Seattle Public Utilities | Protecting Seattle's Waterways

2013 Annual Report
CSO Reduction and CMOM Programs

March 26, 2014

Table of Contents

List of Appendices iii
List of Figures iii
List of Tables iv
List of Abbreviations v

Section 1 Introduction 1-1

1.1 The City of Seattle Wastewater Collection System 1-1
1.2 The Collection System Permit 1-3
1.3 Collection System Enforcement Orders 1-3
1.4 Collection System Reporting Requirements..1-4

Section 2 Planning Activities..2-1

2.1 Long-Term Control Plan 2-1

2.1.1 Work Completed in 2013 2-1
2.1.2 Planned 2014 Work 2-3

2.2 Integrated Plan 2-3

2.2.1 Approach to Plan Development..2-3
2.2.2 Work Completed in 2013 2-4
2.2.3 Planned 2014 Work 2-5

2.3 Joint SPU/King County Operations and System Optimization Plan 2-5
2.4 CMOM Performance Program Plan 2-6
2.5 FOG Control Program Plan 2-7
2.6 Floatables and Solids Observation Program Plan..2-8

Section 3 Operation & Maintenance Activities 3-1

3.1 Nine Minimum Control Activities..3-1

3.1.1 Control 1: Provide System Operations & Maintenance (O&M)......................3-1
3.1.2 Control 2: Maximize Storage of Flows 3-3
3.1.3 Control 3: Control Nondomestic Sources 3-4
3.1.4 Control 4: Deliver Flows to the Treatment Plant..3-5
3.1.5 Control 5: Prevent Dry Weather Overflows 3-6
3.1.6 Control 6: Control Solids and Floatable Materials 3-8
3.1.7 Control 7: Prevent Pollution..3-9
3.1.8 Control 8: Notify the Public 3-11
3.1.9 Control 9: Monitor CSOs 3-12

3.2 CMOM Performance Program Activities 3-12
3.2.1 Planning and Scheduling Initiatives 3-12
3.2.2 Sewer Cleaning Initiatives 3-13
3.2.3 FOG Control Program Initiatives 3-13
3.2.4 Repair, Rehabilitation, and Replacement Initiatives 3-14
3.2.5 Condition Assessment Initiatives 3-15
3.2.6 SSO Response Initiatives 3-15
3.2.7 Other CMOM Initiatives 3-15
3.2.8 SSO Performance 3-16
3.3 FOG Control Program Activities 3-18
3.4 Annual Review of Operations and Maintenance Manuals 3-20
3.5 Floatable Solids Observation Program Activities 3-20
Section 4 Capital Activities 4-1
4.1 Retrofits and Flow Diversion Program 4-2
4.1.1 Weir Height Adjustment Program 4-2
4.1.2 Windermere Retrofit (Basin 13) 4-2
4.1.3 North Union Bay Retrofit (Basin 18) 4-3
4.1.4 West Seattle Retrofit (Basin 95) 4-5
4.1.5 Delridge Retrofit (Basins 168, 169) 4-5
4.1.6 Henderson Retrofits (Basins 47, 49) 4-5
4.1.7 Leschi Retrofits (Basins 26 – 36) 4-7
4.1.9 Future Retrofits 4-7
4.2 Green Stormwater Infrastructure 4-7
4.2.1 RainWise Program 4-8
4.2.2 Ballard Roadside Raingardens 4-9
4.2.3 Delridge Roadside Raingardens 4-11
4.3 Windermere CSO Reduction Project 4-12
4.4 Genesee CSO Reduction Project 4-13
4.5 North Henderson CSO Reduction Project (Basins 44 and 45) 4-14
4.6 52nd Ave S Conveyance Project (Basins 47 and 171) 4-15
4.7 Pump Station 9 Rehabilitation Project (Basin 46) 4-16
4.8 South Henderson CSO Reduction Project (Basin 49) 4-16
4.9 Central Waterfront CSO Reduction Project 4-17
4.10 Pump Station Backup Generator Program 4-17
4.11 Outfall Rehabilitation Program 4-18
Section 5 Monitoring Programs and Monitoring Results 5-1
5.1 Precipitation Monitoring Program 5-1
5.2 Flow Monitoring Program 5-1
5.3 Summary of 2013 Monitoring Results 5-2

5.4 Post-Construction Monitoring Program & Sediment Sampling and Analysis Plan........5-3

List of Appendices

Appendix A: Additional CMOM Information

List of Figures

Figure 1-1. 2013 Combined Sewer Outfalls 1-2
Figure 3-1. FOG Control Program Educational Materials 3-4
Figure 3-2. Example of Outfall Signage 3-11
Figure 3-3. King County/SPU Real-Time Overflow Notification Website 3-11
Figure 4-1. New Slide Gate in Basin 13 (Windermere Area)..........4-3
Figure 4-2. Sub-Basin 18A 2013 Monitoring Results 4-4
Figure 4-3. Retrofit Improvements At Overflow Structure 47C..........4-6
Figure 4-4. Retrofit Improvements At Overflow Structure 47C..........4-6
Figure 4-5. Raingarden (left) and Cistern (right) 4-8
Figure 4-6. Ballard NDS 2015 Proposed Project Blocks..........4-10
Figure 4-7. Controlled flow test monitoring on 28th Ave NW 4-11
Figure 4-8. Windermere CSO Reduction Project Construction, February 2014..........4-12
Figure 4-9. Genesee (CSO 11A) CSO Reduction Project Construction, February 2014...4-13
Figure 4-10. Genesee (CSO 9A) CSO Reduction Project Construction, February 2014...4-14
Figure 4-11. 52nd Ave S Conveyance Project Construction, March 2014 4-15
Figure 4-12. Pump Station 9 Rehabilitation Project 4-16
Figure 4-13. Pump Station 39 Backup Generator 4-18
Figure 4-14. Outfall 64 Rehabilitation Project..........4-19
Figure 4-15. Outfall 95 Rehabilitation Project..........4-20

List of Tables

Table 1-1. 2013 Annual Reporting Requirements 1-5
Table 3-1. 2013 O&M Accomplishments 3-3
Table 3-2. Dry Weather Overflows (DWOs) and Combined Sewer Overflows (CSOs) Exacerbated by System Maintenance Issues 2007 – 2013 3-8
Table 3-3. 2004-2013 SSO Performance 3-16
Table 3-4. 2013 Sewer Camera Observations and Results 3-21
Table 4-1. 2013 CSO Project Spending 4-1
Table 5-1. 2013 Precipitation by Gage and by Month (inches) 5-4
Table 5-2. 2009-2013 Average Precipitation by Month (inches) 5-5
Table 5-3. 2013 Flow Monitor Performance by Outfall and Month 5-6
Table 5-4. 2013 CSO Details by Outfall and Date 5-10
Table 5-5. Comparison of 2013 and Baseline Flows by Outfall 5-25
Table 5-6. 2009-2013 Summary Comparison of Overflows by Outfall 5-28
Table 5-7. 2009-2013 Summary Comparison of CSOs by Receiving Water 5-32
Table 5-8. Outfalls Meeting Performance Standard for Controlled CSOs based on Flow Monitoring Results and Modeling 5-33
Table A-1. 2013 Sanitary Sewer Overflow (SSO) Details 1
Table A-2. Pump Station Location and Capacity 4
Table A-3. 2013 Pump Station Work Order Summary 7
Table A-4. 2013 CSO Structure Inspection Summary 9
Table A-5. 2013 CSO Structure Cleaning Summary 17

List of Abbreviations

Term	Definition
AG	Washington State Office of the Attorney General
CMMS	Computerized Maintenance Management System
CMOM	Capacity, Management, Operations, and Maintenance
CSO	Combined Sewer Overflow
DOJ	U.S. Department of Justice
DNRP	King County Department of Natural Resources and Parks
DWO	Dry Weather Overflow
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
FSE	Food Service Establishment
GC/CM	General Contractor/Construction Manager
GSI	Green Stormwater Infrastructure (see also NDS, LID)
LID	Low Impact Development (see also NDS, GSI)
LTCP	Long-Term Control Plan
MG	million gallons
MGD	million gallons per day
MODA	Multi Objective Decision Analysis
NDS	Natural Drainage Systems (see also GSI, LID)
NPDES	National Pollutant Discharge Elimination System
PACP	Pipeline Assessment and Certification Program
PMP	Project Management Plan
RCM	Reliability Centered Maintenance
SCADA	Supervisory Control and Data Acquisition
SOP	Standard Operating Procedure
SPU	Seattle Public Utilities
SSO	Sanitary Sewer Overflow
WTD	King County Wastewater Treatment Division

SECTION 1

Introduction

This annual report was prepared to meet state and federal regulatory requirements and to share information with the public on Seattle Public Utilities' (SPU's) Combined Sewer Overflow (CSO) Reduction Program and SPU's Capacity, Management, Operations and Maintenance (CMOM) Program. The report is organized as follows:

- Section 1: Introduction
- Section 2: Planning Activities
- Section 3: Operation and Maintenance Activities
- Section 4: Capital Activities
- Section 5: Monitoring Programs and Monitoring Results

Additional information about the program may be found at www.seattle.gov/cso.

1.1 The City of Seattle Wastewater Collection System

The City of Seattle's (City's) wastewater collection system is one of the largest in Washington State and includes separate, partially separated, and combined systems, as shown in Figure 1-1. In the areas of the City where there are separate systems, stormwater runoff flows to a storm drainage system, while sewage is conveyed through sewers to regional wastewater treatment facilities owned and operated by King County. In the partially separated areas of the City, storm drain separation projects were built during the 1960s and 1970s to divert street runoff to the storm drainage system while allowing rooftop and other private property drainage to flow into the sewers. In the combined areas of the City, sewage and stormwater runoff are conveyed in combined sewers to the King County wastewater treatment facilities.

During storm events, the quantity of stormwater runoff flowing into the collection system sometimes exceeds the capacity of the partially separated and combined sewer systems. When this happens, the collection system overflows at outfall structures designed for this purpose. There are currently 87 outfalls in the City of Seattle where combined sewer overflows (CSOs) can occur, as shown in Figure 1-1.

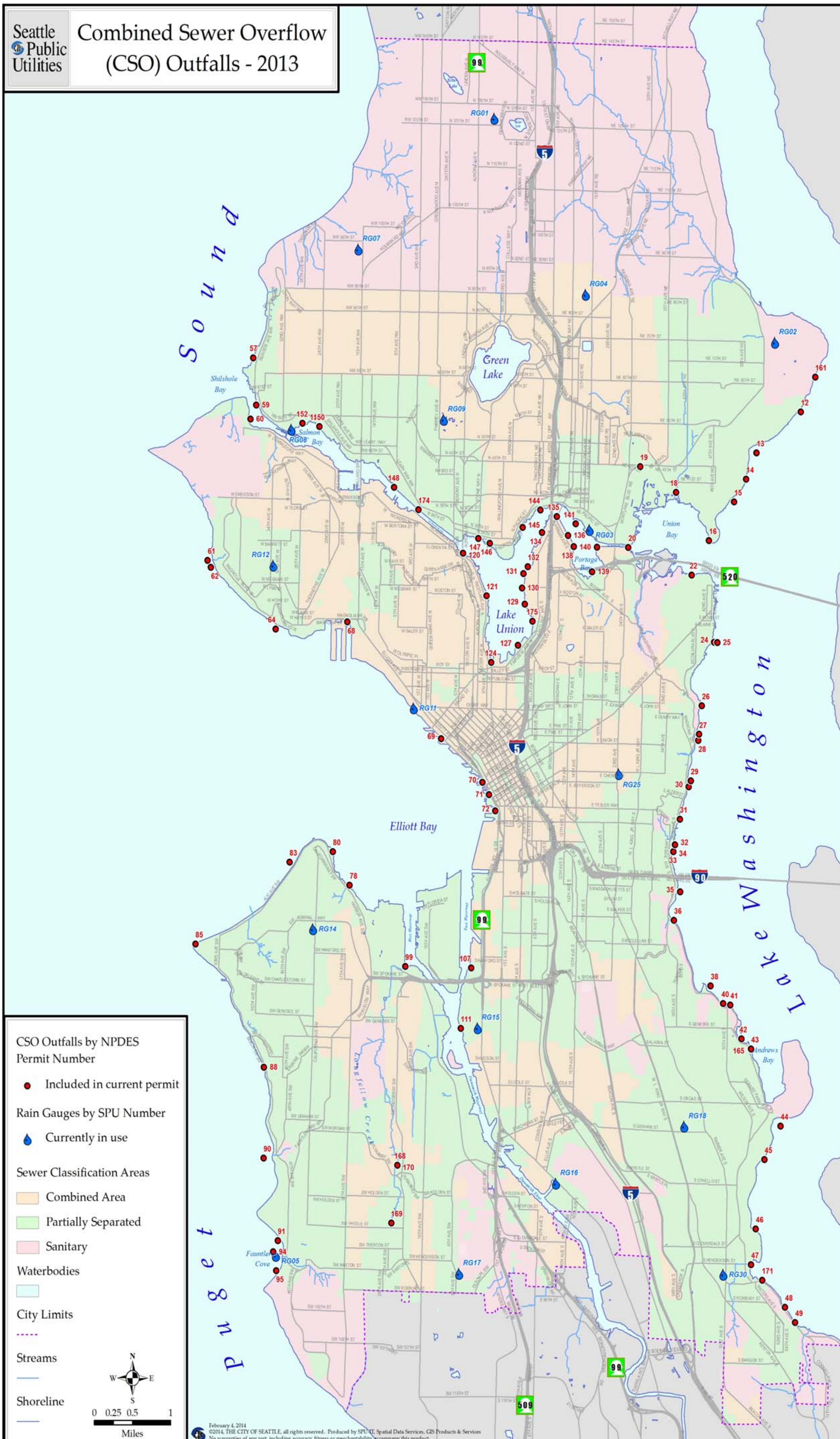

Figure 1-1. 2013 Combined Sewer Outfalls

1.2 The Collection System Permit

The wastewater collection system is regulated by the Washington State Department of Ecology (Ecology), via National Pollutant Discharge Elimination System (NPDES) Permit WA0031682. This permit went into effect on December 1, 2010, was modified on September 13, 2012, and will expire on November 30, 2015. The permit:

- Authorizes CSOs at the 87 outfalls shown in Figure 1-1.
- Requires that SPU limit the number of CSOs from each “controlled” outfall to no more than one event per outfall per year on average.
- Includes a compliance schedule for CSO control projects and other activities that must be completed by the permit expiration date.
- Prohibits overflows from the 87 outfalls during periods of non-precipitation. Such overflows (e.g., caused by mechanical failure, blockage, power outage, and/or human error alone) are called dry weather overflows (DWOs). Note that, based on guidance from Ecology, if the volume of a wet weather overflow is increased because of a mechanical failure, blockage, power outage, and/or human error, the event is called an exacerbated CSO.
- Requires SPU to report spills and sanitary sewer overflows (SSOs).

SPU works to prevent SSOs, DWOs and exacerbated CSOs by providing appropriate system maintenance, backup generators for key facilities, and employee training.

1.3 Collection System Enforcement Orders

SPU also must meet the requirements of three enforcement actions:

- A Request for Information and Compliance Order by Consent (Compliance Order, December 2009) with the U.S. Environmental Protection Agency (EPA), which requires that SPU develop and implement certain plans to provide additional wastewater system reliability.
- An Administrative Order with Ecology (Agreed Order; October 26, 2010), which requires SPU to limit the number of CSOs from each permitted outfall to no more than one event per outfall per year on average by December 31, 2025.
- A Consent Decree with the United States Department of Justice (DOJ), EPA, the State of Washington Attorney General (AG), and Ecology (Civil Action No. 2:13-cv-678; July 3, 2013). The Consent Decree achieves the following:
  - Resolves EPA’s and Ecology’s complaints that the City has violated the Clean Water Act and its wastewater NPDES permit.
  - Sets a schedule for the City to come into compliance with state and federal requirements, including milestones for development of certain plans, construction of

necessary capital improvements, and implementation of a performance based adaptive management approach to system operation and maintenance (O&M).

- Requires the City to report annually on consent decree required activities.
- Establishes penalties for non-compliance.

DOJ, EPA, AG, and Ecology negotiated a similar Consent Decree with King County.

1.4 Collection System Reporting Requirements

SPU's NPDES permit requires submittal of the following kinds of reports:

- Monthly discharge monitoring reports documenting the volume, duration, precipitation, and storm duration for each CSO event, due by the 28th of the following month.
- Reports of any Sanitary System Overflows (SSOs) or Dry Weather Overflows (DWOs), with the initial report due within 24 hours following SPU's discovery of an SSO or DWO and a follow-up written report due within five days.
- Engineering reports, plans, specifications, and construction quality assurance plans for each specific CSO reduction construction project, due by individual deadlines specified in the permit.

Each of the monthly precipitation and discharge monitoring reports was complete and submitted on time. All of the required engineering reports, plans, specifications, and construction quality assurance plans were submitted by the required deadlines, and most were submitted in advance of deadlines. Most of the SSOs and DWOs were reported within 24 hours following SPU's discovery of these incidents, and the majority of the follow-up written reports were submitted on time. Timely 24-hour reporting is sometimes difficult during intense storm events, which is when the majority of the SSOs occur, and some follow-up letters were late because of difficulty determining the underlying cause and obtaining other required information.

In addition, both the NPDES permit and the Consent Decree require submittal of an annual report. Annual reporting requirements are listed in Table 1-1, together with an indication of where the required information is provided in this report. This report meets all NPDES permit and Consent Decree annual reporting requirements.

Table 1-1. 2013 Annual Reporting Requirements		
Source	**Requirement**	**Report Location**
NPDES permit		
S6.A	Detail the past year's frequency and volume of combined sewage discharged from each CSO outfall	Table 5-4
S6.A	For each CSO outfall, indicate whether the number and volume of overflows has increased over the baseline condition and, if so, propose a project and schedule to reduce the number and volume of overflows to baseline or below	Table 5-5
S6.A	Explain the previous year's CSO reduction accomplishments	Section 4
S6.A	List the CSO reduction projects planned for the next year	Table 4-1
S6.A	Document compliance with the Nine Minimum Controls	Section 3.1
S6.A.1	Include a summary of the number and volume of untreated discharge events per outfall	Table 5-6
S6.A.2	Determine and list which outfalls are controlled (no more than one overflow per year on average), using up to 20 years of past and present data, modeling, and/or other reasonable methods	Table 5-8
S6.A	Summarize all event-based reporting for all CSO discharges for the year	Tables 5-4, 5-6, 5-7
Consent Decree		
V.C.26	Report the metrics regarding Sanitary System Overflow (SSO) performance included in Appendix D, Paragraph E (1-7): SSO performance; Number of miles of sewer that were cleaned, inspected, and repaired/replaced/rehabilitated; Number of pump station inspections and the capacity of each pump station; Number of maintenance holes and force mains inspected and repaired/replaced/rehabilitated; Number and type of CSO regulators inspected; Summaries of inspections and cleanings of each CSO control structure; and Summaries of Fats Oil and Grease (FOG) inspections and enforcement actions taken the preceding year.	 a. Tables 3-3, A-1 b. Table 3-1 c. Tables 3-1, A-2, A-3 d. Table 3-1 e. Table 3-1 f. Tables A-4, A-5 g. Section 3.3
V.D.28	Submit summaries of FOG inspections and enforcement actions taken during the previous year.	Section 3.3
VII.43.a.i	Describe the status of any work plan or report development	Section 2

Table 1-1. 2013 Annual Reporting Requirements		
VII.43.a.ii	Describe the status of any design and construction activities	Section 4
VII.43.a.iii	Describe the status of all Consent Decree compliance measures and specific reporting requirements for each program plan, including: The CSO control measures for the Early Action CSO Control Program (Henderson Basins 44, 45, 46, and 47/171); The Long-Term Control Plan; The Post-Construction Monitoring Program Plan; The CMOM Performance Program Plan; The FOG Control Program Plan; The Revised Floatable Solids Observation Program Plan; and The Joint Operations and System Optimization Plan between the City and King County	a. Sections 4.5, 4.6, and 4.7 b. Section 2.1 c. Section 5.4 d. Sections 2.4, 3.2 e. Sections 2.5, 3.3 f. Sections 2.6, 3.6 g. Section 2.3
VII.43.a.iv	Provide the project costs incurred during the reporting period	Table 4-1
VII.43.a.v	Describe any problems anticipated or encountered, along with the proposed or implemented solutions	NA
VII.43.a.vi	Describe the status of any wastewater collection system permit applications	NA
VII.43.a.vii	Describe any wastewater collection system reports submitted to state or local agencies	Section 1.4
VII.43.a.viii	Describe any anticipated or ongoing collection system O&M activities	Section 3
VII.43.a.ix	Describe any remedial activities that will be performed in the upcoming year to comply with the Consent Decree	NA
VII.43.b	Describe any non-compliance with the requirements of the Consent Decree and include an explanation of the likely cause, the duration of the violation, and any remedial steps taken (or to be taken) to prevent or minimize the violation	NA
Appendix D, Paragraph E	Include the listed CMOM performance metrics.	Tables 3-1, 3-3, A-1, A-2, A-3, A-4, and A-5 and Section 3.3
Appendix E	In support of the Floatable Solids Observation Program, document and report the observations of overflow events that occurred during the preceding year.	Section 3.6

SECTION 2

Planning Activities

Several capital and O&M planning efforts were undertaken in 2013 to help ensure SPU meets Clean Water Act, NPDES permit, and consent decree requirements in a way that is cost-effective and provides the most value to our customers. These planning efforts included:

- Long-Term Control Plan
- Integrated Plan
- Joint SPU/King County Operations and System Optimization Plan
- CMOM Performance Program Plan
- FOG Control Program Plan
- Floatable Solids Observation Program Plan

The following sections describe work completed in 2013 and planned work for 2014.

2.1 Long-Term Control Plan

In 2013, SPU continued to develop the CSO Long-Term Control Plan (LTCP), as required by the Consent Decree. The LTCP will also satisfy an NPDES permit requirement to update the City's CSO Reduction Plan by May 30, 2015. The LTCP will define the remaining projects that will need to be constructed in order for each basin in the combined sewer system to meet the regulatory performance standard: a long-term average of no more than one CSO per outfall per year based on up to twenty years of flow monitoring and modeling data, calculated each year. SPU is on schedule to submit the draft LTCP to Ecology and EPA by May 30, 2014, as Volume 2 in SPU's four-volume Plan to Protect Seattle's Waterways (The Plan). The Plan will include:

- Volume 1 - Executive Summary
- Volume 2 - The CSO Long-Term Control Plan
- Volume 3 – The Integrated Plan
- Volume 4 – The Plan EIS

2.1.1 Work Completed in 2013

Specific LTCP and EIS tasks completed during 2013 included:

- Developed a hydraulic model for Basin 107 (East Waterway) and a final modeling report.
- Completed development and calibration of SPU's system-wide hydraulic model and issued a final report.

- Issued a final flow monitoring report for the 2011-2012 wet weather season.
- Completed Long Term Simulation of all remaining uncontrolled combined sewer basins; computed moving 20-year average control volumes and issued final report.
- Continued working with King County on Joint CSO control alternatives and began coordinating with King County on all CSO control projects of mutual interest.
- Developed four LTCP (CSO control) options for consideration:
  - Neighborhood Storage Option
  - Shared (City of Seattle/King County) Storage Option
  - Shared West Ship Canal Storage Option
  - Shared Ship Canal Tunnel Option
- Modeled the Ballard neighborhood, Fremont/Wallingford neighborhood, and West Ship Canal Tunnel options to confirm compliance, and revised the alternatives using modeling results.
- Completed retrofit project modeling for the North Union Bay, Delridge, Leschi and Magnolia Basins.
- Developed total project and lifecycle cost estimates for the four LTCP options.
- Completed Multi Objective Decision Analysis (MODA) analysis to rate and rank the four LTCP Options.
- Completed CSO basin ranking using EPA methodology.
- Developed implementation schedules for the four LTCP options.
- Developed preliminary Financial Analysis and rate impacts.
- Developed a preliminary Operational Plan and future resource projections for new facilities.
- Prepared conceptual post-construction flow monitoring schematics and identified preliminary monitoring requirements to confirm controlled status.
- Issued Community Guide 2 for EIS scoping; updated the website and briefed stakeholders.
- Completed the scoping process for the Plan to Protect Seattle's Waterways EIS, which will evaluate the programmatic impacts of the LTCP Alternative, the Integrated Plan Alternative, and the Do Nothing Alternative.
- Prepared first draft of the Plan to Protect Seattle's Waterways for internal review.
- Met with EPA/Ecology on a quarterly basis to provide status updates and to coordinate on the development of the Plan.
- Prepared a draft Coordination Plan with King County Department of Natural Resources and Parks (DNRP) staff.

2.1.2 Planned 2014 Work

During 2014, SPU will perform the following work on the LTCP and the Plan EIS:

- Provide briefings to stakeholder groups, the Mayor's Office, City Council Members, and Central Council staff.
- Obtain King County input on the LTCP and continue coordinating with King County on all CSO control projects of mutual interest.
- Finish developing the draft LTCP and submit it to EPA and Ecology for review.
- Issue the draft EIS, provide a public comment period, hold a public hearing as part of the comment period, and compile comments.
- Review the EIS comments, develop responses, and begin revising the EIS as appropriate.
- Recommend a preferred alternative for Mayor and City Council Approval.
- Begin preparing the Final LTCP.
- Update the Financial Analysis, Implementation Schedule and CSO Alternative Analysis sections of the LTCP for the preferred alternative.
- Finalize the Plan EIS.
- Update SPU's website to indicate the preferred alternative.

2.2 Integrated Plan

SPU began developing the Integrated Plan in June 2012. The purpose of the Integrated Plan is to prioritize and direct investments in stormwater and CSO control projects so that benefits to water quality will be greater and achieved earlier than would occur if SPU focused exclusively on the CSO control projects identified in the LTCP. The proposed stormwater projects, if approved, will be constructed in addition to all of the CSO reduction projects.

2.2.1 Approach to Plan Development

SPU is using the following approach to develop the Integrated Plan:

- Develop a list of prioritized stormwater project and program opportunities. Opportunities may include structural stormwater controls and stormwater programs such as street sweeping.
- Identify CSO reduction projects that could be deferred and constructed after 2025.
- Estimate the pollutant load reductions that would be achieved by each of the stormwater opportunities and CSO reduction projects using the approach described in the Consent Decree.

- Compare the estimated benefits and pollutant load reductions of stormwater opportunities and CSO reduction projects, in order to identify proposed stormwater projects and CSO projects that would be deferred.
- Prepare and document a cost benefit analysis.
- Develop an implementation schedule for the proposed stormwater projects and the CSO reduction projects that would be deferred.
- Develop a post construction monitoring program for the stormwater projects. (Note that post construction monitoring of CSO reduction projects is addressed in the LTCP.)
- Describe and analyze the Integrated Plan as an alternative in the Plan EIS.
- Provide appropriate opportunities for meaningful stakeholder input throughout the development of the Integrated Plan.
- Deliver the draft Integrated Plan to EPA and Ecology by May 30, 2014.
- Deliver the final Integrated Plan to EPA and Ecology by May 30, 2015.

2.2.2 Work Completed in 2013

During 2013, SPU made great progress towards completing the Integrated Plan:

- Identified appropriate data sources and developed methodology to estimate the pollutant reduction potential of the potential stormwater projects and the CSO reduction projects proposed for deferral.
- Developed exposure assessment methodology and used pollutant estimates to compare the potential reduction in exposure between the potential stormwater projects and the CSO reduction projects proposed for deferral.
- Developed Multi Objective Decision Analysis (MODA) criteria and used the criteria to rate and rank the stormwater projects. The MODA helped SPU make sure that the stormwater projects being considered not only met the Consent Decree requirements but also met SPU's triple bottom line (environmental, social and economic evaluation).
- A panel of experts was assembled to help ensure that SPU used a credible approach for comparing potential stormwater projects with possible deferred CSO reduction projects. The expert panel has reviewed and offered technical advice regarding SPU's methods and assumptions for comparing the water quality benefits of the proposed stormwater projects and the CSO reduction projects proposed for deferral. The expert panel met five times during 2013 and provided valuable input and guidance in the development of the methodologies the SPU team will use to meet the Consent Decree requirements.
- Used the pollutant estimation and exposure assessment methodologies along with the MODA to select stormwater projects that provide significant benefit over the CSO reduction projects proposed for deferral. Information was documented in a report explaining how the

process, the results and the Integrated Plan comply with the Clean Water Act and the Washington Water Pollution Control Act.

- Presented status and progress to Ecology and EPA during quarterly briefings.

2.2.3 Planned 2014 Work

During 2014, SPU will engage in the following work toward completion of the Integrated Plan:

- Develop and issue Community Guide 3 and website updates to provide additional information on the Integrated Plan Alternative, the potential types of stormwater projects and their associated benefits; and to help support Plan outreach activities.
- Continue to provide the public and stakeholders with opportunities for learning about and providing input on the Integrated Plan.
- Finalize the significant benefit comparison of the proposed stormwater projects and the CSO reduction projects proposed for deferral in the Integrated Plan.
- Document the methodology and results of the Integrated Plan and detail the CSO projects that will be proposed for deferral past 2025 and the stormwater projects that will be proposed for construction between 2015 and 2025.
- Brief Ecology and EPA on the Integrated Plan.
- Submit the Integrated Plan in draft form to Ecology and EPA in May.
- Begin revising the Integrated Plan to address Ecology and EPA comments.

2.3 Joint SPU/King County Operations and System Optimization Plan

Seattle Public Utilities' and King County's consent decrees each contain language directing both agencies to work together to develop a single Joint Operations & System Optimization Plan (Joint Plan). In 2013, the Joint Plan team began development of the plan by focusing on understanding the interconnectedness between each agency's systems, each agency's operable facilities, and the greatest areas for optimization opportunities. Highlights of the year include the following.

- Completed a Memorandum of Understanding (MOU) committing both agencies to development of the Joint Plan by March 1, 2016.
- More than 60 staff – management, technical staff (planners, engineers, modelers), and operators – from each agency participated in 10 educational activities over the course of the year. The educational activities involved facility tours and technical presentations of key operable facilities in each agency's system.

- Shared operational objectives were developed and jointly approved for use, which satisfies the Consent Decree requirement for shared operational objectives for King County Wastewater Treatment Division's (WTD's) and Seattle Public Utilities' (SPU's) combined systems.
- Divided the combined wastewater system managed by SPU and WTD into 13 planning basins for joint operations analysis. Basins were delineated based on hydrologic and hydraulic parameters, operational strategies, locations of significant operable facilities, and input from technical staff.
- Developed and approved two early actions for implementation – formation of a Joint System Event Debrief Committee and formation of a Joint Operations Information Sharing Team (JOIST).
- Submitted a 2013 Annual Progress Report for the Joint Plan on December 17, 2013, as required by both agencies' consent decrees.

In 2014 the Joint Plan team will begin development and evaluation of operational alternatives in planning basins where there is the greatest opportunity for operations and system optimization. In addition, more early actions, similar to the Joint System Event Debrief Committee and JOIST, will likely be developed and implemented.

2.4 CMOM Performance Program Plan

Capacity, Management, Operations, and Maintenance (CMOM) Programs are intended to help municipalities identify and implement activities needed to:

- Better manage, operate, and maintain collection systems,
- Reduce the number and volume of sanitary sewer overflow (SSO) events, and
- Prevent dry weather overflow (DWO) events.

The goal of CMOM planning is to identify current performance gaps, select performance goals, and design activities to meet the goals. Data is gathered and analyzed to determine how well each activity is meeting the performance goals, and whether overall system efficiency has improved. Activities are adjusted as needed to better meet the performance goals.

SPU began developing and implementing a CMOM Program in 2004. That year, SPU performed its first gap analysis and proceeded to address prioritized gaps. Work included:

- Implementing data collection improvements;
- Documenting maintenance processes and procedures;
- Hiring a full time Fats Oils and Grease (FOG) Control Program Inspector;
- Revising and re-implementing a Chemical Root Control Program;

- Implementing a geographic based system for scheduling preventive pipe cleaning maintenance; and
- Adopting the Pipeline Assessment and Certification Program (PACP) coding system for pipe condition assessment.

In 2009, SPU performed its second gap analysis, to quantify progress and adjust priorities. This provided an opportunity to integrate SPU's Asset Management business model and asset management-based decision-making into the CMOM Program. It also provided an opportunity to use improved data management tools, including the improved Computerized Maintenance Management System (CMMS) software and the expanded Geographic Information System (GIS) data and software. As a result, dozens of initiatives were identified that would allow SPU to become more effective, efficient, and productive in the operation and maintenance of its wastewater collection system.

SPU worked to prioritize initiatives; identify the level of effort required to implement each initiative; and identify initiative dependences and the appropriate sequencing of the initiatives. The result was a 6-year roadmap for improving operation and maintenance of the wastewater collection system. SPU also set a sanitary sewer overflow (SSO) performance threshold and identified appropriate performance-based follow-up activities if the threshold is exceeded. Together, the 6-year roadmap and the performance threshold and performance-based follow-up activities comprise the CMOM Performance Program Plan.

The Plan was submitted to EPA and Ecology on December 31, 2012. After the Consent Decree was filed in U.S. District Court, the Plan was conditionally approved by EPA on September 5, 2013, approved by Ecology on September 9, 2013, resubmitted with the revisions requested by EPA on October 8, 2013, and approved by EPA on January 10, 2014. Actual 2013 and planned 2014 Plan activities are described in Sections 3.2 and 3.3.

2.5 FOG Control Program Plan

SPU began its Fats Oils and Grease (FOG) Control Program in 2005, with the overall goal of reducing the number of FOG-related SSOs. SPU's initial efforts focused on characterizing the FOG problem by identifying FOG hot spots (locations where FOG was contributing to SSOs, or where pipe segments were scheduled for cleaning every 6 months or less due to FOG accumulation), assessing below-ground FOG impacts at the hot spots (including the relative influence of FOG sources, physical sewer system factors, and the effectiveness of cleaning efforts), and assessing how well Food Service Establishments (FSEs) in the vicinity of the hot spots managed their FOG waste. At the same time, SPU began inventorying FSEs to determine the extent of the FOG problem.

In 2012, SPU completed development and began implementation of a FOG Control Program Plan. SPU used the results of the FOG characterization efforts and the FSE inventory to develop short- and long-term program goals, location-specific strategies, an approach for focusing resources, a workload forecast and staffing plans, and an approach for monitoring and reporting program performance. These items comprise SPU's FOG Control Program Plan, which was submitted to EPA and Ecology on December 31, 2012. After the Consent Decree was filed in U.S. District Court, the FOG Control Plan was approved by EPA on September 5, 2013 and by Ecology on September 9, 2013. SPU is implementing the plan and will review it each year and update it as appropriate in order to continue focusing efforts on the worst FOG problems. Actual 2013 and planned 2014 Plan activities are described in Section 3.3 of this report.

2.6 Floatables and Solids Observation Program Plan

SPU began observing CSO events to document the presence or absence of floatables and solids in 2008. Difficulties with completing visual observations led SPU and EPA to agree to utilize camera technology to accomplish observations beginning in 2011. On December 31, 2012, SPU submitted an updated Floatables and Solids Observation Plan to EPA and Ecology in compliance with the negotiated Consent Decree. The updated plan proposed observing overflows at two additional outfalls each year in 2013 and 2014 and, if no significant floatables are observed by the end of 2014, concluding the observation program. The updated Plan was conditionally approved by EPA on September 5, 2013, approved by Ecology on September 9, 2013, resubmitted with the revisions requested by EPA on October 8, 2013, and approved by EPA on January 10, 2014. 2013 observations are described in Section 3.4 of this report.

SECTION 3

Operation & Maintenance Activities

This section describes the operation and maintenance (O&M) activities SPU undertakes to reduce the number and volume of sanitary system overflows (SSOs), dry weather overflows (DWOs), and combined system overflows (CSOs).

3.1 Nine Minimum Control Activities

The Federal CSO Control Policy requires municipalities with combined sewer systems to implement nine measures that help reduce the number and volume of sewage overflows without extensive engineering studies or significant construction costs. The following paragraphs describe the work that was performed in 2013 on each of these nine control measures.

3.1.1 Control 1: Provide System Operations & Maintenance (O&M)

Reduce the magnitude, frequency, and duration of CSOs through proper operation and maintenance (O&M) of the combined sewer system.

Each year SPU performs extensive system O&M activities to reduce the frequency and volume of preventable overflows. Routine maintenance activities include sewer inspections, cleaning, and non-emergency point repairs; catch basin inspection, cleaning, and repairs; control structure and storage structure cleaning; valve and flap gate inspection, cleaning, lubricating, and servicing; and pump station electrical, mechanical, and facilities inspection and servicing. SPU uses the National Association of Sewer Service Companies (NASSCO) PACP defect coding system to identify and prioritize pipes to be scheduled for maintenance or rehabilitation.

Once a sewer has been identified as having a maintenance-related problem, the sewer is placed on a routine cleaning schedule to prevent future maintenance-related backups. The initial cleaning frequency is based on the cause of the initial backup, and the cleaning frequency is increased or decreased over time as appropriate. Corrective activities include:

- Jetting, for light to medium debris;
- Dragging, for heavy debris in pipes greater than 18-inch diameter;
- Hydrocutting, for roots and/or grease;
- Rodding, for pipes with an active blockage; and
- Chemical root treatment, in sanitary and combined sewers only, when roots are present and no grease.

SPU's routine maintenance frequencies range from as short as once a month to as long as once every six years. The challenge for sewer utilities is to clean sewers as frequently as necessary to maintain system capacity but no more than necessary, as cleaning sewers shortens the sewer's functional life span. In 2011 SPU launched the use of a cleaning optimization tool (COTools) to analyze sewer pipe cleaning data and recommend appropriate cleaning frequencies. SPU staff review these software-generated recommendations and implement those that provide the right balance between sewer capacity and sewer lifespan. In 2013, SPU continued to use COTools to analyze and adjust pipe maintenance frequencies.

Pump station electrical and mechanical components are replaced as necessary during routine pump station maintenance. In 2008, SPU began implementing Reliability Centered Maintenance (RCM) at its wastewater pump stations. The objective of RCM is to ensure the right maintenance is performed at the right intervals, which in turn optimizes life cycle costs while increasing system reliability. In addition, RCM ensures the right data is collected and evaluated, adding discipline to the decision-making process around operations, spare parts inventory, maintenance strategies, and data collection.

Over a three-year period, maintenance strategies were developed for each of the 68 wastewater pump stations, taking into consideration site-specific conditions and the consequences of failure. The RCM Strategies were used to create maintenance tasks and intervals (work orders) that were implemented in 2011. Data collected from these work orders is analyzed and used to adjust future maintenance tasks and intervals. In 2013, SPU continued to use and adjust the RCM-based strategies.

SPU's 2013 O&M accomplishments are summarized in Table 3-1. Compared to 2012 O&M accomplishments, productivity increased in most areas. Most significantly, SPU cleaned over 25% of the collection system in 2013. In addition, SPU cleaned approximately 63% more pipe and inspected approximately 10% more sewers in 2013 than in 2012. The O&M activities summarized in Table 3-1, the CMOM initiatives described in Sections 3.2 and 3.3, and the job plan update activities described in Section 3.4 all help SPU limit the number and volume of overflows in the collection system.

Control 1 also requires that SPU take affirmative steps to prevent tidal inflow into the combined sewer system. SPU reviews flow monitoring results on a regular basis to determine whether there are any outfalls experiencing tidal inflow and, if so, to help determine solutions. In 2011, SPU replaced leaking flap gates at Overflow Structures 111A and 111C to prevent inflow from the tidally influenced reach of the Duwamish River. In early 2012, SPU sealed Overflow Structures 111E and 111F, further preventing tidal inflow from the Duwamish River. And in 2009, SPU sealed the leaking flap gates at Outfalls 69, 70, 71, and 72 along the Central Waterfront, effectively changing the overflow elevation at these outfalls to the previously designated "emergency overflow weirs", which are higher than the high-water level of Elliott Bay.

Table 3-1. 2013 O&M Accomplishments	
Activity	**Quantity**
Miles of mainline pipe cleaned	418
Miles of mainline pipe inspected via CCTV	124
Miles of mainline pipe rehabilitated	10.6
Number of pump station inspections [1]	1,802
Number of maintenance holes inspected	518
Number of force mains inspected and repaired/replaced/rehabilitated	2
Number of CSO structure inspections [2]	304
Number of CSO structure cleanings [2]	129
Number of CSO HydroBrake inspections [2]	225
Number of CSO HydroBrake cleanings [2]	51
Linear feet of pipe receiving chemical treatment to inhibit root growth	63,152
Number of catch basins inspected	905
Number of catch basins cleaned	2,025
Number of catch basins repaired	21
Number of catch basin traps replaced	136

1. *See Tables A-2 and A-3 for pump station capacity and inspection details.*
2. *See Tables A-4 and A-5 for CSO structure inspection and cleaning details.*

3.1.2 Control 2: Maximize Storage of Flows

Maximize the use of the collection system for wastewater storage, in order to reduce the magnitude, frequency, and duration of CSOs.

SPU maximizes storage in its collection system through a multi-faceted approach that includes:

- Regular collection system maintenance, so that existing capacity is available during storm events;
- Retrofits of storage facilities whose existing capacity is not fully utilized;
- Increasing the height of overflow weirs, when doing so increases collection system storage capacity without creating backups; and
- Eliminating excessive inflow and infiltration.

In 2013, SPU continued to perform regular O&M activities as described in Control 1. Those activities helped to minimize sewer blockages and optimize system capacity.

In addition, SPU continued to design and construct system retrofits to better utilize existing sewer system capacity. Work on system retrofits is described in Section 4.1 of this report.

3.1.3 Control 3: Control Nondomestic Sources

Implement selected CSO controls to minimize CSO impacts resulting from nondomestic discharges.

Two important programs are implemented to help control nondomestic discharges into the Seattle sewer system: the FOG Control Program, and the Industrial Pretreatment Program.

SPU administers the City's FOG Control Program, enforcing Seattle Municipal Code requirements to pretreat FOG-laden wastewater before it is discharged to the sewer system. FOG has a deleterious effect on the sewer system as it combines with calcium and grease in wastewater to form hardened calcium deposits which adhere to the inside of sewers, decreasing their capacity. FOG Control Plan development activities are summarized in Section 2.5 of this report. FOG Control inspection and enforcement activities conducted in 2013 are summarized in Section 3.3.

Figure 3-1. FOG Control Program Educational Materials

The industrial Pretreatment Program is administered by King County. King County issues industrial waste pretreatment permits that include appropriate discharge limits. King County also provides regular site inspections and periodic permit reviews. SPU and King County work together if permittees are found to have a negative impact on the sewer system.

3.1.4 Control 4: Deliver Flows to the Treatment Plant

Operate the collection system to maximize flows to the treatment plant, within the treatment plant's capacity.

SPU maximizes flow to the treatment plant by implementing the measures described in Controls 1 and 2 and also through a program of routine system performance monitoring and analysis.

In 2010, SPU integrated its former water and wastewater control centers into a single Control Center (CC). The Control Center is staffed 24 hours a day and receives real-time SCADA (Supervisory Control & Data Acquisition) information.

Initially, the Control Center received SCADA information only from SPU's 68 wastewater pump stations. SPU continues to regularly analyze performance of the 68 pump stations to ensure that they are operating at their design capacity during storm events. Control Center staff respond to any alarms at the wastewater pump stations or the CSO facilities that would indicate a drop in performance or other problem. In addition, SPU monitors pump station, overflow structure, and outfall flow data as it is collected and uses the data to detect maintenance issues that may be affecting system performance.

In 2011, monitoring and controls for SPU's first sewer system facility with active controls and SCADA connectivity also were brought into the Control Center. In 2012, a second major control project was completed and brought into the Control Center for full operation. The project, located in the Windermere Area (Basin 13), includes two storage tanks and a motor-operated gate valve. The valve is programmed to fill or evacuate storage based on water levels in the downstream sewer (the Lake Line). The next three projects that will be monitored from the Control Center following completion are the CSO storage projects being constructed to serve the Windermere, Genesee, and South Henderson Areas (see Section 4).

In 2013, SPU made continued progress constructing/implementing the infrastructure, hardware and software that comprise the Drainage and Wastewater I-SCADA Program, which is a capital program whose goal is to allow SPU to transition from consultant-provided flow monitoring services to an SPU operated monitoring network. By the end of 2013, transition of seven CSO sites and all 17 rain gauges had been achieved. The goal is to have all monitoring locations transmit real-time data to the Control Center by the end of 2015.

The program also includes the upgrade of SCADA equipment in all of SPU's wastewater pump stations. This work was completed in early 2013. Implementation of a major upgrade of the Wonderware SCADA software and the hardware used in the Control Center was also completed in 2013.

3.1.5 Control 5: Prevent Dry Weather Overflows

Prevent dry weather overflows; they are not authorized. Report any dry weather overflows within 24 hours and take prompt corrective action.

SPU experienced three dry weather overflows (DWOs) from its permitted CSO outfalls in 2013, none of which were caused by SPU or any other City entity:

- The first DWO occurred on February 1, 2013, at Outfall 71 on the Central Waterfront, and was caused by a subcontractor on the SR-99 bored tunnel construction contract. The subcontractor inadvertently removed a maintenance hole cover that allowed debris into a 21-inch diameter sewer, blocking flow and causing an estimated 58,760 gallon DWO. SPU issued Notices of Violation to the lead agency (Washington State Department of Transportation, also known as WSDOT) and the prime contractor (Seattle Tunnel Partners).

  It should be noted that proactive efforts by SPU helped avoid two additional DWOs on February 15 and July 2, 2013, when subcontractors drilled into two large diameter SPU sewers. To reduce the risk of recurring construction-caused problems, SPU issued Notices of Violation to WSDOT, Seattle Tunnel Partners, and Malcolm Drilling.

- The other two DWOs occurred at Outfall 129 on the east side of Lake Union. Both were caused by unusually high 45-60 mile per hour winds, which led to failure of private side sewers serving houseboats in Lake Union, which in turn caused high flows, debris, and upset conditions in the collection system. The first of these two DWOs occurred between November 2 and November 4, and the volume was approximately 53,670 gallons. The second DWO occurred on November 6, and the volume was approximately 11,240 gallons. Once the houseboat management association repaired the private side sewers, collection system flows returned to normal.

The details of these DWOs were provided in letters to Ecology and EPA.

SPU also experienced five exacerbated CSOs in 2013 (wet weather overflows at CSO outfalls that, while already discharging as a result of precipitation, were worsened by mechanical failures, blockages, equipment outages, or power outages):

- On January 9, 2013, a 590 gallon CSO at Outfall 12 was exacerbated by equipment and sensor malfunctions at SPU wastewater pump station 51. The equipment and sensors were subsequently repaired.
- On January 9, 2013, a 2,693 gallon CSO at Outfall 22 was exacerbated by an inflow of rocks and sediment from a broken side sewer lateral that restricted the pumping performance at SPU wastewater pump station 50. Emergency operation and maintenance procedures were put in place until the lateral could be repaired.

- On April 7 and 13, 2013, two CSOs at Outfall 22 (907 gallons and 7,802 gallons, respectively) were exacerbated by an inflow of rocks and sediment that restricted the pumping performance at SPU wastewater pump station 50, also causing SSO discharges from the overflow chamber into the street. ERTS reports were filed for the SSOs. The vault at this air assisted lift station was cleaned to restore functionality, and planning was initiated for a pump station rehabilitation project.
- On September 6, 2013, a 902 gallon CSO at Outfall 19 was exacerbated by a pump replacement project at Wastewater Pump Station 35. The pumps had reached the end of their life and were being replaced, starting in August and beginning with the largest pump (which provides storm event pumping capacity). Work to replace the largest pump had not been completed when early rains occurred on September 6. Replacement of the large pump was completed before the next storm event.

To help prevent DWOs and exacerbated CSOs, each combined sewer system overflow location has been configured with an alarm that is triggered if there are potential overflow conditions. The alarms alert analysts and/or field crews to assess the situation and take corrective action if possible.

In addition, whenever SPU experiences a DWO or exacerbated CSO, SPU investigates to identify the cause and takes action to address the overflow and reduce or eliminate the probability of recurrence. Investigation includes manual inspection of the site where the overflow occurred, CCTV inspection of adjacent pipe, and review of SCADA data. Whenever possible, the outfall structure and adjacent pipes are cleaned immediately following the event, and SPU reviews and analyzes the cleaning results. SPU holds monthly “after action” review meetings to learn from our experiences and apply any lessons learned toward preventing additional SSOs, DWOs, and exacerbated CSOs. SPU also looks at the rolling history of DWOs and exacerbated CSOs to determine if there are any patterns and if a systematic solution is required. For example, in past years pump station electrical outages contributed to DWOs, so SPU implemented projects to ensure that each pump station has either an on-site backup generator or an emergency plug that allows a portable generator to be easily placed in service. See Section 4.10 of this report for information on recently completed pump station backup power improvements.

A summary of the DWOs and exacerbated CSOs from 2007-2013 is included in Table 3-3.

Table 3-2. Dry Weather Overflows (DWOs) and Combined Sewer Overflows (CSOs) Exacerbated by System Maintenance Issues 2007 – 2013

Year	DWOs		CSOs Exacerbated by System Maintenance Issues[1]	
	No. of Overflows	Volume (gallons)	No. of Overflows	Volume (gallons)
2007	7	499,264	--	--
2008	1	148,282	8	470,444
2009	1	3,509	3	156,153
2010	0	0	13	12,320,400
2011	0	0	10	2,317,068
2012	0	0	11	5,846,647
2013	3[2]	123,670	5	12,894

[1] *CSOs exacerbated by system maintenance issues were not reported prior to 2008. The 'exacerbated CSOs' listed in this table are listed as CSO discharges in Table 5-4 and are included in the discharges summarized in Tables 5-5, 5-6, 5-7, and 5-8.*

[2] *None of these DWOs were caused by SPU or any other City entity.*

3.1.6 Control 6: Control Solids and Floatable Materials

Implement measures to control solid and floatable materials in CSOs.

SPU implements several measures to control floatables:

Catch basins are designed to prevent floatables from entering the system. Specifically, SPU's catch basins are designed to overflow only when the water level in the catch basin is well above the overflow pipe opening. Because floatables remain on the water surface, they are trapped in the catch basins.

Catch basins are inspected and cleaned regularly to remove debris and potential floatables. In 2013, SPU crews:

- Inspected 905 combined sewer system catch basins,
- Cleaned 2,025 combined sewer system catch basins,
- Replaced 136 traps in combined sewer system catch basins, and
- Repaired 21 combined sewer system catch basins.

In addition, the City of Seattle runs several solid waste and city cleanup programs to prevent and reduce the amount of street litter, including:

- Street sweeping, including increased efforts for Fall leaf pickup,
- Spring clean,
- Storm drain stenciling,
- Event recycling,
- Public litter and recycling cans,
- Waste free holidays,
- Product bans, and
- Illegal dumping investigation and response.

3.1.7 Control 7: Prevent Pollution

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

SPU conducts multiple pollution prevention programs to keep contaminants from entering the sewer system and subsequently being discharged in sewage overflows. Pollution prevention programs performed by SPU in 2013 include:

- Public education programs,
- Solid waste collection and recycling,
- Product ban/substitution,
- Control of product use such as cleaning and yard care recommendations,
- Illegal dumping prevention,
- Bulk refuse disposal,
- Hazardous waste collection,
- Commercial/industrial pollution prevention,
- Spill response,
- Business inspections, and
- Water quality complaint response.

The City of Seattle Department of Transportation (SDOT) performs street sweeping, including street sweeping downtown streets every night and cleaning alleys three nights per week. In 2013, SDOT street sweeping crews swept 8,650 curb miles in the combined sewer system area.

SPU also supports public education programs on pollution prevention, such as:

- Spring Clean,
- Clean and Green,
- Adopt-a-Street,
- Adopt-a-Drain,
- Storm Drain Stenciling,
- Surface Water Pollution Report Line,
- Pet Waste Disposal,
- Natural Yard Care,
- Car tips (to decrease automobile leaks), and
- Reduce, Reuse, and Recycle tips.

SPU also has reduced the potential for pollution by reducing the volume of sewage entering the sewer system. For years, SPU has been a leader in potable water conservation through the Saving Water Partnership, actually reducing the regional water system annual demand while the population has increased. As a result of these efforts, the total Seattle regional water system demand has dropped from a base (winter) flow of approximately 150 MGD in the late 1980s to a current base flow of 100 MGD, thus reducing the capacity demands on the regional sewer system by approximately 50 MGD.

SPU and King County DNRP are both utilizing green stormwater infrastructure (GSI) to reduce the volume of stormwater entering the combined sewer system. SPU encourages installation of rain gardens and cisterns on private properties and is installing roadside rain gardens in street rights-of-way. Please see Section 4.2 for more information on these GSI programs.

Finally, if sewage contamination of surface waters occurs due to side sewer breaks or illicit connections or discharges, SPU uses regulatory tools such as Notices of Violation and associated penalties to help remedy the problem in a timely manner.

3.1.8 Control 8: Notify the Public

Implement a public notification process to inform the citizens of when and where CSOs occur.

Figure 3-2. Example of Outfall Signage

SPU, together with King County and Seattle King County Public Health, maintains a sewage overflow notification and posting program. Signs at each outfall identify the outfall and warn of possible sewage overflows. The signs include the phone number for the CSO Hotline, staffed and managed by Seattle King County Public Health. Seattle King County Public Health also provides a website with detailed information about CSOs, potential public health hazards, and precautions the public may take to protect themselves. If sewage overflows occur due to side sewer breaks or illicit connections or discharges, SPU posts additional warning signs at impacted waterways until the problem is resolved.

In addition, King County has hosted an overflow website since December 2007, providing notification of recent and current King County CSO overflows. In 2009, SPU began working with King County to incorporate City of Seattle real-time overflow information on the King County site. This work was accomplished in 2011. Now the community is able to access consolidated information to assist in making choices about use of local waters. In 2013, the public notification web pages were viewed 11,736 times, with a peak one-day use of 2,167 views on September 30, 2013. SPU featured the public notification website in the Spring 2013 Community Guide to the Long-Term Control Plan.

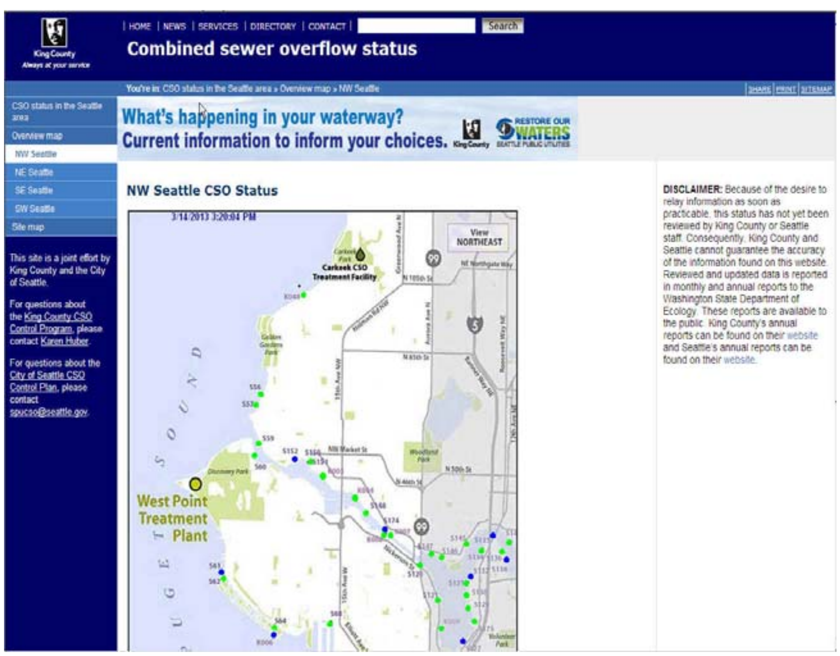

Figure 3-3. King County/SPU Real-Time Overflow Notification Website

3.1.9 Control 9: Monitor CSOs

Monitor CSO outfalls to characterize CSOs and the effectiveness of CSO controls.

SPU monitors each of its CSO outfalls to detect sewage overflows. SPU also tracks the performance of its flow monitors to ensure consistent, high quality measurements. The flow, precipitation, and flow monitor performance monitoring programs and results are described and summarized in Section 5 of this report.

3.2 CMOM Performance Program Activities

The CMOM Performance Program Plan committed SPU to completing performance, productivity, and efficiency initiatives in each of the following program areas:

- Planning and scheduling,
- Sewer cleaning,
- FOG Control Program,
- Repair, rehabilitation, and replacement,
- Condition assessment, and
- SSO response.

Work in each of these program areas is described in the following sections, together with work on a few CMOM initiatives not included in the CMOM Performance Program Plan.

3.2.1 Planning and Scheduling Initiatives

The purpose of the planning and scheduling initiatives is to improve the quality and efficiency of maintenance tasks by standardizing the approach, business rules, and system requirements needed to perform each type of task (for example, sewer cleaning, catch basin pumping, CCTV inspections); centralizing the planning of tasks; and using software to support work order life cycles management. Work completed in 2013 and planned for 2014 includes:

- Risk Based Scheduling - SPU implemented risk based scheduling of sewer pipe cleaning in 2012 and refined the scheduling in 2013. SPU began training Field Managers, Crew Chiefs, and Planning & Scheduling staff in 2013 and will continue in 2014, with a focus on improving communications and performance metric evaluation.
- Planning and Scheduling Centralization - SPU centralized its crew planning and scheduling functions in early 2013. SPU focused on defining staff roles and responsibilities, processes, and procedures to take full advantage of the Maximo 7 Computerized Maintenance Management System (CMMS) software roll out in 2013.

- Maximo 7 Reimplementation – Maximo is SPU's CMMS software and Maximo 7 is the new version implemented by SPU in 2013. This software upgrade is considered a reimplementation as SPU used the software upgrade process as an opportunity to review and revise the software business rules to better reflect and support the business requirements of the utility. Business rule review and revision took place in 2010 and 2011. Design and testing of Maximo 7 took place in 2011, 2012, and early 2013. Maximo 7 was successfully reimplemented in early September 2013.

3.2.2 Sewer Cleaning Initiatives

The purpose of the sewer cleaning initiatives is to improve the quality and efficiency of sewer cleaning by standardizing the procedures, providing ongoing crew training, measuring and tracking the quality of the sewer cleaning efforts, providing feedback to the crews, and using technology to help identify where changes in cleaning frequency should be considered. Work completed in 2013 and planned for 2014 includes:

- Sewer Cleaning Optimization Tool Enhancement - SPU modified its Cleaning Optimization Tool (COTools) in the fourth quarter of 2013 to integrate with Maximo 7.
- Sewer Cleaning Standard Operating Procedures - SPU reviewed and updated Standard Operating Procedures (SOP) for sewer mainline cleaning in 2012. The sewer mainline cleaning SOP was reviewed in early 2013, and no additional revisions were necessary.
- Sewer Cleaning Crew Training - In 2013, SPU provided two, three-week training sessions and one, two-week training session on mainline cleaning. Two, three-week training sessions and one, one week training session will be conducted in 2014. The 2014 training sessions will emphasize use of new jet nozzle technology, effective capture of debris while jetting, and use of bucket machines for cleaning 24-inch diameter and larger sewer pipes.
- Sewer Cleaning Quality Assurance/Quality Control (QA/QC) Plan - SPU developed a Sewer Cleaning QA/QC Plan in 2012 and implemented the plan in the third quarter of 2013. Field Managers and Crew Chiefs receive Production and Quality Reports which show the results of sewer cleaning quality and are used to provide feedback to sewer collection system cleaning staff.

3.2.3 FOG Control Program Initiatives

The purpose of the FOG Control Program is to reduce the number of FOG-related SSOs, by developing and implementing a FOG Control Plan, standardizing procedures, training FOG inspectors, providing outreach and education to FOG-generating dischargers, and gathering data to help prioritize inspections, FOG-related sewer cleaning, and FOG-related enforcement. Work completed in 2013 and planned for 2014 includes:

- FOG Management Plan – The FOG Control Program Plan was submitted to EPA and Ecology on December 31, 2012. After the Consent Decree was filed in U.S. District Court, the FOG Control Plan was approved by EPA on September 5, 2013 and by Ecology on September 9, 2013. SPU is implementing the plan and will review it each year and update it as appropriate in order to continue focusing efforts on the worst FOG problems.
- Food Service Establishment (FSE) Inventory Management Plan – As is described in Section 3.3, SPU's focus in 2013 was on outreach and enforcement rather than on inventorying food service establishments (FSEs). Inspectors completed 352 regulatory FSE inspections and 864 inventory FSE inspections in non-hot spot related areas. These inspections include education, data collection and, if it is the first visit to an FSE, evaluation of FOG discharge risk. The FSE inventory management plan is due to be completed in fourth quarter 2015.
- Standard Operating Procedures and Outreach Materials – SPU updated all FOG Control Program SOPs in 2013, including FOG Characterization, Inventory Inspection, Regulatory Inspection, Enforcement, Education and Outreach, Coordination, Linko Database, Hotspot Database, and FSE ID (identifying FOG hot spots in the wastewater collection system). SPU also reviewed all outreach materials in 2013.
- FOG Inspector Training – New inspectors are provided FOG Control Program training when they begin.

3.2.4 Repair, Rehabilitation, and Replacement Initiatives

The purpose of the repair, rehabilitation, and replacement initiatives is to support timely, efficient, standardized identification and resourcing of sewer repair, rehabilitation, and replacement work. Work completed in 2013 and planned for 2014 includes:

- Repair, Rehabilitation and Replacement (3R) Process and Tool – SPU began developing the 3R Process and Tool in 2012 and completed it in early 2013. The tool was implemented in mid-2013 and fully utilized after Maximo 7 Reimplementation in September 2013. The current version of the 3R Tool prioritizes and recommends corrective action for single structural defects. The 3R Tool will be further enhanced in 2014 to prioritize and make recommendations for addressing multiple structural defects on spans of sewer pipe.
- Capital Improvement Plan and Workload Forecasting – SPU has initiated a review of its Sewer Mainline Rehabilitation Program, including roles and responsibilities, decision making processes, procedures for prioritization of assets to be rehabilitated (3R Tool), use of pipe rehabilitation technologies, processes and procedures for crew rehabilitation work as well as contracting out rehabilitation work, and identification and use of metrics to measure program performance. This work will be conducted in coordination with the 3R workload forecasting which will be completed by the end of the second quarter 2014.

3.2.5 Condition Assessment Initiatives

The purpose of the condition assessment initiatives is to improve the quality and efficiency of force main assessments and sewer inspections by standardizing the procedures, providing crew training, measuring and tracking the quality of the work, and providing feedback to the crews. Work completed in 2013 and planned for 2014 includes:

- Force Main Assessment Strategy – SPU began developing a Force Main Assessment Strategy in 2013. It is on schedule to be completed in March 2014 and will be implemented beginning in April 2014.
- Closed Circuit Television (CCTV) Standard Operating Procedures (SOPs) – CCTV SOPs were completed in early 2013 and provided to all CCTV crews in the third quarter of 2013.
- CCTV Training Plan – The CCTV Training Plan was finalized in early 2013. The training plan was implemented beginning in third quarter 2013. Training of CCTV staff will begin in 2014 and will focus on conformance with the CCTV SOP.
- CCTV QA/QC Plan - The CCTV Quality Assurance Quality Control Plan was completed in 2013. The QA/QC Plan was implemented in 2013 and will be used increasingly if resources allow.

3.2.6 SSO Response Initiatives

The purpose of the SSO response initiatives is to minimize the duration and effects of SSOs by standardizing response procedures, providing training, and ensuring the crews use the most appropriate and best available tools to contain and cleanup SSOs. Work completed in 2013 and planned for 2014 includes:

- Standard Operating Procedures – The Sanitary Sewer Overflow (SSO) Response SOP was finalized in the fourth quarter of 2013. All utility maintenance, analysis and reporting staff will receive training on the SOPs in 2014, starting with the Drainage & Wastewater First Response Crews.
- Tools and Equipment Usage Plans – Tools and Equipment Usage Plans will be finalized in the third quarter of 2014 and will be provided to staff during the fourth quarter of 2014.
- Field Training Program – SPU is on schedule to develop a field training exercise by third quarter 2014 and to implement the field training program in 4th quarter 2014.

3.2.7 Other CMOM Initiatives

As CMOM needs are identified, SPU has implemented additional initiatives beyond the ones that are included in the CMOM Performance Program plan. The purpose of these initiatives is to reduce the number of SSOs and/or improve SPU productivity, efficiency, or sustainability. Work completed in 2013 and planned for 2014 includes:

- SPU reviewed and updated the CSO Control Structure Inspection and Cleaning SOP in 2013 and began developing the CSO Control Structure Inspection and Cleaning Training Plan. The training plan will be completed in 2014.
- SPU began developing the CSO Control Structure Inspection and Cleaning QA/QC Plan in 2013 and will complete the plan in 2014.
- SPU began a workload analysis in 2013, in order to develop a long-term staffing plan for maintenance of drainage and wastewater assets. The workload analysis will be completed in 2014.
- SPU began to evaluate the effectiveness of the Chemical Root Control Program in 2013, and will complete the evaluation in 2014.

3.2.8 SSO Performance

SPU's 2004 - 2013 SSO performance is summarized in Table 3-3. This table shows that SPU steadily reduced the number of SSOs between 2004 and 2010 and operated in the high-performing band of utilities (less than or equal to 4 SSOs per 100 miles per year) in each of the last five years. Table 3-3 also shows that the number of SSOs tends to be higher in years with more rain (for example, 2010 and 2012). Finally, Table 3-3 shows that, although there were fewer SSOs in 2013 than in 2012, the Two-Year Annual Average SSO Performance increased. (i.e., The number of SSOs for the combined 2012-2013 period was slightly higher than the number of SSOs for the combined 2011-2012 period and the number of SSOs for the combined 2010-2011 period.)

Table 3-3. 2004-2013 SSO Performance

Year	Number of SSOs[1]	SSOs/100 Miles of Sewer	2-Year Average SSOs/ 100 Miles of Sewer
2004	100	7.0	NA
2005	100	7.0	7.0
2006	112	7.9	7.5
2007	97	6.8	7.4
2008	67	4.7	5.8
2009	57	4.0	4.4
2010	56	3.9	4.0
2011	36	2.5	3.2
2012	56	3.9	3.2
2013	47	3.3	3.6

1. *Basement backups were not included in these numbers prior to 2008.*

Table A-1 lists the 47 SSOs that occurred in 2013 by date, location, and cause. Conclusions from that table include:

- 12 SSOs occurred during September, the month with the greatest amount of precipitation;
- 9 SSOs were caused by other parties and could not have been prevented by SPU O&M;
- 18 SSOs had roots as a cause, including 16 SSOs where roots was the primary cause. The largest of the root-caused SSOs was 7,000 gallons and the next largest was 1,800 gallons; all others were 600 gallons or less;
- 10 SSOs had FOG as a cause, including 4 SSOs where FOG was the primary cause; all of these SSOs were 600 gallons or less;
- 8 SSOs had structural failure as a cause, including 7 SSOs where structural failure was the primary cause; one of these SSOs discharged 720 gallons, and none of the rest exceeded 100 gallons.
- 2 SSOs had debris as a cause, including 1 SSO where debris was the primary cause;
- 3 SSOs occurred when combined sewage flows exceeded sewer system capacity;
- 3 SSOs were due to human error;
- 2 SSOs occurred at a new operable gate whose controls and configuration were being fine-tuned as it was being brought into regular service; and
- 2 SSOs occurred at a pump station that is no longer meeting its intended purpose and is scheduled for rehabilitation as soon as the rehabilitation design is complete.

In order to remain in the high performing utility band and continue reducing the annual number of SSOS, SPU analyzes each SSO and identifies appropriate follow-up actions, including system modifications and/or increased maintenance where appropriate. SPU also reviews SSO data on an ongoing basis, looking for any patterns or trends. At least a third of the SSOs in each of the last three years were caused by roots, FOG, and/or debris. CMOM Initiatives such as the COTools, FOG Inspection & Enforcement Program, and Chemical Root Control Program were identified and implemented to reduce these types of SSOs.

COTools has been very effective in identifying pipes whose preventive maintenance (PM) frequency needs to be adjusted to reduce the risk of an SSO occurrence. The business rules and algorithm for COTools have been refined over the past three years as SPU utilizes the tool. We’ve learned that SPU must act on the COTools recommendation in a more consistent and timely manner to achieve the most successful results. Toward that end, SPU has assigned an additional resource to run the COTools algorithm and review the resulting recommendations.

The FOG Control Program was originally focused more on public education and outreach, and data analysis indicated that more effort needed to be shifted to inspections and enforcement. Toward that end, SPU has assigned an experienced field worker to provide technical support to the FOG Inspectors thus allowing the FOG Inspectors to focus all of their time on inspections and enforcement. This technical support includes reviewing CCTV inspections, reviewing maintenance history, and making recommendations regarding the condition and maintenance requirements of sewer mainlines impacted by FOG.

SPU has maintained a Chemical Root Control Program for the past 8 years and has continued to refine and expand this program as experience and knowledge of chemical (herbicides) effectiveness grows. However, SPU's Chemical Root Control Program has been focused on one herbicide and on specific areas of the City with larger and denser concentration of "legacy" trees. In 2014, SPU will be implementing an initiative to analyze SPU's 8 years of chemical root control data along with industry data to answer these and other questions:

- Should SPU consider the use of other herbicides,
- Should SPU expand the criteria to include additional categories of pipes for inclusion in the program,
- What additional resources are necessary to expand the program, and
- What metrics would provide accurate and timely feedback regarding program success?

Finally, a number of SPU SSOs occur from pipes that are not currently on a preventive maintenance schedule. To address this issue, over the past 6 years SPU has devoted a portion of its CCTV inspection resources to the assessment of these pipes to determine if the situation has changed such that these pipes should be placed on a preventive maintenance schedule. In late 2013 SPU conducted a pilot program to assess the effectiveness of utilizing an acoustic testing process to screen pipes that are not currently on a preventive maintenance schedule to determine if these pipes display an indication of a possible obstruction that would warrant a follow-up CCTV inspection. The results of the pilot program indicated a high level of accuracy. In 2014, SPU will expand the use of acoustic testing and add this tool to the list of tools that are used to collect data to better understand and respond to the maintenance requirements of SPU's wastewater collection system.

3.3 FOG Control Program Activities

In 2013, FOG Control Program staff worked with both residential and commercial customers to reduce the amount of FOG discharged into the wastewater collection system. Inspectors concentrated on regulatory and inventory Food Service Establishment (FSE) inspections.

The regulatory inspections were conducted in thirty-nine (39) identified FOG impacted areas. These identified areas, or FOG hot spots, included areas that experienced FOG related Sanitary Sewer Overflows (SSOs) and areas where sewer mainlines require frequent maintenance due to FOG. The hot spots were analyzed for maintenance, structural issues, and FOG sources. FOG sources in these areas were inspected for compliance with the Seattle Municipal Code FOG requirements. Inspectors completed 352 Regulatory FSE Inspections. These inspections resulted in 98 Correction Notices (enforcement actions), including:

- 68 requiring grease interceptor maintenance,
- 13 requiring installation of grease interceptors,
- 11 requiring implementation of kitchen best management practices, and
- 6 requiring plumbing modifications.

Inspectors also completed 864 inventory inspections in non-hot spot related areas. These inspections include education, data collection and, if it is the first visit to an FSE, an evaluation of FOG discharge risk. The information gathered is used to establish the priority and future inspection frequency.

Inspectors also conducted door to door residential outreach in residential areas located within FOG hot spots. In 2013, the team was able to conduct outreach to 217 single family dwellings and 83 multi-family properties.

In addition to the door to door residential outreach, the FOG Team was able to sponsor and staff a booth at three outreach events.

- Seattle Chamber of Commerce Restaurant After Hours for the restaurant community,
- Seattle Department of Transportation’s Rainier Days (targeted a smaller residential neighborhood), and
- Trends, a tradeshow specifically held for multi-family residential management and associations.

SPU also compiled the following FOG Team Standard Operating Procedures (SOPs), to enable staff to make consistent decisions and work effectively:

- FOG Characterization
- Inventory Inspection
- Regulatory Inspection
- Enforcement
- Education and Outreach
- Coordination
- Linko Database
- Hotspot Database
- FSE Identification (identifying FOG hot spots in the wastewater collection system)

2014 FOG Control Program efforts will continue to focus on regulatory inspections with progressive enforcement, inventory inspections, hot spot characterization, and outreach.

3.4 Annual Review of Operations and Maintenance Manuals

In 2013, SPU reviewed all Drainage and Wastewater (DWW) Operation and Maintenance (O&M) Manuals, SOPs, and Job Plans. The Mainline Cleaning and Closed Circuit Television (CCTV) Inspection/Condition Assessment SOP was updated in 2012. Revision of the Sewer Overflow Response SOP began in 2012 and was completed in 2013.

In addition, SPU completed its Maximo Reimplementation Project, which configured the Computerized Maintenance Management System (CMMS) to better support SPU's drainage and wastewater system maintenance processes and provided a newer version of the software. Job Plans (there are several dozen for drainage and wastewater maintenance tasks) are attached to Maximo work orders and provide details regarding the resources and steps that are necessary to complete assigned tasks. These Job Plans were reviewed and revised as part of the Maximo Reimplementation Project, to ensure that task performance and data collection aligned with the new software and data analysis tools.

3.5 Floatable Solids Observation Program Activities

Since 2011 SPU has conducted overflow observations by the use of cameras temporarily located in CSO overflow structures. SPU's goal is to observe three overflow events at a given CSO overflow structure before moving the camera to the next CSO structure selected for observation.

In 2011 and 2012, SPU observed three overflow events at Outfalls 150 and 152 in the Ballard area and two overflow events at Outfall 44, which extends from the southwest corner of Seward Park. No floatables were observed at Outfall 152. At Outfall 150, occasional small floatables were observed during each of three CSO events, each time in minor quantities. At Outfall 44, 18 small bits of material were observed during one of the two CSO events.

On January 8, 2013, SPU captured a third overflow event at Outfall 44. No solids or floatables were observed in 36 minutes of video.

After capturing a third overflow event at CSO 44, SPU temporarily installed a sewer camera in the overflow structure at Outfall 43, located in the Genesee area. The purchase of another sewer camera allowed SPU to also install a camera in the overflow structure at Outfall 29, located in the Leschi area. SPU collected video of two overflow events each for Outfalls 43 and 29. During almost 73 minutes of video for the four observed events, no solids or floatables were observed.

Camera assisted floatables observation will continue in 2014, to capture third overflow events at Outfalls 43 and 29 and then to move to two additional outfalls. Based on observations to date, SPU continues to believe that floatables are not a significant issue in Seattle.

Table 3-4. 2013 Sewer Camera Observations and Results

Outfall No.	Receiving Water Body	Observation Date	Video Length (minutes)	Solids/ Floatables Observed?
44	Lake Washington	1/8/2013	36:02	No
43	Lake Washington	4/7/2013	12:00	No
43	Lake Washington	6/25/2013	15:00	No
29	Lake Washington	9/28/13	32:18	No
29	Lake Washington	11/15/2013	13:33	No

SECTION 4

Capital Activities

This section describes capital projects and related activities SPU is undertaking to reduce the number and volume of sewage overflows, including progress made in 2013 and work that we plan to complete in 2014.

SPU is continuing to apply a program management model to oversee and direct the delivery of capital projects. During 2013, SPU used the Project Control System (PCS) to proactively monitor and control scope, schedule, and budget on each of its major sewer overflow reduction projects. In addition, SPU applied considerable attention to managing cost and schedule and applying lessons learned across capital projects. 2013 project spending is summarized in Table 4-1.

Table 4-1. 2013 CSO Project Spending

Project Name	Amount Spent
Long-Term Control Plan	$2,624,589
Integrated Plan	$1,594,627
Delridge Retrofit	$1,695,463
Leschi Retrofits	$354,768
Other Retrofits	$1,345,293
Ballard Roadside Raingardens	$737,912
Delridge Roadside Raingardens	$413,463
Windermere CSO Reduction Project	$19,851,804
Genesee CSO Reduction Project	$13,889,470
North Henderson CSO Reduction Project	$4,362,117
52nd Ave S Conveyance Project	$705,126
Pump Station 9 Rehabilitation Project	$207,922
South Henderson CSO Reduction Project	$572,800
Central Waterfront CSO Reduction Project	$32,489
Pump Station Backup Generator Program	$501,046
Outfall Rehabilitation Program	$506,545
Total	$49,395,434

4.1 Retrofits and Flow Diversion Program

SPU made significant progress on a variety of combined sewer system retrofit projects in 2013, as summarized in the following paragraphs.

4.1.1 Weir Height Adjustment Program

In 2008, SPU began a program to evaluate all 108 overflow weirs in its combined and partially separated sewer systems. The purpose of the program was to raise weirs wherever an increased weir height would increase storage within the collection system and decrease the number and volume of sewage overflows. Altogether, SPU raised 15 weirs as part of this program and completed the work related to the 2009 EPA Compliance Order on schedule in 2010 and 2011. Between October 2010 and December 2012, SPU performed post-project performance monitoring to determine the effectiveness of each weir modification and to confirm the design assumptions. The post-project performance monitoring has demonstrated the effectiveness of the weir adjustments and confirmed all assumptions. In addition, the monitoring showed that between October 2010 and December 2012, 38 CSOs were avoided because the weirs were raised. In August 2013 a Weir Height Adjustment Program Summary Report was prepared and submitted to EPA and Ecology. The report documented all work related to the Weir Height Adjustment Program, the results of post-project performance monitoring, and completion of the program.

4.1.2 Windermere Retrofit (Basin 13)

The NPDES permit required that SPU construct a retrofit in the Windermere area by December 31, 2012, to reduce the number and volume of sewage overflows at Outfall 13. The retrofit within Basin 13 consisted of removing the HydroBrake and replacing the device with an automated slide gate. The automated slide gate modulates based on the sewer system level downstream to balance the discharge from Basin 13 and use of the storage system. This improvement increases utilization of the existing system storage and maximizes flow to the system downstream. SPU completed the design in 2010, updated the design in 2011 based on community feedback, awarded the construction contract in late 2011, and completed construction of the improvements in Summer 2012.

In 2013, as part of the post-project performance monitoring program for this retrofit project, several optimizations were identified. The first optimization was a change in gate set points that will reduce impacts of the retrofit to the downstream system, and the second optimization was an overflow weir height adjustment that will eliminate SSOs upstream of Basin 13’s overflow structure. Additional post-project performance monitoring after implementation of these optimizations has shown that the optimizations were successful. Post-project performance monitoring of this retrofit project will continue through 2014.

Figure 4-1. New Slide Gate in Basin 13 (Windermere Area)

4.1.3 North Union Bay Retrofit (Basin 18)

The North Union Bay Area is located in the University District near the Burke-Gilman Trail. Flow monitoring data indicated that the HydroBrake associated with the overflow structure from Sub-basin 18A was not operating in accordance with its design performance curve. The HydroBrake was prematurely restricting higher flows resulting in more frequent CSOs. In addition, only about half of the available storage in the 141,000 gallon in-line detention pipe could be utilized due to weir and side sewer elevations.

During 2012, design and construction were completed for a retrofit that included the following:

- Raised the overflow weir to maximize storage,
- Constructed a new sewer that conveys flows from the local side sewers away from the CSO Facility (allowing the storage to be safely and fully utilized), and
- Augmented the HydroBrake discharge by adding a slotted opening above the HydroBrake. The combination of the slotted opening and HydroBrake discharge are intended to match the design performance curve and bring this basin into compliance with SPU's long term goal of an average of no more than one overflow per year.

2013 was the first year of a post-project performance monitoring phase that will continue through 2014. Figure 4-2 shows the 2013 monitoring results. The performance of the retrofit during different storm events aligns well with the design curve. Modeling and the past year of performance data indicates that Sub-basin 18A is now controlled.

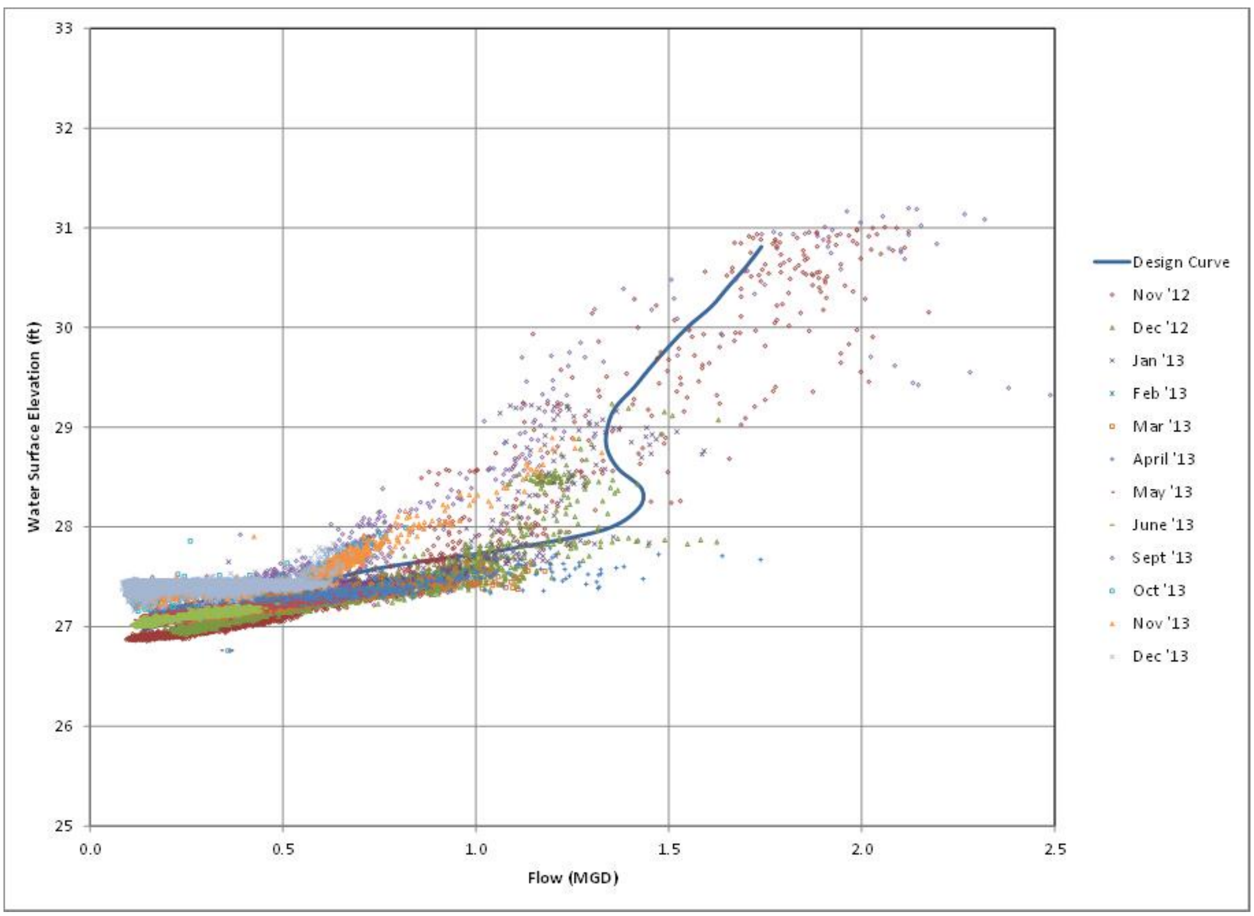

Figure 4-2. Sub-Basin 18A 2013 Monitoring Results

Design of a retrofit at the overflow structure for Sub-basin 18B began in 2013 and will continue through 2014. Similar to the Sub-basin 18A, the existing HydroBrake in Sub-basin 18B is not performing in alignment with its design performance curve. The retrofit consists of replacing the HydroBrake with an automated slide gate.

4.1.4 West Seattle Retrofit (Basin 95)

This retrofit project extended an existing storm drain along Fauntleroy Way SW to collect additional road surface runoff. Diverting road surface runoff frees up capacity in the combined sewer system during storm events and will reduce the frequency of CSOs from this small basin to an average of no more than one overflow per year. Design of this project was completed in early 2012. The project was bid and awarded in Summer 2012 and construction was completed as planned in the first half of 2013. Post-project performance monitoring in 2013 indicates that the basin is controlled. Performance monitoring will continue through 2014.

4.1.5 Delridge Retrofit (Basins 168, 169)

During 2012, SPU completed a detailed analysis of retrofits in the Delridge Area (Basins 168 and 169). The selected retrofits will optimize the performance of CSO Facilities 2 and 3 by replacing existing HydroBrakes with improved upstream diversion structures, actively controlled valves, and an upstream and downstream flow monitoring system. The new system is anticipated to reduce the frequency of surcharging in the downstream sewer system and reduce CSOs at Outfalls 168 and 169. In addition, the improvements will reduce the need for preventive maintenance and the frequency of unscheduled maintenance. Design of this retrofit project began in 2013 and will continue through summer 2014. Construction will begin in fall 2014, and the NPDES permit requires completion of project construction by November 1, 2015.

4.1.6 Henderson Retrofits (Basins 47, 49)

The NPDES permit required that SPU complete construction of Henderson retrofits for Basins 47 and 49 by November 30, 2015. SPU completed design and construction of retrofits at Overflow Structure 47C and Outfall 49 in in 2013. The retrofit for Overflow Structure 47C consisted of raising the overflow weir to maximize storage and access improvements to the overflow structure. The retrofit for Basin 49 consisted of removing the existing HydroBrake and replacing the device with an orifice plate to maximize flow to the downstream system and use storage more efficiently. Post-project performance monitoring of each retrofit will begin in 2014 and continue through 2015. Figures 4-3 and 4-4 below show the retrofit improvements at Overflow Structure 47C.

Figure 4-3. Retrofit Improvements At Overflow Structure 47C

Figure 4-4. Retrofit Improvements At Overflow Structure 47C

4.1.7 Leschi Retrofits (Basins 26 – 36)

The Leschi Area is in east Seattle bordering Lake Washington, and is comprised of Basins 26 through 36. Over a dozen individual retrofit opportunities have been identified in this area as part of the LTCP planning efforts. The retrofit opportunities are being managed as a single project because each basin is connected hydraulically with upstream and downstream basins, and the impact of each individual retrofit will need to be considered in the context of other connected basins. The project team began analyzing alternatives in 2012 and completed the analysis in 2013. Design and construction will be completed in 2014 and 2015, respectively.

4.1.9 Future Retrofits

Duwamish (Basin 111), Madison Park (Basins 139 and 140), Montlake (Basins 22, 24, and 25), and Magnolia (Basin 60) are areas where flow diversions to King County's interceptor and treatment system may reduce the frequency of CSOs. In 2013 SPU analyzed retrofit and flow diversion alternatives in each of these areas. Preferred alternatives were selected as planned in two of the areas at the end of 2013, and these retrofits will begin design in 2014.

In the Duwamish area, baffle walls will be removed in one overflow structure and weirs will be raised in two overflow structures. Modeling indicates these improvements will control Basin 111.

In the Madison Valley area, pump station improvements at two stations are expected to control Basins 22, 24 and 25.

In the remaining areas, Montlake and Magnolia, further analysis will be completed in 2014 and preferred alternatives will be selected by the end of 2014.

4.2 Green Stormwater Infrastructure

The term green stormwater infrastructure (GSI) describes a variety of measures that use soil to absorb stormwater or slow the rate of stormwater entering the sewer system. Green solutions control the sources of pollution by slowing, detaining, or retaining stormwater so that it does not carry runoff into nearby waterways. This reduces the volume and timing of flows into the system. GSI facilities also are referred to as natural drainage systems (NDS) and they are a type of low impact development (LID). Examples of GSI include:

- RainWise – City of Seattle program that provides homeowners with rebates for installing rain gardens and cisterns on their own property.
- Roadside rain gardens – Deep-rooted native plants and grasses planted in a shallow depression in the public right-of-way, such as the planting strip adjacent to homes.

SPU's goal is to use green solutions to the maximum extent feasible to reduce CSOs.

4.2.1 RainWise Program

Since 2010, RainWise has offered rebates to residents living in the combined sewer areas of the Ballard neighborhood of Seattle. Eligible homeowners were alerted through regular mailings, public meetings, media events, and an annual tour. By logging onto the RainWise website at www.rainwise.seattle.gov, property owners are able to learn about green stormwater technologies and are presented with solutions appropriate to their property. Through this site, they are also able to contact a trained contractor marketplace.

Over the last three and a half years, over 450 contractors, landscape designers and similar professionals have been trained in the program. Each year, the program offers two training opportunities for interested contractors to enter the program. This year, in an effort to create greater ease for participating property owners, we required all contractors to verify their credentials and re-register their interest in the program. There are 40 active contractors listed on the site that are available to bid and install systems for RainWise customers. For 2013, a contractor fair was again offered to connect interested participants with participating contractors. Additionally, we and our community partners offered several opportunities to talk with satisfied participants and meet contractors.

Upon completion, installations are inspected by a RainWise inspector and homeowners apply for rebates. RainWise rebates for rain gardens are currently three dollars and fifty cents per square foot of roof area controlled. Rebates for cisterns equal 64% or more of the rain garden rate, depending on the size of the cistern and contributing area. The average 2013 installation now controls the runoff from 1,398 square feet of roof area. Typical RainWise installations are shown in Figure 4-5.

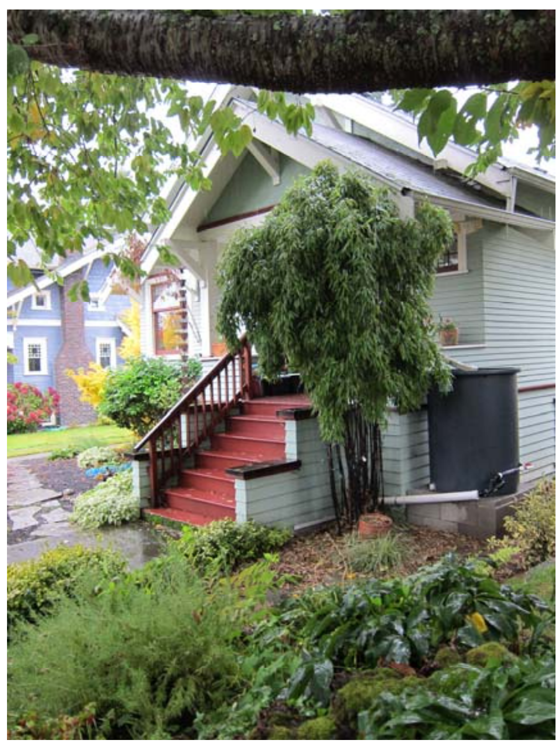

Figure 4-5. Raingarden (left) and Cistern (right)

In 2013, the RainWise program completed 113 projects in the Ballard, North Union Bay, Delridge, and Windermere basins. Since program inception, 321 installations have been completed, controlling a roof area of 9 acres. Approximately 255 installations are in the initially launched Ballard combined sewer area (Basins 150 and 151). These installations control approximately 7.3 acres of impervious roof area and an estimated 4.4 million gallons (MG) per year of stormwater, and provide an estimated 68,487 gallons of CSO control volume in the Ballard basins alone. The remaining basins control approximately 1.7 acres of impervious roof area and an estimated 1.0 MG per year of stormwater, and provide an estimated 22,305 gallons of CSO control volume.

In Fall 2013, the Montlake, Duwamish, Portage Bay, Fremont/Wallingford, Madison Park, Leschi, Genesee, and Henderson basins became eligible for the RainWise program. No installations occurred in these basins in 2013 due to limited outreach efforts.

In Spring 2013, a memorandum of agreement with King County made RainWise rebates available to CSO basins within the City of Seattle under the County's jurisdiction in Ballard/West Phinney, Highland Park, Barton, and South Park. They completed 25 installations in 2013.

4.2.2 Ballard Roadside Raingardens

In August of 2012, SPU began developing and analyzing alternatives for the Ballard Natural Drainage System 2015 (Ballard NDS 2015) project. This project is the next NDS project in Ballard, building on the experience from the first Ballard NDS project constructed in 2010, and providing roadside raingardens on up to 20 blocks.

Work completed in 2013 includes the following:

- SPU shared the results of soil explorations (soil borings and groundwater monitoring wells) and soil infiltration testing with the community. This testing helped to better define the underlying soil, groundwater conditions, and infiltration rates and helped identify 22 project blocks within the outwash (well-draining soils) boundary (Figure 4-6).
- SPU hired a communications consultant who went door to door talking with residents on the selected project blocks about the project and their concerns.
- In the fall of 2013, the project team shared with the community design alternatives and potential siting for raingardens along the project blocks and finalized the concept plan for moving into design.

Design will occur in 2014, followed by the start of construction in the Spring/Summer of 2015.

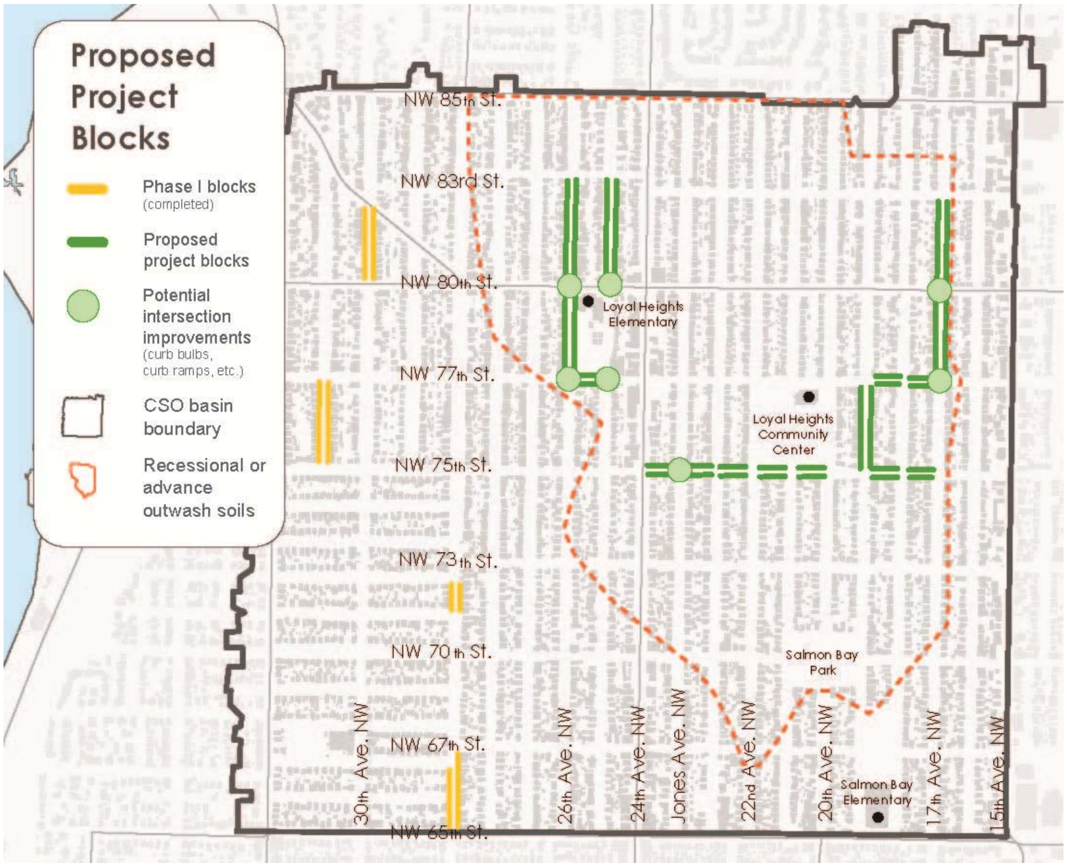

Figure 4-6. Ballard NDS 2015 Proposed Project Blocks

SPU completed its post-project performance flow monitoring for the first Ballard NDS project. This work included monitoring the facilities on two of the project blocks. The monitoring work had two components: controlled flow tests and continuous flow monitoring. The controlled flow tests, which occurred in September of 2012 and again in the Spring of 2013, involved hooking up to a fire hydrant, sending a simulated storm down the streets, and monitoring how well the bioretention facilities perform. The flow going into the raingardens is known and the amount that leaves them is captured by flow monitors located in the pipe system immediately downstream.

These same flow monitors also record flow data continuously and continued to collect data until the middle of 2013. A picture of the controlled flow test on 28th Ave NW project is shown in Figure 4-7. The results of the flow monitoring showed that the infiltrating raingardens along 30th Ave NW are working as designed and are able to provide the desired combined sewage volume reduction. The raingardens along 28th Ave NW, which were retrofitted with an underdrain in 2011 because they did not drain properly, demonstrated that they still could provide significant flow reduction. The monitoring showed that they reduced peak flow rates of CSO sized events by 80-90%, delayed discharge to the combined sewer by 50-60%, and infiltrated 40-50% of the annual flow volume to the raingarden.

Figure 4-7. Controlled flow test monitoring on 28th Ave NW

4.2.3 Delridge Roadside Raingardens

SPU began developing and analyzing alternatives for the Delridge NDS 2015 project in August 2012. This project will use roadside raingardens in the public right-of-way to protect the water quality of Longfellow Creek. In 2012, we engaged the residents in a community meeting to discuss the problem and potential concerns and opportunities. We also conducted geotechnical analyses (soil borings and groundwater monitoring wells) to identify the ability of the local soils to support shallow infiltration.

In December 2012, SPU began to coordinate with the Seattle Department of Transportation (SDOT) to integrate locations for roadside raingardens with Neighborhood Greenways within the Longfellow Creek basin. Neighborhood Greenways are residential streets generally one street over from main arterials with low volumes of auto traffic and low speeds where people who walk and ride bicycles are given priority. In 2013, SPU and SDOT engaged the community within the Longfellow Creek watershed to identify the most technically and socially feasible Neighborhood Greenway east of Delridge Way. SPU conducted a survey, worked with a community-based organization and community ambassadors to canvass residents, held three community meetings to identify the best locations for the roadside raingardens on the Neighborhood Greenway, and assessed the most promising sites for their geotechnical feasibility. By the end of December 2013, the project had completed 5% design for the recommended 17 roadside raingarden blocks.

4.3 Windermere CSO Reduction Project

The Windermere CSO Reduction Project will reduce the number and volume of sewage overflows from Outfall 13. The project is being constructed near Magnuson Park on the south side of NE 65th Street. It includes a 2.05 million gallon (MG) storage tank, facility vault, and motor-operated gates to control the flow of wastewater into the tank. Flow will be diverted to the storage tank through a 2,250-foot-long gravity sewer located in NE 65th Street and Sand Point Way NE. After a storm has passed, the wastewater will be pumped back to the sewer system through a parallel discharge force main.

In March 2011, SPU hired a General Contractor/Construction Manager (GC/CM) to conduct value engineering and constructability reviews and to assist with preconstruction in order to facilitate an early start to construction. Construction began in October 2012 and is on schedule to be completed in late 2014, well ahead of the August 30, 2015 NPDES permit deadline.

In 2013, SPU constructed the floor slab, walls and columns for the new storage tank and installed 1,400 feet of conveyance pipe in Sand Point Way. In 2014, SPU will construct the roof and then backfill the storage tank; install the remaining 700 feet of conveyance pipe in NE 65th St; install the mechanical, electrical, and instrumentation equipment in the tank and the facility vault; and complete system and operational testing. Commissioning of the Windermere system (including Windermere CSO 22 and 22A) is scheduled to be complete in early 2015.

Figure 4-8. Windermere CSO Reduction Project Construction, February 2014

4.4 Genesee CSO Reduction Project

The Genesee CSO Reduction Project will reduce the number and volume of sewage overflows from Outfalls 40, 41, and 43. The project is being constructed in two parking lots along Lake Washington Boulevard S at 49th Avenue S and at 53rd Avenue S. It includes a 380,000 gallon storage tank and a 120,000 gallon storage tank. Each will have a facility vault, diversion sewer, and a force main with motor-operated gates to control the flow of wastewater similar to Windermere.

SPU hired a GC/CM in February 2012 to assist with preconstruction and facilitate the start of construction in 2013. The project team completed the design in April 2013, and the first phase of construction was started in April 2013. In 2013, SPU installed shoring, carried out excavation, and began constructing the underground storage tanks, facility vaults, and site utilities. In 2014, SPU will complete construction of the storage tank, facility vaults and site utilities, install the mechanical and electrical equipment, complete surface restoration, and carry out testing and commissioning. The entire project is scheduled to be completed in early 2015, well ahead of the regulatory deadline. Commissioning is anticipated to continue into January 2015.

Figure 4-9. Genesee (CSO 11A) CSO Reduction Project Construction, February 2014

Figure 4-10. Genesee (CSO 9A) CSO Reduction Project Construction, February 2014

4.5 North Henderson CSO Reduction Project (Basins 44 and 45)

The North Henderson CSO Reduction Project will reduce the number and volume of combined sewage overflows from Outfalls 44 and 45. As part of this project, SPU plans to construct a storage facility in Seward Park and make more modest improvements adjacent to Martha Washington Park. In 2013, SPU:

- Optimized the planned improvements in each basin to eliminate the planned CSO storage tank in Basin 45 and operate the two basins as a single system, saving money and improving performance.
- Submitted a Draft Revised Facility Plan to account for the change in project scope. (The original Facility Plan was submitted on January 31, 2013 and described projects in each of Basins 44 and 45, consistent with the design approach envisioned at the time.)
- Completed a selection process for a General Contractor/Construction Manager (GCCM) and executed a construction contract for the project.
- Completed the 60% design.

- Submitted application materials for a Master Use Permit/Land Use Decision by the City Council.
- Attended stakeholder group meetings to present information and obtain input on the control alternatives for Basins 44 and 45.

In 2014, SPU plans to:

- Obtain the Master Use Permit/Land Use Decision by the City Council.
- Complete and submit the 90% and final plans and specifications to Ecology for review and approval.
- Complete and submit the draft and final construction quality assurance plan to Ecology for review and approval.
- Continue to update the community on project plans and schedule.

4.6 52nd Ave S Conveyance Project (Basins 47 and 171)

The 52nd Ave S Conveyance Project will reduce the number and volume of combined sewage overflows from Outfalls 47 and 171. In 2013, SPU:

- Completed and submitted final plans and specifications and a construction quality assurance plan to Ecology.
- Received construction permits and easements for the project.
- Advertised the project for construction bids, awarded the contract and issued notice to proceed on December 5, 2013, meeting the regulatory requirement to begin construction.
- Conducted community outreach to prepare the community for construction.

SPU will complete construction of this project in Fall 2014.

Figure 4-11. 52nd Ave S Conveyance Project Construction, March 2014

4.7 Pump Station 9 Rehabilitation Project (Basin 46)

The Pump Station 9 Rehabilitation Project will reduce the number and volume of combined sewage overflows from Outfall 46. SPU is replacing the existing pumps with two higher capacity pumps. The project reached 60% design in 2013 and, in early 2014, submitted 90% design plans and specifications and a draft construction quality assurance plan to Ecology for review. SPU plans to complete design in Summer 2014 and begin construction before the end of the year.

Figure 4-12. Pump Station 9 Rehabilitation Project

4.8 South Henderson CSO Reduction Project (Basin 49)

SPU first analyzed Basin 49 combined sewer flows and capacity beginning in 2008, as part of an analysis of the entire South Henderson Area (Basins 46, 47, 48, 49, and 171). Flow monitoring and modeling completed between 2008 and 2010 indicated that the basin's control volume was small (0.16 MG) and that a retrofit project (replacing an existing HydroBrake with an automated gate) would control the basin. However, additional monitoring and modeling conducted between 2011 and 2013 revealed the need for a significantly larger control volume (approximately 0.80 MG). Consequently, the originally planned retrofit is insufficient and an additional CSO reduction project is required to control Basin 49.

SPU initiated planning on the CSO reduction project in 2013 and is planning to submit draft and final Engineering Reports to Ecology for review in 2014. SPU has committed to achieving controlled status for Basin 49 by December 31, 2019.

In 2012 and 2013, retrofits were completed in the basin as required by the NPDES Permit (see Section 4.1.6 Henderson Retrofits for more information) and these retrofits have been instrumental in improving the accuracy of the estimated control volume. The retrofits consisted of a Cipolette weir improvement at the overflow structure (shown in Figure 4-4) and replacement of a HydroBrake with an orifice plate to maximize flow to the downstream system and use the storage in the basin more efficiently.

4.9 Central Waterfront CSO Reduction Project

In 2012, SPU determined that a manifolded conveyance system linking Outfalls 70 (University), 71 (Madison), and 72 (Washington) would allow for decommissioning of Outfalls 70 and 72, with their respective basins discharging any CSOs via Outfall 71. Upsizing the manifolded pipe by one size over that required for conveyance only would provide enough incremental storage to bring all three outfalls under control without needing to route any additional flows to King County.

SPU is continuing to work with SDOT to coordinate construction of this CSO control project with SDOT's Waterfront Seattle program. Design will be completed in 2014 and 2015, and construction will be completed between 2016 and 2018.

Outfall 69 (Vine) will be addressed as a separate project, to be constructed in coordination with SDOT's Elliott Bay Seawall Project – North Section, currently scheduled in 2020.

4.10 Pump Station Backup Generator Program

Currently, SPU's pump stations fall into two categories: (i) those that have generators installed on site to provide power in the event of a power outage, and (ii) those that have emergency plugs for hooking up portable generators. At the time the Pump Station Power Backup Program was initiated in 2008, seventeen stations had permanently installed on-site generators and the remainder either had emergency plugs or required hard wiring to portable generators. The seventeen stations with permanent generators are generally larger stations that require quick response times. Having generators at these stations means that there is no loss of function, and operations and maintenance crews do not need to respond to these stations in the event of a power outage. In comparison, pump stations with emergency plugs still require crews to respond in the event of a power outage, but this approach generally decreases the amount of time it takes to provide alternative power.

In 2010, SPU installed emergency plugs at all wastewater pump stations without permanent generators. This work was completed one year ahead of schedule and was reported to Ecology and EPA on January 31, 2011.

SPU's Pump Station Power Backup Program installed permanent generators at nine additional locations with peak daily flows over 1 MGD, short wet well storage times (less than 1 hour during peak flow), and a history of crews needing to respond to power outages. SPU installed permanent generators at five locations (Pump Stations 7, 25, 43, 49, and 59) by December 31, 2011, and an additional three locations (Pump Stations 62, 63, and 77) by April 30, 2012. The last program installation was at Pump Station 39, where a generator was placed in service on December 31, 2013. SPU will be completing the landscaping work for Pump Station 39 by the end of first quarter 2014, and the project is on schedule to finish closeout activities by second quarter of 2014.

Figure 4-13. Pump Station 39 Backup Generator

4.11 Outfall Rehabilitation Program

The current NPDES permit requires that SPU complete repairs on Outfalls 64, 95, and 150 by December 31, 2014 and complete repairs on Outfalls 28, 31, 45, and 129 by November 1, 2015.

The conditions assessment showed that Outfall 45 is in good condition with no major defects. CCTV video shows a small unknown obstacle 29 feet downstream of the upstream structure that would not permit the camera to pass. Because the obstacle does not impede the passage of flow, no rehabilitation is needed at this time.

Initial inspections showed that Outfalls 28, 64, 95, and 129 were significantly blocked. Outfalls 28 and 129 were cleaned as part of conditions assessment work and do not require any additional rehabilitation.

Outfall 64 was partially filled with sediment, had a 12-inch hole at the crown of the pipe approximately 14 feet upstream of the outlet end, and required cleaning and repair, predominantly staged offshore. SPU completed an eel grass and macroalgae survey and, in December 2013, the outfall was repaired with a Romac sleeve and cleaned from the outfall end. A post construction eel grass survey will be completed in early 2014.

Photo 4: Clean interior & exterior repair area prior to sleeve installation.

Photo 5: ROMAC repair sleeve installed.

Figure 4-14. Outfall 64 Rehabilitation Project

Outfall 95 is partially filled with sediment and will require cleaning, predominantly staged offshore. SPU has completed an eel grass and macroalgae survey and, in early 2014, the outfall will be cleaned from both ends.

Figure 4-15. Outfall 95 Rehabilitation Project

The conditions assessment determined that Outfall 31 has partial tree root intrusion, was damaged during the breakwater installation for Leschi Marina, and will need to be replaced. SPU plans to install an 8-inch diameter high density polyethylene (HDPE) pipe. The land-based portion of the new HDPE pipeline will be installed in the same horizontal and vertical alignments as the existing outfall pipe using trenchless pipe-bursting technology. The project completed the environmental review process in early January 2014. Project design is 90% complete, and construction is anticipated in Fall 2014.

Outfall 150 has deteriorated under an existing pedestrian pier and will need to be replaced. The proposed project would replace the existing maintenance hole just upstream of the shoreline and then install a replacement outfall comprised of approximately 50 feet of 30 inch diameter epoxy-coated ductile iron pipe and approximately 110 feet of 30 inch diameter high-density polyethylene (HDPE) outfall pipe. Construction would use open-trench methods on land and a piling-supported mounting system in the water. The project completed the environmental review process in September 2013 and completed 90% design in early 2014. Construction is anticipated in Fall 2014.

SECTION 5

Monitoring Programs and Monitoring Results

This section provides a brief overview of SPU's regular precipitation and flow monitoring programs and presents the results of the 2013 precipitation and flow monitoring programs, including CSO overflow details, 5-year average overflow frequencies, and comparisons with baseline conditions.

5.1 Precipitation Monitoring Program

SPU collects precipitation data from a network of 17 rain gauges located throughout the City of Seattle, as shown in Figure 1-1. No changes to the network of 17 permanent rain gauges were made in 2013.

5.2 Flow Monitoring Program

During 2013, SPU's flow monitoring consultant operated and maintained 92 monitoring points. An additional 24 monitoring points were operated and maintained by SPU staff, for a total of 116 continuous monitoring sites. These numbers include monitoring at Outfalls 37, 56, and 116, which was discontinued after these outfalls were removed from service (see Section 1.2).

Dedicated monitoring program staff review flow monitoring results on a regular basis and evaluate data quality and flow monitor performance. If emerging problems that might lead to or mask overflows are identified during these reviews (such as data showing slow storage tank drainage or missing data), the issues are rapidly addressed by requesting field service from the monitoring consultant or from the SPU Drainage and Wastewater crews. The consultant and SPU staff also perform site-specific troubleshooting.

Each month, the consultant's lead data analyst and senior engineer and SPU monitoring staff meet to review and analyze any apparent overflows that occurred the previous month, taking into consideration rainfall, knowledge of site hydraulics, and the best available monitoring data. During these meetings a final determination is made regarding whether or not an overflow occurred, and any necessary follow-up actions are documented.

5.3 Summary of 2013 Monitoring Results

Two tables summarizing 2013 precipitation monitoring results are included in the following pages of this Report:

- Table 5-1 provides precipitation by gauge and month; and
- Table 5-2 summarizes the last 5 years of precipitation monitoring results by year and month.

One can see from these two tables that:

- 2013 precipitation amounts varied from one part of the City to another;
- 2013 precipitation amounts varied by month, with the peak month occurring in September when an average of 5.30 inches was recorded and the driest month occurring in July when an average of 0.04 inches was recorded; and
- Average annual precipitation was 27.93 inches for 2013, which was almost 20 inches less than the previous year and almost 14 inches below the average of the previous four years.

Several tables summarizing 2013 flow monitoring and flow monitor performance are included in the following pages of this report:

- Table 5-3 show the 2013 flow monitor performance by outfall and month;
- Table 5-4 provides the details of all 2013 CSOs by outfall and date;
- Table 5-5 includes the most recent 5-year overflow frequency for each outfall and compares 2013 and baseline CSO conditions;
- Table 5-6 compares 2009-2013 CSOs by outfall;
- Table 5-7 compares 2009-2013 CSOs by receiving water body;
- Table 5-8 shows which outfalls met the performance standard for controlled outfalls in 2011-2013.

Observations and conclusions from these tables include:

- 2013 cumulative average system-wide “up-time” and cumulative average individual “up-times” of all flow monitoring stations were over 99%.
- 2013 had the lowest number and volume of CSOs in the last five years (219 CSOs and 37.5 MG), corresponding with 2013 being the driest of the last five years.
- The water body receiving the greatest CSO volume in 2013 was Salmon Bay, followed by Lake Washington, followed by Lake Union, the Ship Canal, and Union Bay.
- Over one-third of the 2013 CSO volume is from Outfall 152 in Ballard, which serves the largest drainage area of any of the outfalls.
- Three outfalls contributed over 50 percent of the 2013 CSO volume: Outfall 152 in Ballard (13.2 MG), Outfall 147 in the Fremont Wallingford Area (4.8 MG), and Outfall 44 in Seward Park (2.9 MG).

A total of 55 of SPU's CSO outfalls are now understood to be controlled based on a combination of recent flow monitoring results and modeling simulations in basins that have calibrated models.

One outfall that was reported to be controlled in SPU's baseline report is still uncontrolled: Outfall 139 in Portage Bay. Improved flow monitoring in recent years, together with long term simulation using a calibrated model, shows that the basin averages more than one overflow per year and will need additional control.

5.4 Post-Construction Monitoring Program & Sediment Sampling and Analysis Plan

In 2013, SPU began conducting in-situ sediment monitoring off shore of controlled Outfall 62. The in-situ monitoring was completed in early 2014. In order to conduct in-line sediment monitoring, a sediment trap was installed in Outfall 62 in early 2014 and will be deployed for one year. Once the samples collected from the outfall pipe are analyzed, the analytical results will be reported to Ecology.

Initial site investigations on uncontrolled Outfalls 107, 147, and 152 were conducted in 2013 and revealed that there was insufficient sediment to sample and analyze. The QAPP was revised to describe a shift to using in-line sediment traps, as well as a shift to using King County Environmental Laboratory for sediment analysis. In early 2014 SPU received approval of the QAPP modifications from Ecology. SPU plans to deploy the sediment traps for one year.

Table 5-1. 2013 Precipitation by Gauge and by Month (inches)												
Rain Gauge	January	February	March	April	May	June	July	August	September	October	November	December
RG01	4.81	1.92	2.78	5.28	1.41	1.80	0.05	0.96	5.09	0.98	2.84	1.33
RG02	4.78	1.55	2.67	4.30	1.15	1.91	0.03	0.94	5.09	1.19	3.08	1.46
RG03	4.22	1.69	2.74	4.85	1.30	1.56	0.09	1.02	4.81	0.90	2.63	1.20
RG04	4.57	1.69	2.74	4.86	1.54	2.23	0.11	0.99	4.97	0.98	3.10	1.46
RG05	2.84	1.54	2.40	3.72	1.68	1.20	0.00	0.92	5.35	1.52	2.84	1.00
RG07	4.33	1.88	2.74	4.98	1.57	2.10	0.00	1.08	4.97	0.98	2.82	1.08
RG08	3.78	1.55	2.46	4.68	1.93	1.55	0.00	1.15	5.65	1.14	2.57	0.93
RG09	4.52	1.82	2.69	5.08	1.85	1.92	0.03	1.00	5.24	1.14	2.83	1.20
RG11	3.33	1.39	2.45	4.18	1.47	1.44	0.00	1.20	4.73	0.76	2.34	0.92
RG12	3.65	1.51	2.53	4.95	1.93	1.55	0.00	1.15	5.65	1.31	2.78	0.98
RG14	4.06	1.73	2.92	4.20	1.84	1.67	0.00	0.82	5.38	1.52	2.87	1.33
RG15	3.33	1.65	2.73	3.96	1.50	1.45	0.00	0.98	5.69	1.10	2.88	1.08
RG16	3.62	1.76	2.91	4.33	1.57	1.20	0.02	1.05	5.29	1.44	3.03	1.17
RG17	3.35	1.58	2.84	4.31	1.72	1.34	0.01	1.26	5.01	1.81	3.13	1.37
RG18	3.95	1.80	2.64	4.67	1.79	1.46	0.14	1.15	5.69	1.72	3.33	1.29
RG25	4.04	1.50	2.49	4.38	1.54	1.71	0.15	1.08	5.51	1.00	2.97	1.40
RG30	3.95	1.81	2.70	5.14	1.95	1.74	0.09	1.24	6.04	1.76	3.60	1.51
Monthly Average	**3.95**	**1.67**	**2.67**	**4.58**	**1.63**	**1.64**	**0.04**	**1.06**	**5.30**	**1.25**	**2.92**	**1.22**

Table 5-2. 2009-2013 Average Precipitation by Month (inches)					
Month/Year	**2009**	**2010**	**2011**	**2012**	**2013**
January	3.86	6.90	5.04	5.40	3.95
February	1.79	3.64	3.42	2.97	1.67
March	3.66	3.32	6.73	6.61	2.67
April	2.90	3.34	3.59	2.27	4.58
May	4.17	3.34	3.10	2.32	1.63
June	0.23	2.25	1.34	3.03	1.64
July	0.11	0.24	0.78	1.53	0.04
August	0.91	0.73	0.06	0.00	1.06
September	2.30	3.88	1.12	0.16	5.30
October	5.48	4.35	2.94	6.12	1.25
November	9.53	4.79	5.91	9.36	2.92
December	2.75	8.83	1.80	7.89	1.22
Annual Total	**37.69**	**45.61**	**35.83**	**47.66**	**27.93**

Table 5-3. 2013 Flow Monitor Performance by Outfall and Month

NPDES #	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sept		Oct		Nov		Dec		2013 Cumulative	
	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)
12	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
13	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
14	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
15	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	7.2	99.0	0.0	100.0	14.0	98.1	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	21.2	99.8
16	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
18	50.6	93.2	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	50.6	99.4
19	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
20	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
22	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
24	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
25	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
26	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
27	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
28	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
29	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
30	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
31	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	1.8	99.8	19.8	97.3	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	21.6	99.8
32	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	17.0	97.6	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	17.0	99.8
33	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
34	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
35	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0

NPDES #	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sept		Oct		Nov		Dec		2013 Cumulative	
	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)
36	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
38	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
40	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
41	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	4.7	99.4	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	4.7	99.9
42	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
43	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
44	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
45	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	9.7	98.7	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	9.7	99.9
46	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
47	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
48	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
49	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
57	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
59	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
60	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
61	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
62	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
64	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
68	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
69	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	4.3	99.4	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	4.3	100.0
70	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
71	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
72	40.8	94.5	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	40.8	99.5

NPDES #	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sept		Oct		Nov		Dec		2013 Cumulative	
	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)
78	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
80	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
83	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
85	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
88	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
90	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.8	99.9	0.0	100.0	0.0	100.0	0.0	100.0	0.8	100.0
91	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
94	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
95	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
99	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
107	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	68.3	90.8	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	68.3	99.2
111	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
120	0.0	100.0	0.0	100.0	4.4	99.4	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	4.4	100.0
121	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
124	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
127	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
129	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
130	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
131	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
132	58.0	92.2	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	58.0	99.4
134	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
135	4.5	99.4	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	4.5	99.9
136	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0

NPDES #	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sept		Oct		Nov		Dec		2013 Cumulative	
	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)	Downtime (hrs)	Uptime (%)
138	0.0	100.0	10.3	98.5	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	3.5	99.5	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	13.8	99.8
139	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
140	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
141	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
144	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
145	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
146	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
147	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
148	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
150 /151	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
152	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
161	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
165	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
168	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
169	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
170	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
171	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
174	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
175	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
TOTAL:	153.9	99.8	10.3	100.0	4.4	100.0	0.0	100.0	11.5	100.0	28.4	100.0	33.8	99.9	76.5	99.9	0.8	100.0	0.0	100.0	0.0	100.0	0.0	100.0	319.5	100.0

Table 5-4. 2013 CSO Details by Outfall and Date								
Permit No	Outfall No	Facility Name	Receiving Water	CSO Events				
				Starting Date	Duration (hours)	Volume (gallons)	Precipitation (inches)	Storm Duration (hours)
WA0031682	**012**	City of Seattle	Lake Washington	1/9/2013	0.30	590	1.47	27.00
				Total	0.30	590	1.47	27.00
				Average	0.30	590	1.47	27.00
WA0031682	**013**	City of Seattle	Lake Washington	01/09/13	4.92	504,215	1.77	29.75
				09/05/13	3.50	385,017	1.87	21.42
				Total	8.42	889,232	3.64	51.17
				Average	4.21	444,616	1.82	25.59
WA0031682	**014**	City of Seattle	Lake Washington	*No combined sewer overflow during 2013*				
WA0031682	**015**	City of Seattle	Lake Washington	1/9/2013	0.33	5	1.69	26.67
				9/5/2013	2.20	28,461	1.81	20.37
				Total	2.53	28,466	3.50	47.03
				Average	1.27	14,233	1.75	23.52
WA0031682	**016**	City of Seattle	Lake Washington	*No combined sewer overflow during 2013*				
WA0031682	**018**	City of Seattle	Union Bay	1/9/2013	4.63	963,033	1.77	29.70
				9/6/2013	1.80	672,214	1.85	20.97
				Total	6.43	1,635,247	3.62	50.67
				Average	3.22	817,624	1.81	25.33
WA0031682	**019**	City of Seattle	Union Bay	9/5/2013	1.03	902	1.46	19.48
				Total	1.03	902	1.46	19.48
				Average	1.03	902	1.46	19.48
WA0031682	**020**	City of Seattle	Union Bay	1/9/2013	3.60	92,421	1.77	28.52

Permit No	Outfall No	Facility Name	Receiving Water	CSO Events				
				Starting Date	Duration (hours)	Volume (gallons)	Precipitation (inches)	Storm Duration (hours)
				9/5/2013	2.53	117,054	1.65	20.62
				Total	6.13	209,474	3.42	49.13
				Average	3.07	104,737	1.71	24.57
WA0031682	**022**	City of Seattle	Union Bay	1/9/2013	1.90	2,693	1.20	22.68
				4/7/2013	1.50	907	2.19	73.68
				4/13/2013	5.02	7,802	0.88	34.12
				Total	8.42	11,402	4.27	130.48
				Average	2.81	3,801	1.42	43.49
WA0031682	**024**	City of Seattle	Lake Washington	9/6/2013	1.73	184,519	1.65	20.48
				Total	1.73	184,519	1.65	20.48
				Average	1.73	184,519	1.65	20.48
WA0031682	**025**	City of Seattle	Lake Washington	9/6/2013	1.53	97,238	1.62	20.25
				Total	1.53	97,238	1.62	20.25
				Average	1.53	97,238	1.62	20.25
WA0031682	**026**	City of Seattle	Lake Washington	*No combined sewer overflow during 2013*				
WA0031682	**027**	City of Seattle	Lake Washington	*No combined sewer overflow during 2013*				
WA0031682	**028**	City of Seattle	Lake Washington	9/5/2013	1.47	835	1.35	18.92
				9/28/2013	4.83	3,703	1.56	33.50
				11/7/2013	0.03	223	0.79	14.40
				Total	6.33	4,762	3.70	66.82
				Average	2.11	1,587	1.23	22.27
WA0031682	**029**	City of Seattle	Lake Washington	1/9/2013	11.10	63,629	1.76	31.05

Permit No	Outfall No	Facility Name	Receiving Water	CSO Events				
				Starting Date	Duration (hours)	Volume (gallons)	Precipitation (inches)	Storm Duration (hours)
				4/7/2013	1.33	3,417	1.80	71.30
				9/5/2013	3.58	34,253	1.69	21.12
				9/28/2013	5.43	5,703	1.58	34.13
				9/29/2013	0.08	110	2.38	61.37
				10/11/2013	0.08	276	0.03	0.70
				11/7/2013	0.12	165	0.81	14.53
				Total	21.73	107,553	10.05	234.20
				Average	3.10	15,365	1.44	33.46
WA0031682	**030**	City of Seattle	Lake Washington	1/9/2013	9.43	89,847	1.76	30.05
				9/6/2013	1.17	13,755	1.58	19.88
				Total	10.60	103,602	3.34	49.93
				Average	5.30	51,801	1.67	24.97
WA0031682	**031**	City of Seattle	Lake Washington	*No combined sewer overflow during 2013*				
WA0031682	**032**	City of Seattle	Lake Washington	1/9/2013	6.42	88,300	1.76	30.45
				Total	6.42	88,300	1.76	30.45
				Average	6.42	88,300	1.76	30.45
WA0031682	**033**	City of Seattle	Lake Washington	*No combined sewer overflow during 2013*				
WA0031682	**034**	City of Seattle	Lake Washington	*No combined sewer overflow during 2013*				
WA0031682	**035**	City of Seattle	Lake Washington	9/28/2013	0.08	802	0.91	28.87
				Total	0.08	802	0.91	28.87
				Average	0.08	802	0.91	28.87
WA0031682	**036**	City of Seattle	Lake Washington	1/9/2013	4.08	6,995	1.75	28.45

Permit No	Outfall No	Facility Name	Receiving Water	CSO Events				
				Starting Date	Duration (hours)	Volume (gallons)	Precipitation (inches)	Storm Duration (hours)
				9/6/2013	0.38	917	1.46	19.42
				9/30/2013	0.25	477	2.68	77.12
				Total	4.72	8,388	5.89	124.98
				Average	1.57	2,796	1.96	41.66
WA0031682	**038**	City of Seattle	Lake Washington	*No combined sewer overflow during 2013*				
WA0031682	**040**	City of Seattle	Lake Washington	1/9/2013	12.63	636,696	2.09	90.87
				9/5/2013	2.07	91,797	1.51	20.75
				Total	14.70	728,493	3.60	111.62
				Average	7.35	364,246	1.80	55.81
WA0031682	**041**	City of Seattle	Lake Washington	1/9/2013	19.40	314,193	2.09	96.07
				4/7/2013	6.53	29,218	2.19	74.38
				4/19/2013	0.60	312	0.84	28.83
				6/25/2013	0.73	2,320	1.00	63.05
				9/5/2013	4.17	47,473	1.58	22.02
				9/28/2013	5.30	2,071	1.33	34.47
				9/29/2013	16.77	4,279	2.84	78.37
				11/7/2013	0.57	312	0.58	12.22
				Total	54.07	400,178	12.45	409.40
				Average	6.76	50,022	1.56	51.18
WA0031682	**042**	City of Seattle	Lake Washington	1/9/2013	7.13	125,525	2.09	88.80
				Total	7.13	125,525	2.09	88.80
				Average	7.13	125,525	2.09	88.80
WA0031682	**043**	City of Seattle	Lake Washington	1/9/2013	12.07	402,958	2.09	89.90
				4/7/2013	0.90	11,074	2.00	69.62
				6/25/2013	0.57	4,279	1.00	62.38
				9/5/2013	2.58	81,672	1.50	20.68

Permit No	Outfall No	Facility Name	Receiving Water	CSO Events				
				Starting Date	Duration (hours)	Volume (gallons)	Precipitation (inches)	Storm Duration (hours)
				9/28/2013	0.23	2,926	1.30	33.93
				9/29/2013	0.67	14,831	2.82	77.63
				Total	17.02	517,740	10.71	354.15
				Average	2.84	86,290	1.79	59.03
WA0031682	**044**	City of Seattle	Lake Washington	1/8/2013	31.20	1,569,764	2.09	97.57
				3/19/2013	2.53	43,839	0.96	17.60
				4/7/2013	11.03	327,910	2.29	78.45
				4/13/2013	0.02	635	0.48	31.92
				4/19/2013	0.08	3	0.57	20.62
				6/25/2013	1.08	72,187	1.00	63.07
				9/5/2013	4.52	489,041	1.58	22.02
				9/28/2013	7.22	133,931	1.39	36.00
				9/29/2013	19.38	141,374	2.92	80.78
				11/7/2013	5.62	87,999	0.88	16.92
				11/18/2013	8.58	6,452	1.01	39.03
				Total	91.27	2,873,137	15.17	503.97
				Average	8.30	261,194	1.38	45.82
WA0031682	**045**	City of Seattle	Lake Washington	1/8/2013	15.50	166,602	2.09	90.07
				4/7/2013	9.87	7,130	2.28	77.38
				6/25/2013	0.40	9,025	1.00	62.35
				09/05/13	3.33	42,411	1.50	20.58
				9/28/2013	5.13	5,595	1.30	33.83
				9/29/2013	18.77	12,525	2.92	79.97
				11/7/2013	0.33	331	0.51	11.55
				Total	53.33	243,619	11.60	375.73
				Average	7.62	34,803	1.66	53.68
WA0031682	**046**	City of Seattle	Lake Washington	9/6/2013	0.33	281	1.36	19.58

Permit No	Outfall No	Facility Name	Receiving Water	CSO Events				
				Starting Date	Duration (hours)	Volume (gallons)	Precipitation (inches)	Storm Duration (hours)
				Total	0.33	281	1.36	19.58
				Average	0.33	281	1.36	19.58
WA0031682	**047**	City of Seattle	Lake Washington	1/9/2013	8.32	1,644,782	2.09	86.63
				4/7/2013	1.07	11,696	2.16	70.05
				9/5/2013	2.85	202,716	1.60	20.07
				9/22/2013	1.10	29,249	0.42	9.62
				9/28/2013	8.40	163,985	1.46	35.73
				9/29/2013	22.27	84,060	3.01	82.93
				10/11/2013	1.55	8,510	0.43	8.88
				11/2/2013	0.38	3,620	0.38	4.27
				11/7/2013	12.70	112,782	1.24	24.37
				11/18/2013	12.12	115,706	1.11	39.10
				Total	70.75	2,377,107	13.90	381.65
				Average	7.07	237,711	1.39	38.17
WA0031682	**048**	City of Seattle	Lake Washington	*No combined sewer overflow during 2013*				
WA0031682	**049**	City of Seattle	Lake Washington	1/9/2013	8.00	945,775	2.09	88.63
				9/6/2013	1.27	110,951	1.63	20.43
				Total	9.27	1,056,726	3.72	109.07
				Average	4.63	528,363	1.86	54.53
WA0031682	**057**	City of Seattle	Puget Sound	*No combined sewer overflow during 2013*				
WA0031682	**059**	City of Seattle	Salmon Bay	09/06/13	0.44	11,666	1.64	20.21
				Total	0.44	11,666	1.64	20.21
				Average	0.44	11,666	1.64	20.21
WA0031682	**060**	City of Seattle	Salmon Bay	9/5/2013	1.17	47,234	1.48	19.38

Permit No	Outfall No	Facility Name	Receiving Water	CSO Events				
				Starting Date	Duration (hours)	Volume (gallons)	Precipitation (inches)	Storm Duration (hours)
				Total	1.17	47,234	1.48	19.38
				Average	1.17	47,234	1.48	19.38
WA0031682	**061**	City of Seattle	Elliott Bay	*No combined sewer overflow during 2013*				
WA0031682	**062**	City of Seattle	Elliott Bay	9/6/2013	0.33	4,176	1.41	19.15
				9/28/2013	0.08	3,109	1.39	56.92
				Total	0.42	7,286	2.80	76.07
				Average	0.21	3,643	1.40	38.03
WA0031682	**064**	City of Seattle	Elliott Bay	*No combined sewer overflow during 2013*				
WA0031682	**068**	City of Seattle	Elliott Bay	9/5/2013	2.10	331,236	1.66	20.52
				Total	2.10	331,236	1.66	20.52
				Average	2.10	331,236	1.66	20.52
WA0031682	**069**	City of Seattle	Elliott Bay	8/29/2013	0.15	17,744	0.77	39.75
				9/5/2013	1.70	357,052	1.24	19.32
				9/28/2013	0.33	64,217	0.81	49.77
				Total	2.18	439,013	2.82	108.83
				Average	0.73	146,338	0.94	36.28
WA0031682	**070**	City of Seattle	Elliott Bay	9/6/2013	0.60	65,550	1.19	19.08
				Total	0.60	65,550	1.19	19.08
				Average	0.60	65,550	1.19	19.08
WA0031682	**071**	City of Seattle	Elliott Bay	2/1/2013	3.53	58,760	0.00	0.00

Permit No	Outfall No	Facility Name	Receiving Water	CSO Events				
				Starting Date	Duration (hours)	Volume (gallons)	Precipitation (inches)	Storm Duration (hours)
				8/29/2013	0.12	2,102	0.77	39.55
				9/5/2013	2.30	246,574	1.41	20.35
				9/28/2013	5.13	61,896	1.21	54.57
				Total	11.08	369,332	3.39	114.47
				Average	2.77	92,333	0.85	28.62
WA0031682	**072**	City of Seattle	Elliott Bay	9/6/2013	0.47	14,783	1.42	19.12
				Total	0.47	14,783	1.42	19.12
				Average	0.47	14,783	1.42	19.12
WA0031682	**078**	City of Seattle	Elliott Bay	*No combined sewer overflow during 2013*				
WA0031682	**080**	City of Seattle	Elliott Bay	*No combined sewer overflow during 2013*				
WA0031682	**083**	City of Seattle	Puget Sound	*No combined sewer overflow during 2013*				
WA0031682	**085**	City of Seattle	Puget Sound	*No combined sewer overflow during 2013*				
WA0031682	**088**	City of Seattle	Puget Sound	*No combined sewer overflow during 2013*				
WA0031682	**090**	City of Seattle	Puget Sound	*No combined sewer overflow during 2013*				
WA0031682	**091**	City of Seattle	Puget Sound	*No combined sewer overflow during 2013*				
WA0031682	**094**	City of Seattle	Puget Sound	*No combined sewer overflow during 2013*				
WA0031682	**095**	City of Seattle	Puget Sound	9/5/2013	1.58	803	1.20	19.98
				Total	1.58	803	1.20	19.98
				Average	1.58	803	1.20	19.98
WA0031682	**099**	City of Seattle	Duwamish River	1/9/2013	5.07	405,700	1.81	87.17

Permit No	Outfall No	Facility Name	Receiving Water	CSO Events				
				Starting Date	Duration (hours)	Volume (gallons)	Precipitation (inches)	Storm Duration (hours)
				Total	5.07	405,700	1.81	87.17
				Average	5.07	405,700	1.81	87.17
WA0031682	**107**	City of Seattle	Duwamish River	1/9/2013	1.03	638	1.75	84.23
				9/6/2013	3.20	230,062	1.49	21.77
				9/28/2013	5.10	1,887	1.57	33.57
				Total	9.33	232,588	4.81	139.57
				Average	3.11	77,529	1.60	46.52
WA0031682	**111**	City of Seattle	Duwamish River	9/6/2013	1.10	10,616	1.42	20.37
				9/28/2013	4.93	584	1.57	33.60
				9/30/2013	0.33	307	3.10	77.00
				Total	6.37	11,507	6.09	130.97
				Average	2.12	3,836	2.03	43.66
WA0031682	**120**	City of Seattle	Lake Union	*No combined sewer overflow during 2013*				
WA0031682	**121**	City of Seattle	Lake Union	*No combined sewer overflow during 2013*				
WA0031682	**124**	City of Seattle	Lake Union	*No combined sewer overflow during 2013*				
WA0031682	**127**	City of Seattle	Lake Union	*No combined sewer overflow during 2013*				
WA0031682	**129**	City of Seattle	Lake Union	11/2/2013	49.77	53,670	0.48	39.28
				11/6/2013	0.20	11,240	0.06	8.13
				Total	49.97	64,910	0.54	47.42
				Average	24.98	32,455	0.27	23.71
WA0031682	**130**	City of Seattle	Lake Union	*No combined sewer overflow during 2013*				

Permit No	Outfall No	Facility Name	Receiving Water	CSO Events				
				Starting Date	Duration (hours)	Volume (gallons)	Precipitation (inches)	Storm Duration (hours)
WA0031682	**131**	City of Seattle	Lake Union	*No combined sewer overflow during 2013*				
WA0031682	**132**	City of Seattle	Lake Union	8/29/2013	0.08	68	0.72	39.73
				9/28/2013	0.15	3,918	0.78	28.40
				Total	0.23	3,985	1.50	68.13
				Average	0.12	1,993	0.75	34.07
WA0031682	**134**	City of Seattle	Lake Union	*No combined sewer overflow during 2013*				
WA0031682	**135**	City of Seattle	Lake Union	*No combined sewer overflow during 2013*				
WA0031682	**136**	City of Seattle	Lake Union	*No combined sewer overflow during 2013*				
WA0031682	**138**	City of Seattle	Portage Bay	1/9/2013	1.90	38,206	1.74	27.25
				9/6/2013	1.60	81,783	1.62	20.18
				Total	3.50	119,988	3.36	47.43
				Average	1.75	59,994	1.68	23.72
WA0031682	**139**	City of Seattle	Portage Bay	9/5/2013	1.43	47,561	1.39	19.12
				Total	1.43	47,561	1.39	19.12
				Average	1.43	47,561	1.39	19.12
WA0031682	**140**	City of Seattle	Portage Bay	4/13/2013	0.00	527	0.63	28.00
				8/29/2013	0.18	3,866	0.72	39.73
				9/5/2013	2.93	136,405	1.63	20.28
				9/28/2013	4.87	6,072	1.27	33.03
				9/29/2013	0.07	537	1.90	60.90
				Total	8.05	147,407	6.15	181.95
				Average	1.61	29,481	1.23	36.39

Permit No	Outfall No	Facility Name	Receiving Water	CSO Events				
				Starting Date	Duration (hours)	Volume (gallons)	Precipitation (inches)	Storm Duration (hours)
WA0031682	**141**	City of Seattle	Portage Bay	*No combined sewer overflow during 2013*				
WA0031682	**144**	City of Seattle	Lake Union	*No combined sewer overflow during 2013*				
WA0031682	**145**	City of Seattle	Lake Union	*No combined sewer overflow during 2013*				
WA0031682	**146**	City of Seattle	Lake Union	*No combined sewer overflow during 2013*				
WA0031682	**147**	City of Seattle	Lake Union	1/8/2013	22.00	1,616,494	2.06	87.70
				1/26/2013	0.25	1,167	0.15	1.93
				1/29/2013	2.03	19,207	1.06	90.13
				2/16/2013	0.53	1,622	0.11	0.78
				2/27/2013	0.52	21,104	0.14	19.77
				3/1/2013	0.25	2,934	0.54	49.17
				3/2/2013	0.08	274	0.09	5.52
				3/6/2013	0.43	2,639	0.51	10.70
				3/19/2013	7.18	84,121	0.90	15.05
				4/4/2013	64.25	744,957	2.46	72.70
				4/10/2013	0.25	341	0.21	2.38
				4/12/2013	21.62	216,856	0.74	31.50
				4/19/2013	0.25	2,545	0.66	27.73
				05/13/13	0.75	162,824	0.39	1.15
				6/20/2013	0.92	31,781	0.48	10.92
				6/23/2013	0.17	1,028	0.18	17.12
				6/25/2013	16.33	74,503	0.87	62.03
				8/29/2013	6.57	105,592	0.60	40.62
				9/5/2013	19.83	1,030,895	1.47	21.58
				9/15/2013	0.38	22,296	0.17	8.72
				9/20/2013	0.42	1,149	0.10	0.65
				9/22/2013	20.87	28,175	0.65	25.25
				9/28/2013	39.75	498,225	2.30	62.43

Permit No	Outfall No	Facility Name	Receiving Water	CSO Events				
				Starting Date	Duration (hours)	Volume (gallons)	Precipitation (inches)	Storm Duration (hours)
				10/1/2013	0.60	7,276	2.57	97.62
				11/2/2013	0.17	299	0.40	4.83
				11/7/2013	9.42	105,182	0.75	18.57
				11/18/2013	2.33	17,204	0.70	12.33
				Total	238.15	4,800,689	21.26	798.88
				Average	8.82	177,803	0.79	29.59
WA0031682	**148**	City of Seattle	Lake Washington - Ship Canal	*No combined sewer overflow during 2013*				
WA0031682	**150/151**	City of Seattle	Salmon Bay	1/8/2013	18.57	31,806	1.56	26.23
				3/20/2013	0.67	2,471	0.85	15.08
				4/5/2013	3.10	216,189	0.98	20.68
				4/6/2013	25.57	151,025	2.35	70.32
				4/13/2013	0.30	195,671	0.26	27.53
				5/13/2013	0.33	29,347	0.46	1.50
				6/20/2013	0.80	14,596	0.20	5.78
				6/25/2013	12.80	39,965	0.91	61.52
				9/5/2013	2.67	732,021	1.65	20.45
				9/23/2013	0.07	826	0.46	19.95
				9/28/2013	8.12	142,738	1.40	57.28
				9/29/2013	37.42	105,341	2.62	121.55
				11/7/2013	4.13	67,924	0.65	13.28
				11/15/2013	0.27	7,286	0.13	39.22
				Total	114.80	1,737,205	14.48	500.38
				Average	8.20	124,086	1.03	35.74
WA0031682	**152**	City of Seattle	Salmon Bay	1/3/2013	4.43	30,386	0.31	4.97

Permit No	Outfall No	Facility Name	Receiving Water	CSO Events				
				Starting Date	Duration (hours)	Volume (gallons)	Precipitation (inches)	Storm Duration (hours)
				1/5/2013	0.78	3,317	0.09	2.18
				1/8/2013	33.18	2,350,119	1.62	35.72
				1/23/2013	0.92	7,474	0.19	5.48
				1/24/2013	0.50	752	0.35	32.25
				1/26/2013	2.52	29,329	0.19	4.13
				1/29/2013	6.83	162,019	0.79	52.78
				2/1/2013	0.42	4,980	1.04	99.87
				2/5/2013	0.08	62	0.10	17.30
				2/7/2013	1.07	25,237	0.31	45.62
				2/13/2013	0.18	419	0.07	42.52
				2/16/2013	0.37	1,750	0.05	1.05
				2/27/2013	10.83	38,238	0.34	15.32
				3/1/2013	0.37	8,741	0.50	48.65
				3/2/2013	0.08	63	0.12	9.45
				3/6/2013	10.52	50,891	0.66	15.45
				3/19/2013	14.10	633,939	0.95	18.08
				4/4/2013	73.25	2,745,531	2.59	81.25
				4/10/2013	2.50	84,731	0.24	3.05
				4/12/2013	26.35	563,440	0.62	35.50
				4/19/2013	35.17	136,347	0.76	53.37
				5/13/2013	0.63	148,330	0.46	1.73
				5/21/2013	16.17	124,229	0.55	17.32
				5/27/2013	0.33	6,482	0.31	44.65
				6/11/2013	2.75	66,090	0.09	2.17
				6/20/2013	3.20	203,481	0.21	6.08
				6/23/2013	1.27	5,100	0.19	17.68
				6/25/2013	32.42	522,435	1.02	77.75
				8/10/2013	0.25	146	0.22	2.10
				8/28/2013	0.27	2,303	0.17	4.40
				8/29/2013	8.00	130,637	0.68	42.12
				9/5/2013	18.58	2,411,039	1.66	20.87

Permit No	Outfall No	Facility Name	Receiving Water	CSO Events				
				Starting Date	Duration (hours)	Volume (gallons)	Precipitation (inches)	Storm Duration (hours)
				9/15/2013	1.13	127,638	0.31	9.82
				9/20/2013	0.52	13,394	0.15	0.93
				9/22/2013	21.05	159,687	0.63	22.05
				9/28/2013	75.33	1,545,808	2.62	121.83
				10/2/2013	8.25	10,184	2.96	156.00
				10/8/2013	0.35	5,408	0.05	2.97
				11/2/2013	3.58	37,313	0.40	5.08
				11/7/2013	10.17	610,356	0.76	19.07
				11/12/2013	1.17	431	0.13	2.42
				11/15/2013	0.58	97,142	0.14	39.28
				11/18/2013	8.92	78,894	0.61	14.08
				12/22/2013	0.93	7,927	0.50	42.63
				Total	440.30	13,192,216	26.71	1297.02
				Average	10.01	299,823	0.61	29.48
WA0031682	**161**	City of Seattle	Lake Washington	*No combined sewer overflow during 2013*				
WA0031682	**165**	City of Seattle	Lake Washington	6/25/2013	0.25	4,387	1.00	62.07
				Total	0.25	4,387	1.00	62.07
				Average	0.25	4,387	1.00	62.07
WA0031682	**168**	City of Seattle	Longfellow Creek	*No combined sewer overflow during 2013*				
WA0031682	**169**	City of Seattle	Longfellow Creek	*No combined sewer overflow during 2013*				
WA0031682	**170**	City of Seattle	Longfellow Creek	*No combined sewer overflow during 2013*				
WA0031682	**171**	City of Seattle	Lake Washington	1/9/2013	9.00	320,061	2.09	87.00

Permit No	Outfall No	Facility Name	Receiving Water	CSO Events				
				Starting Date	Duration (hours)	Volume (gallons)	Precipitation (inches)	Storm Duration (hours)
				4/7/2013	10.00	25,035	2.59	79.00
				9/5/2013	2.82	162,358	1.61	20.20
				9/22/2013	1.03	26,965	0.42	9.55
				9/28/2013	8.37	197,924	1.46	35.70
				9/29/2013	22.27	85,544	3.01	82.93
				10/11/2013	1.52	4,684	0.43	8.85
				11/2/2013	0.42	2,501	0.38	4.30
				11/7/2013	12.50	85,813	1.24	24.25
				11/18/2013	11.83	59,583	1.11	38.90
				Total	79.75	970,468	14.34	390.68
				Average	7.98	97,047	1.43	39.07
WA0031682	**174**	City of Seattle	Lake Washington Canal	1/9/2013	11.30	1,438,503	2.09	87.57
				4/5/2013	0.12	890	0.97	20.90
				4/7/2013	2.93	363,325	2.44	72.27
				5/13/2013	0.40	50,005	0.39	0.88
				9/5/2013	3.88	671,041	1.46	21.13
				9/28/2013	5.48	234,419	1.49	34.58
				9/29/2013	0.83	17,411	2.30	62.18
				Total	24.95	2,775,593	11.14	299.52
				Average	3.56	396,513	1.59	42.79
WA0031682	**175**	City of Seattle	Lake Union	9/5/2013	1.30	2,898	1.15	18.83
				9/28/2013	0.10	164	0.80	28.45
				Total	1.40	3,062	1.95	47.28
				Average	0.70	1,531	0.98	23.64

Table 5-5. Comparison of 2013 and Baseline Flows by Outfall								
Outfall Number	2009 - 2013 Average CSO Frequency (#/year)	2013 CSO Discharge Events			Receiving Waters of Overflow	2010 Baseline CSO		2013 CSO Compared to 2010 Baseline CSO
		Frequency (#/year)	Duration (hours)	Volume (gallons)		Frequency (#/year)	Volume (MG/year)	
012	0.6	1	0.30	590	Lake Washington	0	0	Above
013	4.4	2	8.42	889,232	Lake Washington	12	6.7	Below
014	0.2	0	0.00	0	Lake Washington	0	0	Equals
015	4	2	2.53	28,466	Lake Washington	1.2	0.3	Frequency above, Volume below
016	0.2	0	0.00	0	Lake Washington	0	0	Equals
018	5.4	2	6.43	1,635,247	Union Bay	6.6	0.5	Frequency below, Volume above
019	0.2	1	1.03	902	Union Bay	0.2	0	Above
020	2.6	2	6.13	209,475	Union Bay	2.6	0.1	Frequency below, Volume above
022	2	3	8.42	11,402	Union Bay	0.7	0.1	Frequency above, Volume below
024	0.8	1	1.73	184,519	Lake Washington	0.2	0	Above
025	1	1	1.53	97,238	Lake Washington	2.8	1.6	Below
026	0	0	0.00	0	Lake Washington	0.3	0	Frequency below, Volume equals
027	0	0	0.00	0	Lake Washington	0	0	Equals
028	3.4	3	6.33	4,761	Lake Washington	15	0.4	Below
029	5.4	7	21.73	107,553	Lake Washington	4.7	0.3	Frequency above, Volume below
030	1.4	2	10.60	103,602	Lake Washington	5.4	0.7	Below
031	7.2	0	0.00	0	Lake Washington	9.3	0.5	Below
032	3.6	1	6.42	88,300	Lake Washington	8.4	0.3	Below
033	0.4	0	0.00	0	Lake Washington	0.2	0	Frequency below, Volume equals
034	0.6	0	0.00	0	Lake Washington	1.4	0.5	Below
035	1.2	1	0.08	802	Lake Washington	2	0.3	Below
036	2.6	3	4.72	8,389	Lake Washington	2.7	0.1	Frequency above, Volume below
038	0.6	0	0.00	0	Lake Washington	0.7	0.4	Below
040	5.4	2	14.70	728,493	Lake Washington	6	0.8	Below
041	9	8	54.07	400,178	Lake Washington	7.5	0.9	Frequency above, Volume below
042	1.6	1	7.13	125,525	Lake Washington	0.6	0.02	Above
043	9.4	6	17.02	517,740	Lake Washington	7	0.7	Below
044	16.4	11	91.27	2,873,135	Lake Washington	13	9.3	Below
045	10.6	7	53.33	243,619	Lake Washington	5.9	1.1	Frequency above, Volume below

Outfall Number	2009 - 2013 Average CSO Frequency (#/year)	2013 CSO Discharge Events			Receiving Waters of Overflow	2010 Baseline CSO		2013 CSO Compared to 2010 Baseline CSO
		Frequency (#/year)	Duration (hours)	Volume (gallons)		Frequency (#/year)	Volume (MG/year)	
046	5.6	1	0.33	281	Lake Washington	6.5	0.9	Below
047	9.8	10	70.75	2,377,107	Lake Washington	5.6	1.8	Above
048	0	0	0.00	0	Lake Washington	0	0	Equals
049	3.8	2	9.27	1,056,726	Lake Washington	1.6	0.8	Above
057	0	0	0.00	0	Puget Sound	0	0	Equals
059	0.8	1	0.44	11,666	Salmon Bay	0.2	0.4	Frequency above, Volume below
060	3.2	1	1.17	47,234	Salmon Bay	1.7	0.8	Below
061	0.2	0	0.00	0	Elliott Bay	0	0	Equals
062	1.2	2	0.41	7,285	Elliott Bay	0.7	0	Above
064	0	0	0.00	0	Elliott Bay	0.1	0	Frequency below, Volume equals
068	0.8	1	2.10	331,236	Elliott Bay	1.4	1.3	Below
069	2.2	3	2.18	439,013	Elliott Bay	4.4	1.4	Below
070	0.4	1	0.60	65,550	Elliott Bay	0.9	0.2	Frequency above, Volume below
071	5.6	4	11.08	369,332	Elliott Bay	4.3	1.3	Below
072	0.2	1	0.47	14,783	Elliott Bay	1.2	0.3	Below
078	0	0	0.00	0	Elliott Bay	0.3	0.2	Below
080	0	0	0.00	0	Elliott Bay	0	0	Equals
083	0	0	0.00	0	Puget Sound	0	0	Equals
085	0	0	0.00	0	Puget Sound	0	0	Equals
088	0.2	0	0.00	0	Puget Sound	0.3	0.2	Below
090	0	0	0.00	0	Puget Sound	0.2	0	Frequency below, Volume equals
091	0	0	0.00	0	Puget Sound	0	0	Equals
094	0	0	0.00	0	Puget Sound	0.1	0	Frequency below, Volume equals
095	2.6	1	1.58	803	Puget Sound	3	0.4	Below
099	2.4	1	5.07	405,700	W Waterway - Duwamish River	0.5	2.8	Frequency above, Volume below
107	7	3	9.33	232,587	E Waterway - Duwamish River	3.8	1.9	Below
111	3	3	6.37	11,507	Duwamish River	3	7.9	Frequency equals, Volume below
120	0	0	0.00	0	Lake Union	0	0	Equals
121	0	0	0.00	0	Lake Union	0.1	0	Frequency below, Volume equals
124	0	0	0.00	0	Lake Union	0	0	Equals
127	0.2	0	0.00	0	Lake Union	0.7	0.1	Below

Outfall Number	2009 - 2013 Average CSO Frequency (#/year)	2013 CSO Discharge Events			Receiving Waters of Overflow	2010 Baseline CSO		2013 CSO Compared to 2010 Baseline CSO
		Frequency (#/year)	Duration (hours)	Volume (gallons)		Frequency (#/year)	Volume (MG/year)	
129	0.4	2	49.97	64,910	Lake Union	0.1	0	Above
130	0	0	0.00	0	Lake Union	0	0	Equals
131	0	0	0.00	0	Lake Union	0.1	0	Frequency below, Volume equals
132	0.6	2	0.23	3,986	Lake Union	0.7	0	Above
134	0	0	0.00	0	Lake Union	0	0	Equals
135	0.2	0	0.00	0	Lake Union	0.3	0	Frequency below, Volume equals
136	0	0	0.00	0	Lake Union	0	0	Equals
138	2	2	3.50	119,989	Portage Bay	2.3	2	Below
139	1.4	1	1.43	47,561	Portage Bay	0.7	1.4	Frequency above, Volume below
140	5.2	5	8.05	147,407	Portage Bay	4.1	0.3	Frequency above, Volume below
141	0	0	0.00	0	Portage Bay	0.1	0	Frequency below, Volume equals
144	0	0	0.00	0	Lake Union	0.1	0.2	Below
145	0	0	0.00	0	Lake Union	0	0	Equals
146	0	0	0.00	0	Lake Union	0	0	Equals
147	44.4	27	238.15	4,800,690	Lake Union	33	19	Below
148	0.6	0	0.00	0	Lake Washington Ship Canal	0	0	Equals
150/151	24.2	14	114.80	1,737,206	Salmon Bay	15	2	Below
152	48.2	44	440.30	13,192,217	Salmon Bay	15	9.7	Above
161	0	0	0.00	0	Lake Washington	0	0	Equals
165	1	1	0.25	4,387	Lake Washington	1.1	0.02	Below
168	2	0	0.00	0	Longfellow Creek	3.9	1.6	Below
169	1.2	0	0.00	0	Longfellow Creek	2.2	49	Below
170	0.8	0	0.00	0	Longfellow Creek	0.4	0.1	Below
171	8.8	10	79.75	970,469	Lake Washington	4.1	0.75	Above
174	12.2	7	24.95	2,775,594	Lake Washington Ship Canal	11	5.9	Below
175	0.6	2	1.40	3,062	Lake Union	0.7	0	Above
Total	**303**	**219**	**1,408**	**37,497,456**		**252**	**140**	

Table 5-6. 2009-2013 Summary Comparison of Overflows by Outfall

NPDES #	Frequency					Overflow Duration (Hours)					Overflow Volume (Gallons per Year)					Receiving Waters
	2009	2010	2011	2012	2013	2009	2010	2011	2012	2013	2009	2010	2011	2012	2013	
012	0	1	0	1	1	0.00	12.40	0.00	10.87	0.30	0	223,010	0	58,966	590	Lake Washington
013	4	5	4	7	2	14.13	70.70	49.66	60.87	8.42	1,157,651	6,526,814	1,397,291	4,471,990	889,232	Lake Washington
014	1	0	0	0	0	0.08	0.00	0.00	0.00	0.00	163	0	0	0	0	Lake Washington
015	8	4	4	2	2	16.95	41.45	4.03	14.78	2.53	242,956	1,409,738	22,529	188,231	28,466	Lake Washington
016	1	0	0	0	0	1.00	0.00	0.00	0.00	0.00	6	0	0	0	0	Lake Washington
018	8	5	4	8	2	23.19	75.72	20.39	70.93	6.43	2,949,987	17,174,989	1,772,295	9,541,486	1,635,247	Union Bay
019	0	0	0	0	1	0.00	0.00	0.00	0.00	1.03	0	0	0	0	902	Union Bay
020	3	3	3	2	2	3.33	24.13	17.03	14.36	6.13	68,255	1,943,677	189,159	762,481	209,475	Union Bay
022	1	1	1	4	3	2.42	19.00	2.23	46.23	8.42	14,101	1,193,468	6,285	23,146	11,402	Union Bay
024	1	1	0	1	1	0.73	13.77	0.00	11.00	1.73	41,390	2,181,178	0	1,179,613	184,519	Lake Washington
025	2	1	0	1	1	1.80	13.50	0.00	10.77	1.53	34,467	2,402,363	0	1,214,977	97,238	Lake Washington
026	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	Lake Washington
027	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	Lake Washington
028	8	2	2	2	3	37.65	0.38	0.11	0.35	6.33	50,283	324	1,204	3,931	4,761	Lake Washington
029	4	2	3	11	7	31.12	10.78	38.41	43.45	21.73	617,548	42,839	24,029	299,426	107,553	Lake Washington
030	1	0	1	3	2	3.75	0.00	0.03	18.53	10.60	89,479	0	13	360,739	103,602	Lake Washington
031	12	11	11	2	0	88.00	116.21	99.19	9.76	0.00	548,679	957,983	356,655	8,170	0	Lake Washington
032	7	3	4	3	1	16.22	25.53	44.43	19.46	6.42	136,956	1,111,491	368,002	237,856	88,300	Lake Washington
033	1	0	0	1	0	0.08	0.00	0.00	0.10	0.00	7,875	0	0	360	0	Lake Washington
034	1	1	0	1	0	0.53	16.57	0.00	11.13	0.00	8,590	833,946	0	229,082	0	Lake Washington
035	3	0	1	1	1	19.25	0.00	0.25	1.07	0.08	16,387	0	1,815	5,893	802	Lake Washington
036	5	2	1	2	3	42.48	19.43	14.43	12.65	4.72	232,619	256,969	16,852	40,092	8,389	Lake Washington
038	1	1	0	1	0	7.42	18.97	0.00	10.38	0.00	365,042	2,144,838	0	433,405	0	Lake Washington
040	6	5	4	10	2	35.97	37.93	48.06	83.74	14.70	1,154,534	3,207,479	814,849	3,602,239	728,493	Lake Washington
041	14	5	5	13	8	153.63	78.73	84.48	189.40	54.07	1,668,410	1,623,574	557,594	1,747,947	400,178	Lake Washington
042	1	1	2	3	1	10.25	19.13	6.86	26.43	7.13	158,728	1,377,285	82,769	453,768	125,525	Lake Washington
043	11	9	7	14	6	64.03	99.23	76.79	135.33	17.02	1,682,131	2,825,223	1,136,935	2,693,671	517,740	Lake Washington

NPDES #	Frequency					Overflow Duration (Hours)					Overflow Volume (Gallons per Year)					Receiving Waters
	2009	2010	2011	2012	2013	2009	2010	2011	2012	2013	2009	2010	2011	2012	2013	
044	16	16	17	22	11	188.85	318.67	270.03	399.66	91.27	7,722,187	9,887,390	7,331,324	12,327,310	2,873,135	Lake Washington
045	11	10	11	14	7	42.08	124.83	85.31	199.56	53.33	855,264	1,322,252	159,235	889,798	243,619	Lake Washington
046	9	12	4	2	1	22.27	167.11	28.50	16.00	0.33	18,393	4,197,631	88,604	27,595	281	Lake Washington
047	12	8	7	12	10	82.85	42.87	67.29	89.47	70.75	13,644,914	10,900,742	1,044,960	10,000,932	2,377,107	Lake Washington
048	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	Lake Washington
049	6	4	2	5	2	45.10	29.98	19.15	35.25	9.27	1,769,188	4,552,799	634,667	1,984,105	1,056,726	Lake Washington
057	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	Puget Sound
059	0	0	1	2	1	0.00	0.00	0.17	5.51	0.44	0	0	915	95,408	11,666	Salmon Bay
060	3	4	2	6	1	3.30	11.90	25.03	10.76	1.17	215,743	466,164	174,145	727,910	47,234	Salmon Bay
061	0	1	0	0	0	0.00	1.23	0.00	0.00	0.00	0	50,026	0	0	0	Elliott Bay
062	0	0	3	1	2	0.00	0.00	0.24	6.80	0.41	0	0	239	237	7,285	Elliott Bay
064	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	Elliott Bay
068	1	1	0	1	1	1.25	12.77	0.00	7.00	2.10	120,387	1,840,469	0	2,801,197	331,236	Elliott Bay
069	3	1	2	2	3	15.02	26.87	0.46	10.70	2.18	303,675	214,775	57,940	277,093	439,013	Elliott Bay
070	1	0	0	0	1	0.08	0.00	0.00	0.00	0.60	5,302	0	0	0	65,550	Elliott Bay
071	9	7	3	5	4	28.65	54.68	39.08	14.47	11.08	496,549	1,352,572	129,452	600,682	369,332	Elliott Bay
072	0	0	0	0	1	0.00	0.00	0.00	0.00	0.47	0	0	0	0	14,783	Elliott Bay
078	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	Elliott Bay
080	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	Elliott Bay
083	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	Puget Sound
085	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	Puget Sound
088	0	1	0	0	0	0.00	10.38	0.00	0.00	0.00	0	342,740	0	0	0	Puget Sound
090	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	Puget Sound
091	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	Puget Sound
094	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	Puget Sound
095	7	3	1	1	1	9.45	10.42	0.03	0.22	1.58	263,424	179,782	744	4,276	803	Puget Sound
099	1	2	3	5	1	6.75	22.77	29.97	30.00	5.07	1,434,480	1,620,161	715,775	2,494,862	405,700	W Waterway - Duwamish River
107	11	12	5	4	3	66.58	71.30	64.33	14.02	9.33	3,379,938	4,167,734	767,499	352,041	232,587	E Waterway - Duwamish River

NPDES #	Frequency					Overflow Duration (Hours)					Overflow Volume (Gallons per Year)					Receiving Waters
	2009	2010	2011	2012	2013	2009	2010	2011	2012	2013	2009	2010	2011	2012	2013	
111	6	3	2	1	3	6.17	20.27	17.85	26.23	6.37	1,445,180	7,724,604	723	314,968	11,507	Duwamish River
120	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	Lake Union
121	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	Lake Union
124	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	Lake Union
127	1	0	0	0	0	1.33	0.00	0.00	0.00	0.00	3,509	0	0	0	0	Lake Union
129	0	0	0	0	2	0.00	0.00	0.00	0.00	49.97	0	0	0	0	64,910	Lake Union
130	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	Lake Union
131	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	Lake Union
132	0	0	1	0	2	0.00	0.00	0.08	0.00	0.23	0	0	2,559	0	3,986	Lake Union
134	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	Lake Union
135	1	0	0	0	0	0.17	0.00	0.00	0.00	0.00	56	0	0	0	0	Lake Union
136	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	Lake Union
138	2	1	3	2	2	4.25	15.30	15.05	12.25	3.50	379,444	1,098,144	124,027	649,289	119,989	Portage Bay
139	1	2	1	2	1	0.17	13.33	0.03	10.60	1.43	2,884	399,306	2,638	320,403	47,561	Portage Bay
140	7	8	2	4	5	16.05	48.48	0.15	17.96	8.05	57,937	755,672	3,107	437,331	147,407	Portage Bay
141	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	Portage Bay
144	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	Lake Union
145	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	Lake Union
146	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	Lake Union
147	45	63	40	47	27	616.65	801.28	391.91	672.19	238.15	25,119,846	23,213,300	9,748,238	14,636,073	4,800,690	Lake Union
148	0	1	2	0	0	0.00	0.78	0.69	0.00	0.00	0	19,092	6,883	0	0	Lake Washington Ship Canal
150/151	22	29	25	31	14	163.08	244.24	208.64	378.01	114.80	3,168,871	2,848,612	2,497,818	4,871,447	1,737,206	Salmon Bay
152	29	63	48	57	44	449.06	999.37	640.68	1098.59	440.30	20,546,673	40,356,610	40,634,362	52,382,276	13,192,217	Salmon Bay
161	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	Lake Washington
165	1	1	0	2	1	4.67	11.30	0.00	10.43	0.25	34,446	118,552	0	54,470	4,387	Lake Washington
168	6	2	0	2	0	80.35	110.83	0.00	47.24	0.00	4,767,226	4,824,814	0	5,364,038	0	Longfellow Creek
169	1	2	2	1	0	9.33	36.30	6.50	16.03	0.00	934,903	6,874,940	614,501	2,587,257	0	Longfellow Creek
170	2	1	0	1	0	23.47	5.17	0.00	0.90	0.00	16,622	40,069	0	12,286	0	Longfellow Creek

NPDES #	Frequency					Overflow Duration (Hours)					Overflow Volume (Gallons per Year)					Receiving Waters
	2009	2010	2011	2012	2013	2009	2010	2011	2012	2013	2009	2010	2011	2012	2013	
171	10	5	6	13	10	56.50	72.09	68.67	97.47	79.75	2,436,795	3,344,191	828,364	2,199,443	970,469	Lake Washington
174	14	13	10	17	7	99.28	122.91	93.30	267.09	24.95	6,170,717	9,846,389	5,877,361	10,262,141	2,775,594	Lake Washington Ship Canal
175	1	0	0	0	2	0.08	0.00	0.00	0.00	1.40	269	0	0	0	3,062	Lake Union
Total	343	339	260	355	219	2,617	4,121	2,580	4,296	1,408	106,561,059	189,996,720	78,194,356	154,232,337	37,497,456	

Table 5-7. 2009-2013 Summary Comparison of CSOs by Receiving Water

Receiving Waters of Overflow	Overflow Frequency (# per Year)					Overflow Event Duration (Hours)					Overflow Volume (Gallons per Year)				
	2009	2010	2011	2012	2013	2009	2010	2011	2012	2013	2009	2010	2011	2012	2013
Duwamish River	6	3	2	1	3	6	20	18	26	11	1,445,180	7,724,604	723	314,968	11,507
East Waterway	11	12	5	4	3	67	71	64	14	9	3,379,938	4,167,734	767,499	352,041	232,587
Elliott Bay	14	10	8	9	12	45	96	40	39	12	925,913	3,457,842	187,631	3,679,209	1,227,201
Lake Union	48	63	41	47	33	618	801	392	672	290	25,123,680	23,213,300	9,750,797	14,636,073	4,872,642
Lake Washington	157	110	96	149	84	987	1,362	1,006	1,518	462	34,695,081	61,448,611	14,867,691	44,714,009	11,216,814
Lake Washington - Ship Canal	14	14	12	17	7	99	124	94	267	25	6,170,717	9,865,481	5,884,244	10,262,141	2,775,594
Longfellow Creek	9	5	2	4	0	113	152	7	64	0	5,718,751	11,739,823	614,501	7,963,581	0
Portage Bay	10	11	6	8	8	20	77	15	41	13	440,265	2,253,122	129,772	1,407,023	314,957
Puget Sound	7	4	1	1	1	9	21	0.03	0.22	2	263,424	522,522	744	4,276	803
Salmon Bay	54	96	76	96	60	615	1,256	875	1,493	561	23,931,287	43,671,386	43,307,240	58,077,041	14,988,321
Union Bay	12	9	8	14	8	29	119	40	132	22	3,032,343	20,312,134	1,967,739	10,327,113	1,857,024
West Waterway	1	2	3	5	0	7	23	30	30	0	1,434,480	1,620,161	715,775	2,494,862	0
TOTAL:	343	339	260	355	219	2,615	4,122	2,581	4,296	1,407	106,561,059	189,996,720	78,194,356	154,232,337	37,497,450

Table 5-8. Outfalls Meeting Performance Standard for Controlled CSOs based on Flow Monitoring Results and Modeling

Outfall Number	Number of Overflows Per Year [1]																				Average Annual Overflow Frequency (as of 2013)	Meets Performance Standard? (as of 201)	Average Annual Overflow Frequency (as of 2012)	Meets Performance Standard? (as of 2012)	Average Annual Overflow Frequency (as of 2011)	Meets Performance Standard? (as of 2011)	Long-Term Simulation Source	Notes
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013								
12								0	0	0	0	0	0	0	0	0	1	0	1	1	0.2	Yes	0.2	Yes	0.1	Yes	N/A	2, 3
13	9	14	16	19	15	15	8	10	5	14	8	9	25	4	2	4	5	4	7	2	9.8	No	10.1	No	10.3	No	Windermere H&H Report, July 2010	4
14														1	0	1	0	0	0	0	0.3	Yes	0.3	Yes	0.4	Yes	N/A	3, 5
15	0	0	3	1	2	0	0	0	0	2	0	1	4	1	0	8	4	4	2	2	1.7	No	1.6	No	5.9	No	Windermere H&H Report, July 2010	4.
16								0	0	0	0	0	1	0	0	1	0	0	0	0	0.2	Yes	0.2	Yes	0.2	Yes	N/A	2, 3
18	2	2	7	5	5	2	0	3	2	3	4	4	11	2	3	8	5	4	8	2	4.1	No	4.1	No	6.3	No	LTCP Long Term Simulation Results February 2013	4
19								0	0	1	0	0	1	0	0	0	0	0	0	1	0.2	Yes	0.2	Yes	0.2	Yes	N/A	2, 3
20	0	0	3	2	1	1	0	0	0	2	1	0	3	1	0	3	3	3	2	2	1.4	No	1.3	No	2.6	No	LTCP Long Term Simulation Results February 2013	4
22	0	0	2	1	0	0	0	0	0	2	3	0	1	1	0	1	1	1	4	3	1.0	Yes	0.9	Yes	0.5	Yes	LTCP Long Term Simulation Results February 2013	4
24	0	0	4	1	1	0	0	0	0	2	2	0	4	1	0	1	1	0	1	1	1.0	Yes	0.9	Yes	0.3	Yes	LTCP Long Term Simulation Results February 2013	4
25	0	0	3	0	0	0	0	0	0	2	1	0	3	1	1	2	1	0	1	1	0.8	Yes	0.75	Yes	2.4	No	LTCP Long Term Simulation Results February 2013	4, 6
26	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0.2	Yes	0.2	Yes	0.3	Yes	LTCP Long Term Simulation Results February 2013	4
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Yes	0	Yes	0.0	Yes	LTCP Long Term Simulation Results February 2014	4
28	0	0	3	1	0	0	0	1	1	1	1	0	2	1	26	8	2	2	2	3	2.7	No	2.6	No	12.5	No	LTCP Long Term Simulation Results February 2013	4
29	0	1	4	1	1	1	0	3	1	2	2	0	5	1	5	4	2	3	11	7	2.7	No	2.4	No	4.3	No	LTCP Long Term Simulation Results February 2013	4
30	0	0	2	0	1	0	0	1	1	1	1	0	1	1	2	1	0	1	3	2	0.9	Yes	0.9	Yes	0.7	Yes	LTCP Long Term Simulation Results February 2013	7
31	11	18	22	11	21	14	2	17	13	18	13	19	32	10	4	12	11	11	2	0	13.1	No	13.8	No	9.6	No	LTCP Long Term Simulation Results February 2013	4
32	5	8	10	5	7	4	1	13	4	4	4	4	15	5	1	7	3	4	3	1	5.4	No	5.5	No	7.5	No	LTCP Long Term Simulation Results February 2013	4
33	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	1	0	0	1	0	0.3	Yes	0.3	Yes	0.2	Yes	LTCP Long Term Simulation Results February 2013	4
34	0	0	4	1	1	1	0	1	1	2	1	0	3	1	0	1	1	0	1	0	1.0	Yes	1.0	Yes	1.3	No	LTCP Long Term Simulation Results February 2013	4, 8
35	0	0	3	0	0	0	0	1	1	2	2	0	1	1	0	3	0	1	1	1	0.9	Yes	0.9	Yes	0.5	Yes	LTCP Long Term Simulation Results February 2013	4, 9
36	1	1	6	0	3	2	0	3	1	2	2	1	6	1	0	5	2	1	2	3	2.1	No	2	No	2.5	No	LTCP Long Term Simulation Results February 2013	4

Outfall Number	Number of Overflows Per Year [1]																				Average Annual Overflow Frequency (as of 2013)	Meets Performance Standard? (as of 201)	Average Annual Overflow Frequency (as of 2012)	Meets Performance Standard? (as of 2012)	Average Annual Overflow Frequency (as of 2011)	Meets Performance Standard? (as of 2011)	Long-Term Simulation Source	Notes
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013								
38	0	0	2	0	1	0	0	1	0	2	1	0	2	1	0	1	1	0	1	0	0.7	Yes	0.7	Yes	0.5	Yes	InfoWorks V9.5 H&H Model - Extracted Data Set From Long Term Simulation Run.	4
40	4	8	10	6	5	2	3	9	4	6	4	4	12	7	1	6	5	4	10	2	5.6	No	5.6	No	4	No	InfoWorks V9.5 H&H Model - Extracted Data Set From Long Term Simulation Run.	4
41	4	9	11	8	9	3	3	11	5	7	5	9	15	7	9	14	5	5	13	8	8.0	No	7.8	No	8.3	No	InfoWorks V9.5 H&H Model - Extracted Data Set From Long Term Simulation Run.	4
42	0	0	3	0	1	0	0	1	2	1	1	0	0	0	0	1	1	2	3	1	0.9	Yes	0.8	Yes	1	Yes	InfoWorks V9.5 H&H Model - Extracted Data Set From Long Term Simulation Run.	4
43	4	9	10	7	8	3	3	11	5	7	4	5	13	7	3	11	9	7	14	6	7.3	No	7.1	No	7.5	No	InfoWorks V9.5 H&H Model - Extracted Data Set From Long Term Simulation Run.	4
44	12	16	18	22	20	12	8	14	10	18	16	13	29	9	12	16	16	17	22	11	15.6	No	15.5	No	15.3	No	InfoWorks V9.5 H&H Model - Extracted Data Set From Long Term Simulation Run.	4
45	10	13	24	15	20	10	6	16	11	18	22	17	21	19	5	11	10	11	14	7	14.0	No	13.9	No	9.3	No	InfoWorks V9.5 H&H Model - Extracted Data Set From Long Term Simulation Run.	4
46	7	9	11	12	9	4	3	13	4	8	7	8	13	5	9	9	12	4	2	1	7.5	No	7.6	No	8.5	No	InfoWorks V9.5 H&H Model - Extracted Data Set From Long Term Simulation Run.	4
47	9	12	19	11	10	8	9	10	17	28	32	27	39	34	3	12	8	7	12	10	15.9	No	15.8	No	7.5	No	InfoWorks V9.5 H&H Model - Extracted Data Set From Long Term Simulation Run.	4
48															0	0	0	0	0	0	0	Yes	0	Yes	0	Yes	N/A	3, 4
49	1	1	3	1	1	0	0	1	1	2	0	4	11	2	1	6	4	2	5	2	2.4	No	2.3	No	3.3	No	InfoWorks V9.5 H&H Model - Extracted Data Set From Long Term Simulation Run.	4
57								0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	Yes	0.0	Yes	0.0	Yes	N/A	2, 3
59								0	0	1	0	0	0	1	0	0	0	1	2	1	0.5	Yes	0.4	Yes	0.3	Yes	N/A	2, 3
60	0	4	8	3	1	4	1	2	0	2	1	4	4	3	0	3	4	2	6	1	2.7	No	2.6	No	1.5	No	LTCP Long Term Simulation Results February 2013	4
61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.1	Yes	0.1	Yes	0.1	Yes	N/A	2, 3
62								0	0	0	0	0	0	0	0	0	0	3	1	2	0.8	Yes	0.3	Yes	0.3	Yes	N/A	2, 3
64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	Yes	0.1	Yes	0.1	Yes	N/A	2, 3
68	0	1	3	0	0	0	0	1	0	2	0	1	1	1	0	1	1	0	1	1	0.7	Yes	0.7	Yes	1.3	No	LTCP Long Term Simulation Results February 2013	4, 10
69	0	2	3	2	3	0	1	1	1	2	1	1	2	1	1	3	1	2	2	3	1.6	No	1.5	No	2.2	No	LTCP Long Term Simulation Results February 2013	4
70	0	0	2	1	1	0	0	1	0	0	1	0	1	1	0	1	0	0	0	1	0.5	Yes	0.45	Yes	0.5	Yes	AWVSRP Modeling Support Alternative Modeling Report May 2012, Appendix D	4

Outfall Number	Number of Overflows Per Year [1]																				Average Annual Overflow Frequency (as of 2013)	Meets Performance Standard? (as of 201)	Average Annual Overflow Frequency (as of 2012)	Meets Performance Standard? (as of 2012)	Average Annual Overflow Frequency (as of 2011)	Meets Performance Standard? (as of 2011)	Long-Term Simulation Source	Notes
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013								
71	1	0	4	2	1	0	0	1	0	3	1	1	2	1	2	9	7	3	5	4	2.4	No	2.15	No	4.7	No	AWVSRP Modeling Support Alternative Modeling Report May 2012, Appendix D	4
72	1	0	2	1	0	0	0	0	0	2	0	0	1	1	0	0	0	0	0	1	0.5	Yes	0.4	Yes	0.3	Yes	AWVSRP Modeling Support Alternative Modeling Report May 2012, Appendix D	4
78								0	0	2	0	0	0	1	0	0	0	0	0	0	02	Yes	0.3	Yes	0.3	Yes	N/A	2, 3
80								0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	Yes	0.0	Yes	0.0	Yes	N/A	2, 3
83								0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	Yes	0.0	Yes	0.0	Yes	N/A	2, 3
85								0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	Yes	0.0	Yes	0.0	Yes	N/A	2, 3
88								0	0	0	1	0	0	2	0	0	1	0	0	0	0.8	Yes	0.3	Yes	0.4	Yes	N/A	2, 3
90								0	0	0	0	1	1	0	0	0	0	0	0	0	0.2	Yes	0.2	Yes	0.2	Yes	N/A	2, 3
91								0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	Yes	0.0	Yes	0.0	Yes	N/A	2, 3
94								0	0	1	0	0	0	0	0	0	0	0	0	0	0.1	Yes	0.1	Yes	0.1	Yes	N/A	2, 3
95								3	1	2	0	4	6	1	3	7	3	1	1	1	2.5	No	2.7	No	2.8	No	N/A	2, 3
99	0	2	3	1	2	2	0	3	0	1	1	2	1	1	0	1	2	3	5	1	1.6	No	1.5	No	1.5	No	LTCP Long Term Simulation Results February 2013	4
107	2	2	7	4	5	6	1	6	5	3	7	5	7	1	2	11	12	5	4	3	4.9	No	4.6	No	4.6	No	LTCP Long Term Simulation Results January 2014	4
111	0	0	3	3	2	0	0	2	1	3	1	3	2	1	0	6	3	2	1	3	1.8	No	1.7	No	2.8	No	LTCP Long Term Simulation Results February 2013	4
120								0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	Yes	0.0	Yes	0.0	Yes	N/A	2, 3
121								0	0	0	1	0	0	0	0	0	0	0	0	0	0.1	Yes	0.1	Yes	0.1	Yes	N/A	2, 3
124								0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	Yes	0.0	Yes	0.0	Yes	N/A	2, 3
127								0	0	0	1	0	3	0	1	1	0	0	0	0	0.5	Yes	0.5	Yes	0.5	Yes	N/A	2, 3
129								0	1	0	0	0	0	0	0	0	0	0	0	2	0.2	Yes	0.1	Yes	0.1	Yes	N/A	2, 3
130															0	0	0	0	0	0	0.0	Yes	0	Yes	0	Yes	N/A	3, 4
131								0	0	0	0	0	0	1	0	0	0	0	0	0	0.1	Yes	0.1	Yes	0.1	Yes	N/A	2, 3
132															0	0	0	1	0	2	0.5	Yes	0.2	Yes	0.3	Yes	N/A	3, 4
134								0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	Yes	0.0	Yes	0.0	Yes	N/A	2, 3
135															0	1	0	0	0	0	0.2	Yes	0.2	Yes	0.3	Yes	N/A	3, 4
136								0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	Yes	0.0	Yes	0.0	Yes	N/A	2, 3
138	0	1	5	2	1	0	0	1	0	2	3	0	3	1	1	2	1	3	2	2	1.5	No	1.4	No	2.4	No	LTCP Long Term Simulation Results February 2013	4
139	0	0	2	4	2	0	0	1	0	1	3	1	2	1	0	1	2	1	2	1	1.2	No	1.15	No	1.5	No	LTCP Long Term Simulation Results February 2013	4
140	3	1	7	7	3	0	2	2	3	6	5	6	5	1	1	7	8	2	4	5	3.9	No	3.7	No	4.4	No	LTCP Long Term Simulation Results February 2013	4
141								0	0	0	0	0	1	0	0	0	0	0	0	0	0.1	Yes	0.1	Yes	0.1	Yes	N/A	2, 3
144								0	0	0	0	0	0	1	0	0	0	0	0	0	0.1	Yes	0.1	Yes	0.1	Yes	N/A	2, 3
145								0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	Yes	0.0	Yes	0.0	Yes	N/A	2, 3
146								0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	Yes	0.0	Yes	0.0	Yes	N/A	2, 3
147	32	43	50	41	32	32	27	26	29	31	29	37	45	35	50	45	63	40	47	27	38.1	No	38.1	No	36.5	No	LTCP Long Term Simulation Results February 2013	4
148								0	0	0	0	0	0	0	0	0	1	2	0	0	0.2	Yes	0.3	Yes	0.3	Yes	N/A	2, 3

Outfall Number	Number of Overflows Per Year [1]																				Average Annual Overflow Frequency (as of 2013)	Meets Performance Standard? (as of 201)	Average Annual Overflow Frequency (as of 2012)	Meets Performance Standard? (as of 2012)	Average Annual Overflow Frequency (as of 2011)	Meets Performance Standard? (as of 2011)	Long-Term Simulation Source	Notes
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013								
150/151	7	18	24	29	15	19	11	16	10	14	6	15	23	11	2	22	29	25	31	14	17.1	No	17	No	17	No	LTCP Long Term Simulation Results February 2013	4
152	46	44	52	52	49	49	57	47	39	53	44	46	42	43	11	29	63	48	57	44	45.8	No	45.2	No	37.8	No	LTCP Long Term Simulation Results February 2013	4
161								0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	Yes	0.0	Yes	0.0	Yes	N/A	2, 3
165															1	1	1	0	2	1	1.0	Yes	1	Yes	0.8	Yes	N/A	3, 4
168	3	3	5	1	2	6	0	5	1	2	1	2	8	3	0	6	2	0	2	0	2.6	No	2.6	No	3.3	No	LTCP Long Term Simulation Results February 2013	4
169	3	3	5	1	2	6	0	5	1	2	1	2	8	3	1	1	2	2	1	0	2.5	No	2.45	No	2.2	No	LTCP Long Term Simulation Results February 2013	4
170															0	2	1	0	1	0	0.7	Yes	0.8	Yes	0.5	Yes	N/A	3, 4
171	3	6	10	9	8	2	4	4	10	6	3	8	12	6	4	10	5	6	13	10	7.0	No	6.7	No	6.3	No	InfoWorks V9.5 H&H Model - Extracted Data Set From Long Term Simulation Run.	4
174	5	5	12	10	9	6	1	8	3	5	6	10	21	6	6	14	13	10	17	7	8.7	No	8.4	No	11.1	No	LTCP Long Term Simulation Results February 2013	4
175															0	1	0	0	0	2	0.5	Yes	0.2	Yes	0.3	Yes	N/A	3, 4

Notes:

1. *Per Section S6.A.2 of the NPDES Permit, the determination of whether an outfall is meeting the performance standard for controlled outfalls has been made based on up to 20 years of data and modeling. Numbers in the colorless cells were obtained from flow monitoring. Numbers in blue-shaded cells were obtained using actual precipitation data and basin-specific models and are used in the long-term average annual overflow calculation for years when monitoring data either is not available or the accuracy cannot be confirmed.*
2. *Monitoring configuration prior to 2001 cannot be confirmed and the data accuracy is questionable.*
3. *Average annual frequency calculated based on the number of years that reliable data was collected.*
4. *Monitoring configuration prior to 2008 cannot be confirmed and the data accuracy is questionable.*
5. *Monitoring configuration prior to 2007 cannot be confirmed and the data accuracy is questionable.*
6. *SPU raised the weir at Outfall 25 in early 2008.*
7. *Monitoring configuration prior to 2009 cannot be confirmed and the data accuracy is questionable*
8. *CSOs in 2006 likely due to clogged HydroBrake; inspection frequency has since been increased.*
9. *CSOs in 2009 likely due to clogged HydroBrake; inspection frequency has since been increased.*
10. *Actual overflow frequency affected by clogged HydroBrake (12005, 2007) and leaky flap gate leading to offline storage (scheduled for replacement in 2013).*

Appendix A: Additional CMOM Information

Table A-1. 2013 Sanitary Sewer Overflow (SSO) Details									
SSO	ERTS Number	Date	Address	SSO Volume (gallons)	Volume Reaching Receiving Water (gallons)	Receiving Water	Primary Cause	Secondary Cause, if Any	Additional Contributing Cause, If Any
1	638616	1/9/2013	5515 NE Ambleside	42,000	0		New facility startup		
2	638992	1/24/2013	Terry Ave N & Harrison St	500	0		Damaged by known party		
3	639107	2/4/2013	Beacon Ave S & S Holgate St	100	0		Structural failure-gravity main	Debris	
4	639278	2/12/2013	11740 Beacon Ave S	10	0		Roots	FOG	
5	639442	2/20/2013	3227 51st Ave SW	120	0		Roots	FOG	
6	639640	2/27/2013	9073 6th Ave NW	2	0		Maintenance error		
7	639683	3/1/2013	26th Ave SW & SW Yancy St	5	0		Maintenance error	Structural failure-gravity main	Roots
8	639793	3/7/2013	907 N Northlake Way	600	500	Lake Union	FOG		
9	639822	3/11/2013	15th Ave & E Spruce St	100	0		Roots	FOG	
10	640210	3/26/2013	3rd Ave N & Valley St	60	0		Roots		
11	640272	3/28/2013	S College St & Airport Way S	80	0		Structural failure-gravity main		
12	640456	4/5/2013	1835 Queen Anne Ave N	20	0		Damaged by known party		
13	640487	4/7/2013	2534 39th Ave E	3,670	0		Pump Station		
14	640485	4/8/2013	3268 McClintock Ave S	10	0		Structural failure-gravity main		
15	640670	4/13/2013	2534 39th Ave E	3,182	0		Pump Station		
16	641929	5/15/2013	3rd Ave W & W Dravus St	1,000	0		Capacity-gravity main		
17	641927	6/13/2013	3440 NW 57th St	235	0		Damaged by unknown party		
18	641831	6/11/2013	6415 32nd Ave NW	10	0		FOG		

SSO	ERTS Number	Date	Address	SSO Volume (gallons)	Volume Reaching Receiving Water (gallons)	Receiving Water	Primary Cause	Secondary Cause, if Any	Additional Contributing Cause, If Any
19	642287	6/25/2013	6th Ave N, Thomas & Harrison	150	0		Damaged by known party		
20	642264	7/1/2013	1532 & 1537 NE 96th St	10	0		Roots		
21	642492	7/15/2013	1250 Denny Way	250	0		Damaged by known party		
22	643477	8/28/2013	4248 1st Ave NW	15	0		Private side sewer issue		
23	643548	8/29/2013	802 Newton St	720	0		Structural failure-gravity main		
24	643646	8/29/2013	1815 N 45th St	7,000	0		Roots		
25	643529	8/30/2013	1423 10th Ave	10	0		FOG		
26	643781	9/5/2013	1244 S Concord St	18,000	0		Capacity-gravity main		
27	643797	9/6/2013	5515 NE Ambleside	48,250	0		New facility startup		
28	644103	9/6/2013	2203 E Prospect St	50	0		Roots		
29	644107	9/6/2013	504 N 85th St	50	0		Private side sewer issue		
30	643849	9/11/2013	1707 N 45th St	120	0		Roots	FOG	
31	643948	9/16/2013	2224 NE 92nd St	1	0		Roots		
32	644116	9/23/2013	529 NE 95th St	30	0		Roots		
33	None	9/28/2013	102 N 67th St	50	0		Roots		
34	644272	9/29/2013	2003 4th Ave N	1,800	0		Roots		
35	644606	9/29/2013	4442 & 4446 38th Ave SW	unknown	0		Roots		
36	644235	9/30/2013	750 Republican St	50	0		Structural failure-gravity main		
37	None	9/30/2013	Magnolia Basin (2562 Thorndyke Ave W, 2109 Raye St, 3223 & 3219 32nd Ave W, 3617 & 3613 32nd Ave W)	<300	0		Capacity-gravity main		

SSO	ERTS Number	Date	Address	SSO Volume (gallons)	Volume Reaching Receiving Water (gallons)	Receiving Water	Primary Cause	Secondary Cause, if Any	Additional Contributing Cause, If Any
38	644490	10/7/2013	4355 W McLaren St	350	0		Private side sewer issue		
39	644635	10/11/2013	1201 10th Ave W	2	0		Roots		
40	None	10/14/2013	1415 NE 45th St	50	0		Roots		
41	644871	10/25/2013	415 1st Ave N	5	0		Maintenance error		
42	644897	10/26/2013	7502 23rd Ave NW	12	0		Structural failure-gravity main		
43	644987	10/31/2013	900 Terry Ave	100	0		Debris	Roots	
44	645353	11/20/2013	3021 W Laurelhurst Dr NE	10	0		Structural failure-force main		
45	645349	11/20/2013	Renton Ave S & S Henderson St	50	0		Damaged by unknown party	Debris	FOG
46	645587	12/4/2013	427 S Henderson St	240	0		FOG		
47	645880	12/21/2013	1631 16th Ave	600	0		Roots	FOG	

Table A-2. Pump Station Location and Capacity								
Number	Name	Address	Type [1]	Basin Area (acres)	Average Inflow (gpm)	Number of Pumps and Rating	Static Head (feet)	Storage Time (hours)
1	Lawton Wood	5645 45th Ave West	WW/DW	31.8	36	2 at 350 gpm each	60.5	9.4
2	Charles Street	901 Lakeside Dr	WW/DW	108.1	262	2 at 450 gpm each	20	4+
4	South Director Street	5135 South Director St	Air Lift	3.1	4	2 at 150 gpm each	28.5	10.7
5	46th Avenue South	3800 Lake Washington Blvd	WW/DW	198.2	1147	2 at 1000 gpm each	13.9	4+
6	South Alaska Street	4645 Lake Washington Blvd	WW/DW	10.2	439	2 at 300 gpm each	14	4+
7	East Lee Street	4214 East Lee St	WW/DW	227	209	2 at 2800 gpm each	50	5.75
9	South Grattan Street	8400 55th Ave South	WW/DW	422.2	1293	2 at 900 gpm each	13.9	2
10	South Holly Street	5711 South Holly St	WW/DW	188.4	1064	2 at 1000 gpm each	13.5	2
11	North Sand Point	63rd Ave NE and NE 78th St	Submersible		10	2 at 800 gpm each	23	1
13	Montlake	2160 East Shelby St	WW/DW	64.9		2 at 600 gpm each	29.7	4+
15	West Park Drive East	West Park Dr East and East Shelby St	Submersible		10	2 at 800 gpm each	12	1
17	Empire Way	42nd Ave South and South Norfolk St	WW/DW	395	1341	2 at 2000 gpm each	27.7	5
18	South 116th Place	6700 South 116th Pl	Submersible		18	2 at 800 gpm each	45	12+
19	Leroy Place South	9400 Leroy Pl South	Submersible		22	2 at 800 gpm each	45	12+
20	East Shelby Street	1205 East Shelby St	WW/DW	48.6	541	2 at 600 gpm each	45	4+
21	21st Avenue West	2557 21st Ave West	Submersible		19	2 at 800 gpm each	45	12+
22	West Cramer Street	5400 38th Ave West	WW/DW	26.9	444	2 at 750 gpm each	62	6.64
25	Calhoun Street	1812 East Calhoun St	WW/DW	52.2	371	2 at 850 gpm each	36	3.63
28	North Beach	9001 View Ave NW	Submersible	4.8	7	2 at 800 gpm each	40.7	4
30	Esplanade	3206 NW Esplanade St	Submersible	5.7	9	2 at 800 gpm each	63	11.88
31	11th Avenue NW	12007 11th Ave NW	Submersible	2	10	2 at 800 gpm each	20	12+
35	25th Avenue NE	2734 NE 45th St	WW/DW	71	436	3 at 850 gpm each	39.8	1
36	Maryland	1122 Harbor Ave SW	Air Lift	12.2	18	2 at 150 gpm each	10	10.25
37	Fairmont	1751 Harbor Ave SW	WW/DW	281.5	1491	2 at 3500 gpm each	12.8	2
38	Arkansas	1411 Alki Ave SW	Air Lift	46.5	188	2 at 150 gpm each	10	13.15

Number	Name	Address	Type [1]	Basin Area (acres)	Average Inflow (gpm)	Number of Pumps and Rating	Static Head (feet)	Storage Time (hours)
39	Dawson	5080 Beach Dr SW	WW/DW	55	622	2 at 1100 gpm each	36.7	4.6
42	Lincoln Park	8617 Fauntleroy Way SW	WW/DW	6.5	64	2 at 200 gpm each	55.5	12.4
43	Seaview No. 1	5635 Seaview Ave NW	WW/DW	177.4	1693	2 at 1500 gpm each	40.4	4.85
44	Boeing No. 1	6820 Perimeter Rd S	WW/DW	168.5	334	2 at 600 gpm each	19	1.68
45	Boeing No. 2	7609 Perimeter Rd S	WW/DW	133.5	293	2 at 300 gpm each	16.5	2.91
46	Seaview No. 2	6541 Seaview Ave NW	Air Lift	52.6	68	2 at 150 gpm each	14.6	2.45
47	Seaview No. 3	7242 Seaview Ave NW	Air Lift	11	14	2 at 150 gpm each	9.5	5.87
48	Brooklyn	3701 Brooklyn Ave NE	WW/DW	31.4	156	2 at 1000 gpm each	53.3	4.01
49	Latona	3750 Latona Ave NE	WW/DW	22.4	257	2 at 250 gpm each	33.3	4+
50	39th Avenue East	2534 39th Ave East	Air Lift	10.6	14	2 at 150 gpm each	20.5	10
51	NE 60th Street	6670 NE 60th St	WW/DW	44.5	59	2 at 325 gpm each	126.3	1.71
53	SW Hinds Street	4951 SW Hinds St	WW/DW	10.6	41	2 at 150 gpm each	66	2
54	NW 41st Street	647 NW 41st St	WW/DW	24.5	169	2 at 350 gpm each	27	1.52
55	Webster Street	3021 West Laurelhurst NE	Air Lift	2.4	5	2 at 150 gpm each	31	2.15
56	Bedford Court	10334 Bedford Ct NW	Air Lift	1.6	3	2 at 150 gpm each	30.3	0.75
57	Sunnyside	3600 Sunnyside Ave North	WW/DW	16.3	57	2 at 300 gpm each	31.5	2.66
58	Woodlawn	1350 North Northlake Way	WW/DW	33.4	290	2 at 600 gpm each	30	3.5
59	Halliday	2590 Westlake Ave North	WW/DW	21.2	53	2 at 325 gpm each	17.7	9.7
60	Newton	2010 Westlake Ave North	WW/DW	57.6	77	2 at 250 gpm each	67.4	4.38
61	Aloha	912 Westlake Ave North	WW/DW	26.3	59	2 at 450 gpm each	19.1	4.9
62	Yale	1103 Fairview Ave North	WW/DW	12.2	211	2 at 350 gpm each	18.4	4.63
63	East Blaine	140 East Blaine St	WW/DW	33.1	251	2 at 600 gpm each	31	2.43
64	East Lynn Street No. 2	2390 Fairview Ave East	WW/DW	9.4	253	2 at 300 gpm each	16.2	7.05
65	East Allison Street	2955 Fairview Ave East	WW/DW	19.2	111	2 at 300 gpm each	47.2	3.96
66	Portage Bay No. 1	3190 Portage Bay Pl East	WW/DW	6.5	200	2 at 200 gpm each	12.2	18.6
67	Portage Bay No. 2	1209 East Shelby St	WW/DW	14.7	176	2 at 250 gpm each	17	9.08

Number	Name	Address	Type [1]	Basin Area (acres)	Average Inflow (gpm)	Number of Pumps and Rating	Static Head (feet)	Storage Time (hours)
69	Sand Point	6451 65th Ave NE	WW/DW	15.5	124	2 at 300 gpm each	79	2.03
70	Barton No. 2	4890 SW Barton St	WW/DW	73	136	2 at 300 gpm each	29	5.34
71	SW 98th Street	5190 SW 98th St	WW/DW	36.3	155	2 at 450 gpm each	16	6.79
72	SW Lander Street	2600 13th Ave SW	WW/DW	203.5	428	3 at 2000 gpm each	22.8	4+
73	SW Spokane St	1190 SW Spokane St	WW/DW	336.5	45	3 at 2500 gpm each	16.3	4+
74	26th Avenue SW	2799 26th Ave SW	Submersible	144		2 at 800 gpm each	30	3.21
75	Point Place SW	3200 Point Pl SW	Air Lift	4.9	9	2 at 150 gpm each	12.2	10
76	Lowman Park	7025 Beach Dr SW	WW/DW	20.4	27	2 at 100 gpm each	34	17.8
77	32nd Avenue West	1499 32nd Ave West	WW/DW	206.5	601	2 at 1400 gpm each	48	5.17
78	Airport Way South	8415 Airport Way South	Air Lift	18.4	41	2 at 150 gpm each	14.5	5.5
80	South Perry Street	9724 Rainier Ave South	Air Lift	4.6	5	2 at 150 gpm each	22	10
81	72nd Avenue South	10199 Rainier Avenue South	WW/DW	11	60	2 at 200 gpm each	53.3	24.3
82	Arroyo Beach Place	11013 Arroyo Beach Pl SW	Air Lift	6	8	2 at 150 gpm each	19.8	10
83	West Ewing Street	390 West Ewing St	Air Lift	6.1	39	2 at 150 gpm each	19	4.24
84	28th Avenue NW	5390 28th Ave NW	WW/DW	691.4	128	2 at 500 gpm each	24.4	3.43
114	35th Avenue NE	10701 36th Ave NE	Submersible	3.2	47	2 at 800 gpm each	5.6	2
118	Midvale Avenue North	1200 North 107th St	WW/DW	22.4	103	2 at 300 gpm each	11.5	3.5

1. WW/DW = Wet Well/Dry Well

Table A-3. 2013 Pump Station Work Order Summary			
WWPS Number	**Inspection**	**Maintenance**	**Total Work Orders**
WWPS001	20	2	22
WWPS002	19	4	23
WWPS004	27		27
WWPS005	28	3	31
WWPS006	15	2	17
WWPS007	36	11	47
WWPS009	26	6	32
WWPS010	14	7	21
WWPS011	19	5	24
WWPS013	21	11	32
WWPS015	10	2	12
WWPS017	91	8	99
WWPS018	19	17	36
WWPS019	15	5	20
WWPS020	14	9	23
WWPS021	21	10	31
WWPS022	22		22
WWPS025	15	10	25
WWPS028	16	8	24
WWPS030	22	21	43
WWPS031	20	1	21
WWPS035	71	12	83
WWPS036	30	1	31
WWPS037	13	18	31
WWPS038	30		30
WWPS039	15	5	20
WWPS042	16	2	18
WWPS043	14	9	23
WWPS044	20	6	26
WWPS045	14	5	19
WWPS046	34	1	35
WWPS047	28		28
WWPS048	14	7	21
WWPS049	74	13	87
WWPS050	35	9	44
WWPS051	71	4	75

WWPS053	15	10	25
WWPS054	24	5	29
WWPS055	30	2	32
WWPS056	34	4	38
WWPS057	18	6	24
WWPS058	18	9	27
WWPS059	16	3	19
WWPS060	12	1	13
WWPS061	18	8	26
WWPS062	65	9	74
WWPS063	21	14	35
WWPS064	19	5	24
WWPS065	13	5	18
WWPS066	14	2	16
WWPS067	16		16
WWPS069	23	11	34
WWPS070	18	3	21
WWPS071	22	3	25
WWPS072	9	2	11
WWPS073	14	3	17
WWPS074	36	16	52
WWPS075	32		32
WWPS076	70	5	75
WWPS077	14	5	19
WWPS078	27		27
WWPS080	32	3	35
WWPS081	18	6	24
WWPS082	29	1	30
WWPS083	31	1	32
WWPS084	14	2	16
WWPS114	31	6	37
WWPS118	26	11	37
WWPSSTS	54		54
Grand Total	**1802**	**395**	**2197**

Table A-4. 2013 CSO Structure Inspection Summary

Location	Inspection Date	Inspection Findings	Inspection Severity
NPDES13	3/14/2013	NOPROB	NONE
NPDES13	6/13/2013	NOPROB	NONE
NPDES13	10/15/2013	DEBRIS	MEDIUM
NPDES13	11/1/2013	NOPROB	NONE
NPDES13	12/12/2013	NOPROB	NONE
NPDES14	3/19/2013	NOPROB	NONE
NPDES14	6/17/2013	NOPROB	NONE
NPDES14	9/23/2013	NOPROB	NONE
NPDES14	10/24/2013	DEBRIS	LIGHT
NPDES14	11/1/2013	NOPROB	NONE
NPDES14	12/11/2013	NOPROB	NONE
NPDES15	3/19/2013	NOPROB	NONE
NPDES15	6/17/2013	NOPROB	NONE
NPDES15	9/19/2013	NOPROB	NONE
NPDES15	10/15/2013	NOPROB	NONE
NPDES15	11/1/2013	NOPROB	NONE
NPDES15	12/11/2013	NOPROB	NONE
NPDES18	3/19/2013	NOPROB	NONE
NPDES18	6/10/2013	NOPROB	NONE
NPDES18	10/15/2013	DEBRIS	LIGHT
NPDES18	11/1/2013	DEBRIS	LIGHT
NPDES18	12/11/2013	NOPROB	NONE
NPDES19	6/17/2013	DEBRIS	LIGHT
NPDES20	3/14/2013	CASTING	NONE
NPDES20	6/18/2013	DEBRIS	LIGHT
NPDES20	10/4/2013	DEBRIS	LIGHT
NPDES20	12/5/2013	NOPROB	NONE
NPDES22	3/18/2013	NOPROB	NONE
NPDES22	6/24/2013	NOPROB	NONE
NPDES22	8/26/2013	NOPROB	NONE
NPDES22	12/10/2013	NOPROB	NONE
NPDES24	3/18/2013	NOPROB	NONE
NPDES24	6/24/2013	NOPROB	NONE
NPDES24	8/26/2013	NOPROB	NONE
NPDES24	12/10/2013	NOPROB	NONE
NPDES25	3/18/2013	NOPROB	NONE
NPDES25	6/24/2013	NOPROB	NONE
NPDES25	8/26/2013	NOPROB	NONE

Location	Inspection Date	Inspection Findings	Inspection Severity
NPDES25	12/10/2013	NOPROB	NONE
NPDES26	3/18/2013	NOPROB	NONE
NPDES26	6/3/2013	NOPROB	NONE
NPDES27	6/7/2013	NOPROB	NONE
NPDES28	6/7/2013	NOPROB	LIGHT
NPDES29	3/15/2013	DEBRIS	MEDIUM
NPDES29	6/7/2013	NOPROB	NONE
NPDES29	10/7/2013	NOPROB	LIGHT
NPDES29	11/8/2013	NOPROB	NONE
NPDES29	12/12/2013	NOPROB	NONE
NPDES30	3/15/2013	NOPROB	LIGHT
NPDES30	6/10/2013	NOPROB	NONE
NPDES30	10/29/2013	NOPROB	NONE
NPDES30	12/31/2013	NOPROB	NONE
NPDES31	6/10/2013	DEBRIS	HEAVY
NPDES32	3/14/2013	DEBRIS	MEDIUM
NPDES32	6/10/2013	DEBRIS	HEAVY
NPDES32	10/25/2013	NOPROB	NONE
NPDES32	12/12/2013	NOPROB	NONE
NPDES34	3/14/2013	NOPROB	LIGHT
NPDES34	6/10/2013	NOPROB	NONE
NPDES34	10/25/2013	NOPROB	LIGHT
NPDES34	12/12/2013	NOPROB	NONE
NPDES35	3/11/2013	NOPROB	LIGHT
NPDES35	6/5/2013	NOPROB	NONE
NPDES35	10/23/2013	NOPROB	NONE
NPDES35	12/12/2013	NOPROB	NONE
NPDES36	3/11/2013	NOPROB	NONE
NPDES36	6/5/2013	NOPROB	LIGHT
NPDES36	10/14/2013	NOPROB	NONE
NPDES36	11/13/2013	NOPROB	NONE
NPDES36	12/9/2013	NOPROB	NONE
NPDES37	6/5/2013	NOPROB	NONE
NPDES38	3/11/2013	NOPROB	NONE
NPDES38	6/4/2013	NOPROB	NONE
NPDES38	10/1/2013	DEBRIS	LIGHT
NPDES38	11/13/2013	NOPROB	NONE
NPDES38	12/17/2013	NOPROB	NONE
NPDES39	3/5/2013	NOPROB	NONE
NPDES39	6/5/2013	NOPROB	LIGHT

Location	Inspection Date	Inspection Findings	Inspection Severity
NPDES40	3/5/2013	NOPROB	LIGHT
NPDES40	6/4/2013	NOPROB	LIGHT
NPDES40	10/1/2013	NOPROB	LIGHT
NPDES40	11/13/2013	NOPROB	LIGHT
NPDES40	12/11/2013	NOPROB	LIGHT
NPDES42	3/5/2013	NOPROB	LIGHT
NPDES42	6/4/2013	NOPROB	LIGHT
NPDES42	10/1/2013	DEBRIS	MEDIUM
NPDES42	11/14/2013	NOPROB	NONE
NPDES42	12/18/2013	NOPROB	NONE
NPDES43	3/5/2013	NOPROB	LIGHT
NPDES43	6/4/2013	NOPROB	NONE
NPDES43	10/2/2013	NOPROB	LIGHT
NPDES43	12/11/2013	NOPROB	NONE
NPDES44	3/4/2013	DEBRIS	LIGHT
NPDES44	6/11/2013	NOPROB	LIGHT
NPDES44	10/2/2013	DEBRIS	LIGHT
NPDES44	11/14/2013	DEBRIS	LIGHT
NPDES44	12/25/2013	NOPROB	NONE
NPDES45	3/4/2013	NOPROB	LIGHT
NPDES45	6/11/2013	DEBRIS	HEAVY
NPDES45	10/2/2013	NOPROB	LIGHT
NPDES45	12/2/2013	NOPROB	NONE
NPDES46	6/11/2013	DEBRIS	HEAVY
NPDES47	3/4/2013	DEBRIS	HEAVY
NPDES47	6/11/2013	NOPROB	LIGHT
NPDES47	10/2/2013	DEBRIS	LIGHT
NPDES47	12/25/2013	NOPROB	NONE
NPDES49	3/4/2013	NOPROB	NONE
NPDES49	6/12/2013	NOPROB	LIGHT
NPDES49	9/24/2013	NOPROB	NONE
NPDES49	12/26/2013	NOPROB	NONE
NPDES56	3/7/2013	GRS/DBR	LIGHT
NPDES56	6/25/2013	NOPROB	NONE
NPDES57	3/14/2013	NOPROB	NONE
NPDES57	6/25/2013	NOPROB	NONE
NPDES57	9/20/2013	GRS/DBR	LIGHT
NPDES57	12/4/2013	NOPROB	NONE
NPDES59	6/25/2013	NOPROB	NONE
NPDES59	9/20/2013	NOPROB	NONE

Location	Inspection Date	Inspection Findings	Inspection Severity
NPDES59	12/5/2013	NOPROB	NONE
NPDES60	3/13/2013	NOPROB	NONE
NPDES60	6/26/2013	NOPROB	NONE
NPDES60	12/5/2013	NOPROB	NONE
NPDES61	3/13/2013	NOPROB	NONE
NPDES61	6/26/2013	NOPROB	NONE
NPDES61	9/18/2013	NOPROB	NONE
NPDES61	11/4/2013	NOPROB	NONE
NPDES61	12/3/2013	NOPROB	NONE
NPDES62	3/13/2013	NOPROB	NONE
NPDES62	6/26/2013	NOPROB	NONE
NPDES62	9/11/2013	NOPROB	NONE
NPDES62	12/3/2013	NOPROB	NONE
NPDES63	3/13/2013	NOPROB	NONE
NPDES63	6/26/2013	NOPROB	NONE
NPDES64	3/13/2013	NOPROB	NONE
NPDES64	6/26/2013	NOPROB	NONE
NPDES64	9/20/2013	NOPROB	NONE
NPDES64	12/4/2013	NOPROB	NONE
NPDES68	3/13/2013	SAND	LIGHT
NPDES68	6/24/2013	NOPROB	NONE
NPDES62	9/23/2013	NOPROB	NONE
NPDES68	11/4/2013	NOPROB	NONE
NPDES68	12/3/2013	NOPROB	NONE
NPDES70	3/15/2013	NOPROB	LIGHT
NPDES70	6/13/2013	NOPROB	LIGHT
NPDES70	10/28/2013	NOPROB	NONE
NPDES95	6/6/2013	NOPROB	LIGHT
NPDES99	3/15/2013	NOPROB	LIGHT
NPDES99	6/12/2013	NOPROB	LIGHT
NPDES99	10/7/2013	NOPROB	NONE
NPDES99	11/14/2013	NOPROB	NONE
NPDES99	12/9/2013	NOPROB	NONE
NPDES102	6/13/2013	DEBRIS	HEAVY
NPDES107	6/13/2013	NOPROB	LIGHT
NPDES111	3/1/2013	NOPROB	NONE
NPDES111	6/19/2013	NOPROB	LIGHT
NPDES111	9/12/2013	NOPROB	NONE
NPDES111	12/25/2013	NOPROB	NONE
NPDES120	3/13/2013	SAND	LIGHT

Location	Inspection Date	Inspection Findings	Inspection Severity
NPDES120	6/5/2013	NOPROB	NONE
NPDES120	9/3/2013	NOPROB	NONE
NPDES120	9/3/2013	NOPROB	NONE
NPDES120	12/4/2013	NOPROB	NONE
NPDES121	3/13/2013	NOPROB	NONE
NPDES121	6/4/2013	NOPROB	NONE
NPDES121	9/3/2013	NOPROB	NONE
NPDES121	12/3/2013	NOPROB	NONE
NPDES124	3/13/2013	NOPROB	NONE
NPDES124	6/24/2013	NOPROB	NONE
NPDES124	9/3/2013	NOPROB	LIGHT
NPDES124	12/3/2013	NOPROB	NONE
NPDES127	3/14/2013	NOPROB	NONE
NPDES127	6/24/2013	NOPROB	NONE
NPDES127	9/26/2013	NOPROB	NONE
NPDES127	12/3/2013	NOPROB	NONE
NPDES129	3/14/2013	NOPROB	NONE
NPDES129	6/24/2013	NOPROB	NONE
NPDES129	10/3/2013	NOPROB	NONE
NPDES129	12/5/2013	NOPROB	NONE
NPDES130	11/15/2013	NOPROB	NONE
NPDES130	12/5/2013	NOPROB	NONE
NPDES131	3/14/2013	NOPROB	NONE
NPDES131	6/18/2013	NOPROB	NONE
NPDES131	9/26/2013	NOPROB	NONE
NPDES131	12/5/2013	NOPROB	NONE
NPDES132	3/14/2013	NOPROB	NONE
NPDES132	6/18/2013	NOPROB	NONE
NPDES132	9/26/2013	NOPROB	NONE
NPDES132	12/5/2013	NOPROB	NONE
NPDES134	3/14/2013	NOPROB	NONE
NPDES134	6/18/2013	DEBRIS	LIGHT
NPDES134	9/25/2013	NOPROB	NONE
NPDES134	12/5/2013	NOPROB	NONE
NPDES135	3/14/2013	NOPROB	NONE
NPDES135	6/18/2013	NOPROB	NONE
NPDES135	9/25/2013	NOPROB	NONE
NPDES135	12/11/2013	NOPROB	NONE
NPDES136	3/14/2013	NOPROB	NONE
NPDES136	6/18/2013	NOPROB	NONE

Location	Inspection Date	Inspection Findings	Inspection Severity
NPDES136	9/26/2013	NOPROB	NONE
NPDES136	12/11/2013	NOPROB	NONE
NPDES138	3/14/2013	NOPROB	NONE
NPDES138	6/18/2013	NOPROB	NONE
NPDES138	8/26/2013	NOPROB	NONE
NPDES138	10/3/2013	NOPROB	NONE
NPDES138	11/5/2013	DEBRIS	LIGHT
NPDES138	12/11/2013	NOPROB	NONE
NPDES139	3/14/2013	NOPROB	NONE
NPDES139	6/18/2013	DEBRIS	LIGHT
NPDES139	9/5/2013	DEBRIS	HEAVY
NPDES139	9/5/2013	NOPROB	NONE
NPDES140	3/14/2013	NOPROB	NONE
NPDES140	6/18/2013	NOPROB	NONE
NPDES140	10/1/2013	NOPROB	NONE
NPDES140	10/1/2013	DEBRIS	LIGHT
NPDES140	11/5/2013	NOPROB	NONE
NPDES140	12/9/2013	NOPROB	NONE
NPDES141	3/19/2013	GREASE	LIGHT
NPDES141	6/12/2013	NOPROB	NONE
NPDES141	9/25/2013	NOPROB	NONE
NPDES141	12/9/2013	NOPROB	NONE
NPDES144	3/18/2013	GREASE	LIGHT
NPDES144	6/12/2013	NOPROB	NONE
NPDES144	9/25/2013	NOPROB	NONE
NPDES144	12/9/2013	NOPROB	NONE
NPDES145	3/18/2013	NOPROB	NONE
NPDES145	6/12/2013	NOPROB	NONE
NPDES145	9/25/2013	NOPROB	NONE
NPDES145	12/9/2013	NOPROB	NONE
NPDES146	3/13/2013	NOPROB	NONE
NPDES146	6/12/2013	NOPROB	NONE
NPDES146	9/3/2013	NOPROB	NONE
NPDES146	12/9/2013	NOPROB	NONE
NPDES147	3/13/2013	NOPROB	NONE
NPDES147	6/12/2013	NOPROB	NONE
NPDES147	9/3/2013	NOPROB	NONE
NPDES147	9/3/2013	NOPROB	NONE
NPDES147	12/10/2013	NOPROB	NONE
NPDES148	3/7/2013	NOPROB	NONE

Location	Inspection Date	Inspection Findings	Inspection Severity
NPDES148	6/12/2013	NOPROB	NONE
NPDES148	9/23/2013	NOPROB	NONE
NPDES148	12/4/2013	NOPROB	NONE
NPDES150	4/1/2013	NOPROB	NONE
NPDES150	6/25/2013	NOPROB	NONE
NPDES150	9/20/2013	NOPROB	NONE
NPD150	12/4/2013	NOPROB	NONE
NPDES151	3/14/2013	NOPROB	NONE
NPDES151	6/25/2013	NOPROB	NONE
NPDES152	3/14/2013	NOPROB	NONE
NPDES152	6/25/2013	NOPROB	NONE
NPDES152	9/20/2013	NOPROB	NONE
NPDES152	12/4/2013	NOPROB	NONE
NPDES161	3/4/2013	NOPROB	NONE
NPDES161	6/10/2013	NOPROB	NONE
NPDES161	9/19/2013	NOPROB	NONE
NPDES161	12/12/2013	NOPROB	NONE
NPDES168	3/1/2013	NOPROB	MEDIUM
NPDES168	6/13/2013	NOPROB	LIGHT
NPDES168	10/7/2013	DEBRIS	MEDIUM
NPDES168	12/17/2013	NOPROB	NONE
NPDES169	3/1/2013	DEBRIS	MEDIUM
NPDES169	3/21/2013	NOPROB	NONE
NPDES169	6/12/2013	DEBRIS	LIGHT
NPDES169	9/24/2013	DEBRIS	LIGHT
NPDES169	10/28/2013	NOPROB	NONE
NPDES169	12/10/2013	NOPROB	NONE
NPDES170	3/1/2013	NOPROB	LIGHT
NPDES170	6/6/2013	NOPROB	LIGHT
NPDES170	9/23/2013	NOPROB	NONE
NPDES170	10/25/2013	NOPROB	NONE
NPDES170	11/18/2013	NOPROB	NONE
NPDES170	12/31/2013	NOPROB	NONE
NPDES171	3/4/2013	NOPROB	LIGHT
NPDES171	6/11/2013	DEBRIS	HEAVY
NPDES171	9/16/2013	NOPROB	NONE
NPDES171	10/8/2013	NOPROB	NONE
NPDES171	12/26/2013	NOPROB	NONE
NPDES174	3/13/2013	NOPROB	NONE
NPDES174	6/12/2013	NOPROB	LIGHT

Location	Inspection Date	Inspection Findings	Inspection Severity
NPDES174	9/23/2013	NOPROB	NONE
NPDES174	12/3/2013	NOPROB	NONE
NPDES175	3/14/2013	NOPROB	NONE
NPDES175	6/24/2013	NOPROB	NONE
NPDES175	9/19/2013	NOPROB	NONE

Table A-5. 2013 CSO Structure Cleaning Summary				
Location	**Cleaning Date**	**Cleaning Tasks**	**Cleaning Severity**	**Cleaning Findings**
NPDES13	1/7/2013	CLEAN FLOW CONTROL STRUCTURE - NPDES 13A - CSO 22 - 017-253	DEBRIS/OBJECT	MEDIUM
NPDES13	1/14/2013	CLEAN FLOW CONTROL STRUCTURE - NPDES 13 - CSO 23 - 017-225	DEBRIS/OBJECT	LIGHT
NPDES14	1/9/2013	CLEAN FLOW CONTROL STRUCTURE - NPDES 14 - CSO 21 - 025-299	DEBRIS/OBJECT	LIGHT
NPDES18	1/15/2013	CLEAN OVERFLOW STRUCTURE - NPDES 18 - 025-380	DEBRIS/OBJECT	LIGHT
NPDES20	1/11/2013	CLEAN FLOW CONTROL STRUCTURE - NPDES 20 - CSO 26 - 031-381	DEBRIS/OBJECT	LIGHT
NPDES24	1/7/2013	CLEAN FLOW CONTROL STRUCTURE - DETENTION SITE 110 - NPDES 24/25 - 038-149	DEBRIS/OBJECT	LIGHT
NPDES29	1/7/2013	CLEAN FLOW CONTROL STRUCTURE - NPDES 29 - CSO 18 - 042-302	DEBRIS/OBJECT	LIGHT
NPDES29	3/15/2013	CLEAN FLOW CONTROL STRUCTURE - NPDES 29 - CSO 18 - 042-303	DEBRIS/OBJECT	LIGHT
NPDES29	5/9/2013	CLEAN FLOW CONTROL STRUCTURE - NPDES 29 - CSO 18 - 042-302	BLOCKAGE BY DEBRIS	HEAVY
NPDES29	7/18/2013	CLEAN FLOW CONTROL STRUCTURE - NPDES 29 - CSO 18 - 042-302	BLOCKAGE BY DEBRIS	HEAVY
NPDES32	4/26/2013	CSO CLEANING CSO 16 - NPDES32	BLOCKAGE BY DEBRIS	HEAVY
NPDES32	8/1/2013	JET CLEAN NPDES 32 DETENTION MAIN LINE - 046-158 046-157	RESTRICTION	MEDIUM
NPDES36	1/3/2013	CLEAN FLOW CONTROL STRUCTURE - NPDES 36 - CSO 13 - 046E-142	BLOCKAGE BY DEBRIS	HEAVY
NPDES38	1/3/2013	CLEAN FLOW DIVERSION STRUCTURE - NPDES 38 - CSO 12 - 059-574	DEBRIS/OBJECT	LIGHT
NPDES38	10/8/2013	JET CLEAN DETENTION MAIN LINE - NPDES 38 - CSO 12 - 059-354 059-353	DEBRIS/OBJECT	LIGHT
NPDES38	10/9/2013	CLEAN DETENTION MAIN LINE - NPDES 38 - CSO 12 - 059-352 059-351	DEBRIS/OBJECT	LIGHT
NPDES42	1/7/2013	CLEAN FLOW CONTROL STRUCTURE - NPDES 42 - CSO 10 - 060W-052	DEBRIS/OBJECT	LIGHT
NPDES42	2/6/2013	CLEAN HYDROBRAKE - FLOW CONTROL STRUCTURE - NPDES 42 - CSO 10 - 060W-052	BLOCKAGE BY DEBRIS	HEAVY
NPDES42	3/21/2013	CLEAN HYDROBRAKE - FLOW CONTROL STRUCTURE - NPDES 42 - CSO 10 - 060W-052	BLOCKAGE BY DEBRIS	HEAVY
NPDES42	4/2/2013	CLEAN FLOW CONTROL STRUCTURE - NPDES 42 - CSO 10 - 060W-052	BLOCKAGE BY DEBRIS	HEAVY
NPDES42	4/23/2013	CLEAN HYDROBRAKE - FLOW CONTROL STRUCTURE - NPDES 42 - CSO 10 - 060W-052	BLOCKAGE BY DEBRIS	HEAVY
NPDES43	5/7/2013	CLEAN FLOW CONTROL STRUCTURE - NPDES 43 - CSO 9 - 060W-047	BLOCKAGE BY DEBRIS	HEAVY
NPDES43	8/6/2013	CLEAN FLOW CONTROL STRUCTURE - NPDES 43 - CSO 9 - 060W-047	BLOCKAGE BY DEBRIS	HEAVY
NPDES43	12/30/2013	CLEAN FLOW CONTROL STRUCTURE - NPDES 43 - CSO 9 - 060W-047	DEBRIS/OBJECT	LIGHT

Location	Cleaning Date	Cleaning Tasks	Cleaning Severity	Cleaning Findings
NPDES44	4/2/2013	CLEAN FLOW CONTROL STRUCTURE - NPDES 44 - CSO 8 - 067-272	BLOCKAGE BY DEBRIS	HEAVY
NPDES44	5/15/2013	CLEAN FLOW CONTROL STRUCTURE - NPDES 44 - CSO 8 - 067-272	BLOCKAGE BY DEBRIS	HEAVY
NPDES44	7/18/2013	CLEAN FLOW CONTROL STRUCTURE - NPDES 44 - CSO 8 - 067-272	BLOCKAGE BY DEBRIS	HEAVY
NPDES45	1/4/2013	CLEAN FLOW CONTROL STRUCTURE - NPDES 45 - CSO 29 - 074-159	BLOCKAGE BY DEBRIS	HEAVY
NPDES45	5/7/2013	CLEAN FLOW CONTROL STRUCTURE - NPDES 45 - CSO 29 - 074-159	BLOCKAGE BY DEBRIS	HEAVY
NPDES45	6/20/2013	CLEAN FLOW CONTROL STRUCTURE - NPDES 45 - CSO 29 - 074-159	BLOCKAGE BY DEBRIS	HEAVY
NPDES45	12/30/2013	CLEAN FLOW CONTROL STRUCTURE - NPDES 45 - CSO 29 - 074-159	DEBRIS/OBJECT	LIGHT
NPDES47	5/29/2013	CLEAN COMBINED MAINTENANCE HOLE - 081-049	BLOCKAGE BY DEBRIS	HEAVY
NPDES47	6/21/2013	JET CLEAN DETENTION MAIN LINE - NPDES 47 - 081-233 081-232	RESTRICTION	LIGHT
NPDES48	6/13/2013	JET CLEAN DETENTION MAIN LINE - NPDES 48 - 306-429 306-428	DEBRIS/OBJECT	LIGHT
NPDES48	6/13/2013	JET CLEAN DETENTION MAIN LINE - NPDES 48 - 306-430 306-429	RESTRICTION	LIGHT
NPDES49	1/2/2013	CLEAN FLOW CONTROL STRUCTURE - NPDES 49 - CSO 4 - 306-428	BLOCKAGE BY DEBRIS	HEAVY
NPDES49	2/7/2013	CLEAN FLOW CONTROL STRUCTURE - NPDES 49 - CSO 4 - 306-428	BLOCKAGE BY DEBRIS	HEAVY
NPDES49	3/11/2013	CLEAN HYDROBRAKE - FLOW CONTROL STRUCTURE - NPDES 49 - CSO 4 - 306-428	BLOCKAGE BY DEBRIS	HEAVY
NPDES49	4/2/2013	CLEAN FLOW CONTROL STRUCTURE - NPDES 49 - CSO 4 - 306-428	BLOCKAGE BY DEBRIS	HEAVY
NPDES49	5/7/2013	CLEAN FLOW CONTROL STRUCTURE - NPDES 49 - CSO 4 - 306-428	BLOCKAGE BY DEBRIS	HEAVY
NPDES59	3/18/2013	CSO CLEANING - NPDES59 3 MONTHS	BLOCKAGE BY DEBRIS	HEAVY
NPDES60	1/8/2013	CLEAN FLOW CONTROL STRUCTURE - NPDES 60 - 010-159	DEBRIS/OBJECT	LIGHT
NPDES72	10/25/2013	JET CLEAN OVERFOW TO OUTFALL - NPDES 72 - 043-046 043-150	RESTRICTION	LIGHT
NPDES134	1/8/2013	JET CLEANOVERFLOW TO OUTFALL - NPDES 134 - 023-033 023-423	RESTRICTION	LIGHT
NPDES139	7/15/2013	CLEAN MAINLINE M/H 031-076 M/H 031-313 - NPDES139:CSO25 3 MONTHS	RESTRICTION	MEDIUM
NPDES140	10/9/2013	CLEAN FLOW CONTROL STRUCTURE - NPDES 140 - CSO 31 - 031-001	DEBRIS/OBJECT	LIGHT
NPDES140	10/9/2013	CLEAN HYDROBRAKE FLOW CONTROL STRUCTURE - NPDES 140 - CSO 31 - 031-001	BLOCKAGE BY DEBRIS	HEAVY
NPDES144	1/10/2013	CLEAN FLOW CONTROL STRUCTURE - NPDES 144 - 023-439	DEBRIS/OBJECT	LIGHT
NPDES148	3/18/2013	CSO CLEANING - NPDES148 3 MONTHS	BLOCKAGE BY DEBRIS	HEAVY
NPDES150	3/18/2013	CSO CLEANING - NPDES150 3 MONTHS	BLOCKAGE BY DEBRIS	HEAVY

Location	Cleaning Date	Cleaning Tasks	Cleaning Severity	Cleaning Findings
NPDES150	6/18/2013	CSO CLEANING - NPDES150 3 MONTHS	DEBRIS/OBJECT	LIGHT
NPDES150	9/18/2013	CSO CLEANING - NPDES150 3 MONTHS	DEBRIS/OBJECT	LIGHT
NPDES168	1/17/2013	CLEAN HYDROBRAKE - FLOW CONTROL CHAMBER - NPDES 168 - CSO 2 - 069-428	DEBRIS/OBJECT	LIGHT
NPDES168	3/29/2013	CLEAN HYDROBRAKE - FLOW CONTROL CHAMBER - NPDES 168 - CSO 2 - 069-428	BLOCKAGE BY DEBRIS	HEAVY
NPDES168	5/7/2013	CLEAN HYDROBRAKE - FLOW CONTROL CHAMBER - NPDES 168 - CSO 2 - 069-428	BLOCKAGE BY DEBRIS	HEAVY
NPDES168	6/3/2013	CLEAN HYDROBRAKE - FLOW CONTROL CHAMBER - NPDES 168 - CSO 2 - 069-428	DEBRIS/OBJECT	MEDIUM
NPDES168	7/3/2013	CLEAN HYDROBRAKE - FLOW CONTROL CHAMBER - NPDES 168 - CSO 2 - 069-428	BLOCKAGE BY DEBRIS	HEAVY
NPDES168	7/10/2013	CLEAN MAIN DETENTION TANK - NPDES 168 - CSO 2 - 069-408	DEBRIS/OBJECT	MEDIUM
NPDES168	8/30/2013	CLEAN HYDROBRAKE - FLOW CONTROL CHAMBER - NPDES 168 - CSO 2 - 069-428	DEBRIS/OBJECT	LIGHT
NPDES168	10/31/2013	CLEAN HYDROBRAKE - FLOW CONTROL CHAMBER - NPDES 168 - CSO 2 - 069-428	DEBRIS/OBJECT	MEDIUM
NPDES168	12/30/2013	CLEAN HYDROBRAKE - FLOW CONTROL CHAMBER - NPDES 168 - CSO 2 - 069-428	DEBRIS/OBJECT	MEDIUM
NPDES169	7/2/2013	CLEAN FLOW STRUCTURE - 076-367	BLOCKAGE BY DEBRIS	HEAVY
NPDES169	7/17/2013	CLEAN MAIN TANK - NPDES169 CSO 3	DEBRIS/OBJECT	MEDIUM
NPDES170	1/8/2013	CLEAN FLOW CONTROL STRUCTURE - NPDES 170 - CSO 1 - 069-146	BLOCKAGE BY DEBRIS	HEAVY
NPDES170	5/9/2013	CLEAN FLOW CONTROL STRUCTURE - NPDES 170 - CSO 1 - 069-146	BLOCKAGE BY DEBRIS	HEAVY