	C	C
33-2	E. U-District	D	D	C	C	N	C										
34-1	Lee	P	P	P	P	D	D	D	D	D	C	C	C	C	N	C	C
34-2	Underhill	N	C	C	C	N	C	C									
34-3	20 th & Ray	N	C	C	C												
I-03 NW	TJ Meenach NW Blvd	P	P	P	P	D	D	D	D	C	C	C					
I-04 M	Bosch's Lot	P	P	P	P	D	D	D	D	D	C	C	C				
I-07	Napa	P	P	P	P	D	D	D	D	D	C	C	C	C	N	C	C

Legend: P Planning phase D Design phase C Construction phase

Table 7: CSO Control Projects Scheduled for 2014

	<p>City Project #: 2010123, 2013042, 2013201, 2014056</p> <p>CSO Basin #: 20</p> <p>Location: Phase 1: High Dr from 29th Ave. to Bernard St.; Phase 2: High Dr. from Bernard St. to Grand Blvd.</p> <p>Water Body: Latah Creek</p> <p>Description: Eliminate CSO outfall 20. Construction of a 206,000 gallon CSO control facility at 43rd Ave. and Hatch Rd. Separation of portions of the CSO 20 / 24 basins to drywells and swales.</p> <p>Estimated Cost: \$8.5m</p> <p>Estimation Completion: Q1-2016</p>
---	---



City Project #: 2011085
CSO Basin #: 33
Location: Sprague Ave. and Sprague Way
Water Body: Spokane River
Description: Construction of a 450,000 gallon CSO control facility (33-2)
Estimated Cost: \$3.8m
Estimated Completion: Q3-2015



City Project #: 2011144
CSO Basin #: 34
Location: Hartson Ave. & Regal St.
Water Body: Spokane River
Description: Construction of a 1,500,000 gallon CSO Facility (34-2) and conveyance from 8th Ave. and Freya St. to Hartson Ave. and Regal St. to reduce basement flooding.
Estimated Cost: \$9.9m
Estimated Completion: Q3-2015



City Project #: 2011145
CSO Basin #: 34
Location: 20th Ave. and Ray St.
Description: Construction of a 1,040,000 gallon CSO Facility (34-3).
Estimated Cost: \$5.6m
Estimated Completion: Q4-2014

Table 8: CSO Control Projects Scheduled for 2015

CSO NPDES BASIN NO.	LOCATION OF IMPROVEMENT	WATER BODY	DESCRIPTION
6	Northwest Boulevard and Providence Ave.	Spokane River	Construction of CSO control facility totaling 900,000 gallons with conveyance to new interceptor inlet near CSO 7. Estimated completion Q1-2016.
7	Downriver Dr. and Columbia Cir.	Spokane River	Construction of CSO control facility totaling 8,000 gallons with adjusted flow controls and new interceptor inlet for CSO 6 and CSO 7 flows. Estimated completion Q1-2016.
20	High Dr. from 29 th Ave. to Hatch Rd.	Latah Creek	Eliminate CSO outfall 20. Construction of a 206,000 gallon CSO control facility at 43 rd & Hatch. Separation of portions of the CSO 20 & 24 basins to drywells and swales. Estimated completion Q1-2016.
33-2	Sprague Ave. and Sprague Way	Spokane River	Construction of CSO control facility 33-2 totaling 450,000 gallons. Estimated completion Q3-2015.
34-2	Hartson Ave. and Regal St.	Spokane River	Construction of CSO control facility 34-2 totaling 1,400,000 gallons. Estimated completion Q3-2015.

Appendix “A”

Detailed CSO Event Information
Monthly Reports
January through December 2014
(FY 2014 Report)

Monthly Reports are available online at:

<https://my.spokanecity.org/publicworks/wastewater/cso/>

Appendix “B”

Maintenance Summary

January through December, 2013
(FY 2013 Report)

(Three pages)

Water Main-Related DWO in 2014

CSO	Date	Overflow (Gallons)	Duration (Minutes)	Activity
Totals		-	0	

Maintenance-Related DWO in 2014

CSO	Date	Overflow (Gallons)	Duration (Minutes)	Activity
Totals	0	0	0	

Other DWO in 2014

CSO	Date	Overflow (Gallons)	Duration (Minutes)	Comments
34	09/15/2014	23,600	30	Contractor lost plug while testing CSO 34-2
Totals	1	23,600	30	

Appendix “C”

CSO O&M Plan Annual Update
(Revised 9/2013)
(Reviewed 9/2014)
(Reviewed & Revised 9/2015)

(Eight pages)

City of Spokane

OPERATIONS & MAINTENANCE PLAN For CSO Regulators and OUTFALLS

Table of Contents

Goal	Page 2
Awareness and Prevention	Page 2
Frequency of Inspection	Page 3
Routine Inspections	Page 3
Tank Inspection	Page 3
Stage II Snow Event Procedure	Page 4
High River Procedures	Page 4
Dry Weather Procedures	Page 4
DWO Maintenance Procedures	Page 4
Caution Signs & Flags	Page 5
Internal Notification Protocol	Page 5
Supervisor Procedures	Page 6
24 Hr Phone Notification to Ecology	Page 7
24 Hour Notification to County Health	Page 7
Post Event Inspection	Page 7
5 Day Written Report to Ecology	Page 7
Record Keeping	Page 8
Submission Dates	Page 8

GOAL:

The goal of this operations and maintenance plan is to properly manage the entire CSO regulator structures at all times and prevent/minimize any combined sewer overflows during dry weather (DWO's). This update accounts for weirs modified in 2008 (#6, #7, #25) 2009 (#12, #14, #15) 2010 (#19, and Control Facilities (tanks) 2/3, 16/18, 42, 10 & 38/39/40 as we upgrade from dams & leaping weirs to hydrosides. See comprehensive 6 year sewer program for future tank construction schedules.

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.

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 District 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.

- Northside-Dan Duffey Radio #326,
- Southside-Mal Lund Radio #330,
- Stormwater-Raylene Gennett Radio #350,
- Construction Mike Lowdon #331.

SUPERVISOR PROCEDURES:

In any Dry Weather Overflow (DWO) event, the Wastewater Maintenance and Collection Superintendent, Gary Kaesemeyer, or responsible person shall notify external personnel as defined in the following section and notify the Director of Wastewater Management, Dale Arnold and the Director of Public Works Rick Romero.

- 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, Gary Kaesemeyer 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, Gary Kaesemeyer 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, Gary Kaesemeyer 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)