Seattle Public Utilities

Protecting Seattle's Waterways

2012 Annual Report Combined Sewer Overflow (CSO) Reduction Program

March 30, 2013

Table of Contents

List of Appendices

Appendix A: Additional CMOM Information

List of Figures

List of Tables

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
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 provide information to the public on Seattle Public Utilities' (SPU's) combined sewer overflow (CSO) reduction 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 on our program website: 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 and industrial wastewaters are 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, industrial wastewater, 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 system overflows at combined sewer overflow (CSO) outfall structures designed for this purpose. There are currently 87 outfalls in the City of Seattle where combined sewer overflows can occur, as shown in Figure 1-1.

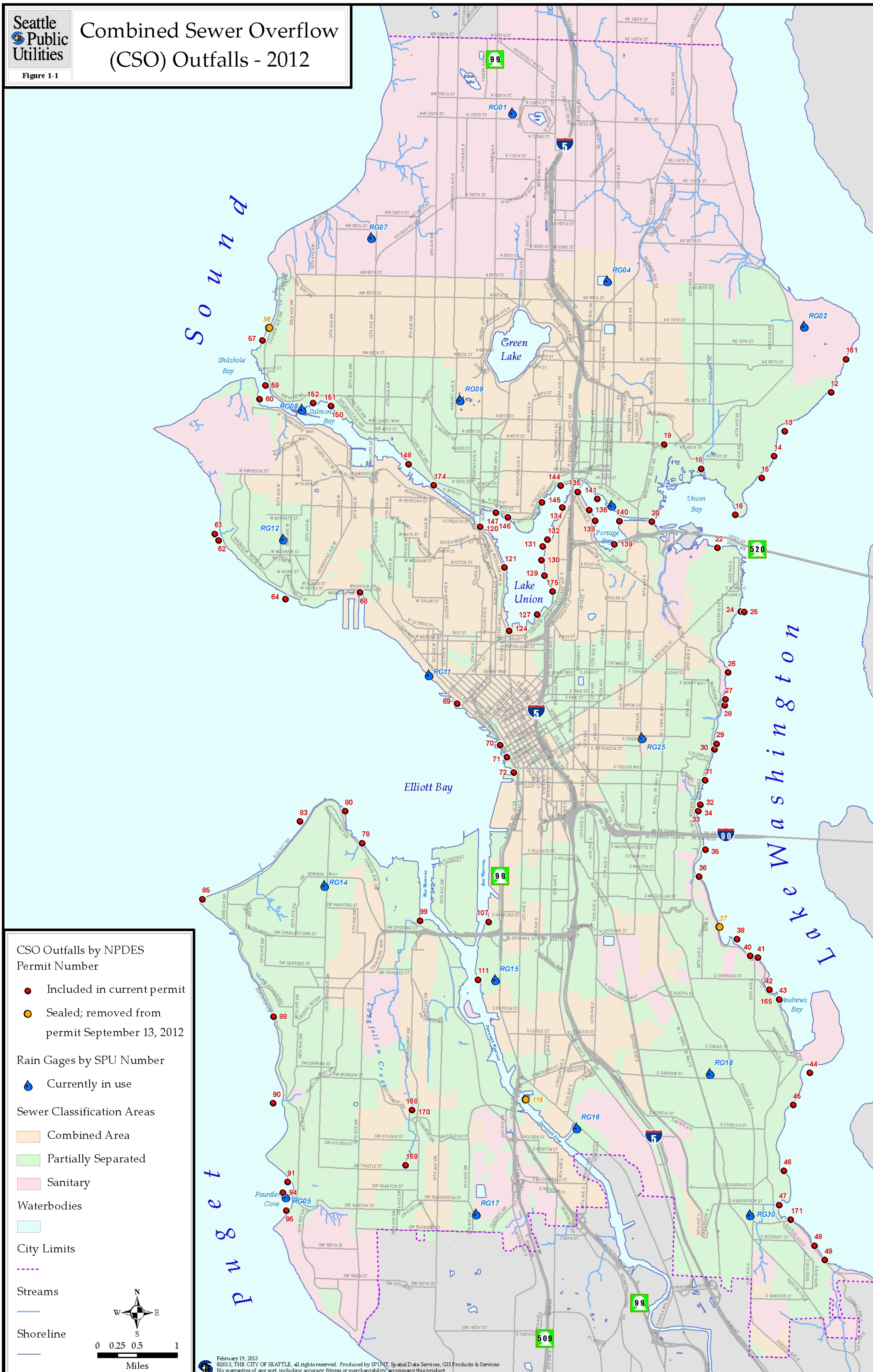

Figure 1-1. 2012 Combined Sewer Outfalls

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 was re-issued on October 27, 2010, went into effect on December 1, 2010, and will expire on November 30, 2015. Ecology modified the permit on September 13, 2012, to incorporate changes requested by SPU on June 14, 2012, including:

- Elimination of three outfalls that were sealed and no longer in use:
  - 37 (on Lake Washington in the Henderson Area),
  - 56 (on Puget Sound north of Shilshole Bay), and
  - 116 (on the Duwamish River, upstream of the 1st Avenue S Bridge).
- Revision of the Green Stormwater Infrastructure (GSI) implementation requirements. SPU completed additional analysis to determine where roadside raingardens and green alleys are feasible and cost-effective at reducing CSOs. SPU's analysis showed that it was not feasible to install roadside raingardens in Ballard Basin 60, and it is feasible to install roadside raingardens in Delridge (Basins 168 and 169). Consequently, SPU requested that Ecology replace the permit requirement to "complete GSI construction in Basin 60 by October 31, 2015" with one to "start construction of GSI Delridge (Basin 168 and/or 169) by October 31, 2015". Also, our experience on the Ballard Roadside Raingardens Pilot Project in 2010-2011 taught SPU the importance of collecting sufficient subsurface data and leaving adequate time for a thorough public involvement process. As a result, SPU requested that Ecology replace the permit requirement to "complete GSI construction in Ballard (150/151, and 152) by October 31, 2015" with one to "start construction in Ballard (150/151 and 152) by October 31, 2015". Finally, SPU analyzed the cost effectiveness of green alleys and found that green alleys in Ballard (150/151, 152, and 60) are currently not cost-effective. Consequently, SPU requested that Ecology replace the permit requirement to "complete construction of green alleys in Ballard" with one to "offer residential customers rebates for installing residential raingardens in Ballard (150/151 and 152), North Union Bay (18), Montlake (20), and Delridge (168 and 169).
- Modification of the schedule for installation of an emergency generator at Pump Station 39. The NPDES permit required installation of emergency generators at several of SPU's larger wastewater pump stations, including an emergency generator at pump station 39 by June 30, 2012. During the design process, SPU learned that this generator would require a land-use variance that would need to be approved by the City Council. In addition, siting of this generator required additional public involvement steps to improve public acceptance of the project. SPU requested that the deadline for installing the generator at pump station 39 be extended to December 31, 2013 in exchange for accelerating the installation of generators at pump stations 62, 63, and 77.

- Modification of the outfalls to be rehabilitated. The NPDES permit required rehabilitation of Outfalls 72 and 138 by November 1, 2015. SPU proposed swapping Outfall 72 with Outfall 28, because SPU plans to seal Outfall 72 as part of the Alaskan Way Viaduct and Seawall Replacement Program, and Outfall 28 discharges into Lake Washington and is in disrepair. SPU also proposed swapping Outfall 138 with Outfall 31, because Outfall 138 was replaced in the early 1990s and is in good condition, whereas Outfall 31 discharges to Lake Washington and is in disrepair.

1.3 Collection System Enforcement Orders

SPU also must meet the requirements of two current enforcement orders and one pending enforcement action. The current enforcement orders include:

- 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, and
- An Administrative Order with Ecology (Agreed Order, October 26, 2010), which requires SPU to reduce its CSOs to a long-term average of no more than one overflow per site per year by December 31, 2025.

The pending enforcement action is a Consent Decree with the United States Department of Justice (DOJ), EPA, the State of Washington Attorney General (AG), and Ecology. 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. All parties to the negotiations expect that both Consent Decrees will be approved by the United States District Court later this year.

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 telephone report due immediately following discovery of an SSO or DWO and a follow-up written report due within five days.
- Engineering reports for each specific CSO reduction construction project, due by individual deadlines specified in the permit.

Each of these reports was submitted to Ecology as required.

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. 2012 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): a. SSO performance; b. Number of miles of sewer that were cleaned, inspected, and repaired/replaced/rehabilitated; c. Number of pump station inspections and the capacity of each pump station; d. Number of manholes and force mains inspected and repaired/replaced/rehabilitated; e. Number and type of CSO regulators inspected; f. Summaries of inspections and cleanings of each CSO control structure; and g. Summaries of Fats Oil and Grease (FOG) inspections and enforcement actions taken the preceding year.	a. Tables 3-2, 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. 2012 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: h. The CSO control measures for the Early Action CSO Control Program (Henderson Basins 44, 45, 46, and 47/171); i. The Long-Term Control Plan; j. The Post-Construction Monitoring Program Plan; k. The CMOM Performance Program Plan; l. The FOG Control Program Plan; m. The Revised Floatable Solids Observation Program Plan; and n. The Joint Operations and System Optimization Plan between the City and King County	a. Section 4.5 b. Section 2.1 c. Section 5.4 d. Sections 2.4, 3.2 e. Sections 2.5, 3.3 f. Sections 2.6, 3.4 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	Section 2.1.1
VII.43.a.vi	Describe the status of any wastewater collection system permit applications	Section 1.2
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, 3-2, 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 3.4

SECTION 2

Planning Activities

Several capital and O&M planning efforts were undertaken in 2012 to help ensure SPU meets Clean Water Act and NPDES permit 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 Program Performance Plan
- FOG Control Program Plan
- Floatable Solids Observation Program Plan

The following sections describe work completed in 2012 and planned work for 2013.

2.1 Long-Term Control Plan

In 2012, SPU continued to develop the 2015 CSO Reduction Plan (Long-Term Control Plan), which will define the remaining projects that will need to be constructed to bring the combined sewer system into regulatory compliance. 2012 work focused on modeling revisions and alternatives development. Work is on schedule to meet the Consent Decree Long-Term Control Plan deadlines and the NPDES permit deadline for a 2015 CSO Reduction Plan.

2.1.1 Hydrologic/Hydraulic Models

In 2011, SPU developed and calibrated priority basin models using EPA Stormwater Management Model (SWMM version 5.018 released in October 2005). In April 2011, EPA released upgraded version 5.022 of the software, which included significant changes to better simulate groundwater infiltration and evaporation processes. SPU decided to recalibrate the models work using SWMM version 5.022, and the recalibration effort commenced in October 2011. In November 2012, SPU completed the recalibration of the twelve priority CSO areas: Ballard, Delridge, Duwamish, Fremont/Wallingford, Interbay, Leschi, Madison Park, Montlake, North Union Bay, Portage Bay, Magnolia and the Central Waterfront (Basin 69).

Flow monitoring data collected from 2008-2010 was used to re-calibrate and validate the SWMM version 5.022 models. Additional flow monitoring data was collected in the Leschi and North Union Bay basins during the 2011-2012 wet weather season to provide assurance that these challenging basins were accurately modeled. Fifteen sites were monitored from October 2011 through March 2012. A supplemental Flow Monitoring Report will be issued in 2013.

Hydraulic Model Reports were completed for each of the twelve priority CSO areas listed above. Individual reports were provided for each area along with an Executive Summary. The reports were submitted to EPA and Ecology in December 2012.

SPU continued Phase 2 development (calibration/validation) of its SWMM version system-wide model. Calibration has been completed for all but one area. The model is expected to be completed by first quarter 2013 and will be used to conduct boundary condition modeling.

2.1.2 Alternatives Development and Evaluation

SPU worked to develop viable alternatives based on the control volumes determined using the new SWMM version 5.022 models. Alternatives will be modeled in the first and second quarters of 2013 to confirm that they meet the performance criteria for controlling CSOs.

Several changes have been made to the alternatives since last year mainly as a result of the analysis using the new SWMM version 5.022 models. A summary of these changes follows:

- North Union Bay (Basin 18) was analyzed (SWMM V5.022 model) for a retrofit project that would reduce CSOs to meet the performance standard of no more than one overflow per year on a moving 20-year average. The retrofit will improve operation of the existing storage facility to its original design performance standard and eliminate the need to construct 1.6 million gallons of storage capacity. SPU currently plans to have the retrofit project operating by 2016.
- Increased inspection and cleaning of the HydroBrake at the Interbay storage facility (Basin 68) has reduced the overflow frequency at Outfall 68 in recent years. A combination of accurate flow monitoring data (2008-2012) and SWMM V5.022 long term frequency simulations was used to indicate that Interbay (Basin 68) is now controlled, as indicated in Table B-6. This finding eliminates the need to construct 30,000 gallons of storage.
- In the 2010 CSO Reduction Plan Amendment, a major retrofit project was proposed for the Delridge Area (Basins 168 and 169) to bring these two basins into control. Modeling analysis (SWMM V5.022) has demonstrated that there is a possibility these retrofit projects will reduce CSOs to meet the control standard of no more than one overflow per year on a moving 20-year average and eliminate the need to construct additional storage in the Delridge Area. SPU will conduct post-project monitoring and modeling of the Delridge Area after the retrofits are constructed and operational, to confirm whether the basins are controlled or whether a future storage facility will be needed.
- The Central Waterfront-Alaskan Way Manifold Project (Basins 70, 71, and 72) will be constructed during the Phase 1 Central Waterfront Project and will bring this part of the Central Waterfront Area into control. Basin 69 will be addressed as part of the LTCP.

- Two tunnel options were identified for further analysis. A new 8 million gallon (MG) Neighborhood CSO Tunnel Storage option was developed for the combined storage of the Ballard and Fremont/Wallingford Areas. A 14 MG "West Ship Canal Tunnel Option" was also developed which would include the Ballard and Fremont/Wallingford Areas as well as King County 3rd Ave W and King County 11th Ave W.

SPU is continuing discussions with King County on the development of joint alternatives. SPU currently has four LTCP options which are as follows:

- <u>Neighborhood Storage Option</u>. Under this option, SPU would build a combination of independent sewer system improvements, natural drainage solutions, and underground storage for all SPU uncontrolled CSO Basins. This alternative involves building the largest number of underground storage facilities throughout the city.
- <u>Shared Storage Option</u>. This option includes several joint SPU/King County projects:
  - Storage tanks to control SPU's Montlake, Madison Park, and Leschi Areas and King County's Montlake Regulator and University Area,
  - Storage tanks to control SPU's Fremont/Wallingford Area and King County's 3rd Ave W discharge,
  - Storage tanks to control SPU's North Union Bay Area and King County University Regulator, and
  - Flow transfer from SPU's East Waterway Area (Basin 107) to a new King County treatment facility serving the Hanford, Lander, Kingdome, and King (HLKK) Area.

  In addition, SPU would build a combination of sewer system improvements and natural drainage solutions in the Portage Bay, Duwamish, Magnolia, Central Waterfront (Basin 69) and Delridge Areas.
- <u>West Ship Canal Tunnel Option</u>. This option includes the following projects:
  - A joint SPU/King County storage tunnel underneath the West Ship Canal to control SPU's Ballard and Fremont/Wallingford Areas and King County's 3rd Ave W and 11th Ave W discharges,
  - Flow diversion from the East Waterway Area (Basin 107) to a new King County HLKK CSO Treatment Plant, and
  - Flow diversion from the Magnolia Area (Basin 60) to the King County North Interceptor.

  In addition, SPU would build sewer system improvements and natural drainage solutions in all Areas, and underground storage in the Leschi, Madison Park, Montlake, Portage Bay, Duwamish, Magnolia, Portage Bay, Central Waterfront (Basin 69) and Delridge (Basin 99) Areas.

- Ship Canal Tunnel Option. This option includes the following projects:
  - A joint SPU/King County storage tunnel underneath the Ship Canal to control SPU's Madison Park, Montlake, Portage Bay, Ballard, and Fremont/Wallingford Areas and King County's University, Montlake, 3rd Ave W and 11th Ave W discharges.
  - Flow diversions from SPU's Leschi, Duwamish, East Waterway, Magnolia and Delridge (Basin 99) Areas to King County.

  In addition, Seattle Public Utilities would build a combination of sewer system improvements and natural drainage solutions in the Ballard, Magnolia, Interbay, Leschi, Delridge, and Duwamish Areas and underground storage in the Central Waterfront Area.

2.1.3 Environmental Impact Statement (EIS)

SPU began working on a Programmatic EIS for the LTCP in 2011, soliciting input on the scope and focus of the EIS through a formal scoping process. Because the Consent Decree provides SPU an opportunity to develop an Integrated Plan alternative (see Section 2.2), the EIS will be expanded to analyze both the LTCP and the Integrated Plan alternatives. The overall plan (with both alternatives) will be called "Protecting Seattle's Waterways" or "The Plan" for short, and the EIS will be called "The Plan EIS". A new scoping effort will begin in the second quarter of 2013. SPU remains on schedule to complete the Draft EIS and Final EIS by the deadlines in the Consent Decree.

2.1.4 Public and Regulatory Agency Participation Program

SPU prepared a Public and Regulatory Agency Participation Program (required by the Consent Decree) crosswalk in the fourth quarter of 2012 for presentation to EPA. The Program includes public meetings, a public hearing for the Draft EIS, semi-annual website updates, community guide updates, stakeholder briefings, quarterly meetings with EPA/Ecology, and semi-annual reports summarizing public involvement activities and public comments. SPU's next website update will occur during second quarter 2013 in preparation for the new EIS scoping process.

2.1.5 Long-Term Control Plan Preparation

Development of preliminary draft sections of the LTCP commenced in the fourth quarter of 2012. The first draft of the LTCP will be distributed for internal review in the fourth quarter of 2013. SPU remains on schedule to meet the remaining LTCP regulatory milestones.

2.2 Integrated Plan

In June 2012, SPU began a planning process designed to meet the requirements for Integrated Planning as described in the Consent Decree. 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 has established the following approach to help meet the Integrated Plan requirements in the Consent Decree.

- 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 projects that could be deferred and constructed after 2025.
- Estimate and document the pollutant load reductions as identified in the Consent Decree for each of the stormwater opportunities and CSO projects.
- Compare pollutant load reductions and benefits of stormwater opportunities and CSO projects to select the CSO projects to defer and the stormwater projects to propose.
- Prepare and document a cost benefit analysis.
- Develop an implementation schedule for the stormwater projects and the CSO projects proposed to be deferred.
- Develop a post construction monitoring program for the stormwater projects. (Note: post construction monitoring of CSO projects is addressed in the LTCP).
- Document and communicate the Integrated Plan for inclusion as an alternative in the Programmatic EIS (see Section 2.1.3).
- Provide appropriate opportunities for meaningful stakeholder input throughout the development of the Integrated Plan.
- Deliver draft Integrated Plan to EPA and Ecology in May 30, 2014.
- Deliver final Integrated Plan to EPA and Ecology in May 30, 2015.

2.2.2 Status of Plan Development

During 2012, SPU completed the following tasks towards completion of the Integrated Plan:

- Areas of the municipal separate storm sewer system (MS4) were identified where implementation of stormwater projects may have the greatest benefits for meeting the Consent Decree requirements around pollutant reductions to impaired water bodies. The evaluation work is documented in a Draft Technical Memorandum titled “Stormwater Priority Basins.”
- GIS and other data sources were used to identify a number of potential stormwater projects in areas identified during the basin evaluation work above. These projects include traditional stormwater treatment facilities, green stormwater infrastructure (also known as natural drainage systems), and stormwater programs such as street sweeping in residential areas.
- Preliminary work was conducted on developing evaluation criteria to rate and rank the stormwater projects and to compare stormwater projects to the CSO control projects we propose to defer past 2025.

- The community guide for the Plan EIS scoping process (see Section 2.1.3) was revised to introduce the Integrated Plan alternative and describe the potential types of stormwater projects and their associated benefits.
- A panel of experts was assembled to help ensure that the way that SPU compares potential stormwater projects with possible deferred CSO projects is credible. The Expert Panel will review and offer technical advice regarding SPU's methods and assumptions for comparing the water quality benefits of proposed stormwater projects and possible deferred CSO control projects.

No problems have been anticipated or encountered in developing the Integrated Plan.

2.2.3 Planned 2013 Work

During 2013 SPU will engage in the following work toward completion of the Integrated Plan:

- Continue to provide the public and stakeholders with opportunities for learning about and providing input on the Integrated Plan.
- Evaluate the CSO control measures and control volumes to determine which CSO projects are most suitable for deferring past 2025. Through early 2013, this evaluation has identified ten CSO locations that will be considered for deferral during Integrated Plan development.
- Develop and use a methodology for estimating the pollutant removal capacity of stormwater and CSO projects proposed in the Integrated Plan. Estimation of pollutant removal will use existing data from local and national sources.
- Gather available data on the parameters listed in the Consent Decree. These data will be used in the methodology described above to estimate and report the potential pollutant reductions associated with the proposed stormwater projects and CSOs proposed to be deferred.
- Continue work on the development and use of evaluation criteria for use in Multi Objective Decision Analysis (MODA). Evaluation criteria will reflect the requirements of the Consent Decree as well as environmental, economic and social criteria (a.k.a. the Triple Bottom Line). The MODA will assist the Integrated Plan team with rating and ranking the stormwater projects and can be used to value or weight different evaluation criteria to allow the team to evaluate the trade-offs between competing objectives. MODA is not a decision making tool; it is a decision aid that can provide insight to decision makers who are faced with making a decision where multiple and perhaps conflicting objectives are present.
- Engage the Expert Panel in reviewing :
  - SPU's proposed methods and existing data for calculating pollutant loads, estimating post-treatment pollutant concentrations, evaluating human and ecological exposure, and addressing any data gaps; and

  - The draft criteria for SPU's Multi Objective Decision Analysis (MODA) of potential stormwater and CSO projects; and
  - The relative water quality benefits of the stormwater/CSO alternatives as developed based on the methods and MODA.
- Prepare the first draft of the Integrated Plan that details 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.
- Engage in quarterly progress meetings with EPA and Ecology.

2.3 Joint SPU/King County Operations and System Optimization Plan

In 2012 SPU and King County Wastewater Treatment Division (WTD) developed and approved a Project Management Plan (PMP) for development of a Joint Operations and System Optimization Plan (Joint Plan). The PMP included a detailed scope of work, schedule, and a budget for development and approval of the final Joint Plan. The final Joint Plan will be submitted to EPA and Ecology no later than March 1, 2016, in accordance with both SPU's and WTD's Consent Decrees.

The Joint Plan is a foundational effort to:

- Define the connection points between SPU's and WTD's systems where joint operations and/or system optimization may be possible over time,
- Understand and document both systems' existing operations, and
- Develop methods to share information and optimize both systems' operations.

Development of a Joint Plan is the first phase of a paradigm shift from operating two separate but connected systems to operating a single system, including facilities that are interdependent and interconnected but owned and operated by two agencies who intend to work together to optimize the operations. The three-year planning effort encompasses the portion of WTD's wastewater conveyance and treatment system that collects flow from SPU's wastewater collection and conveyance system, as well as portions of SPU's stormwater conveyance system that connect to WTD's wastewater system. The Joint Plan will be consistent with both agencies' operational objectives, optimize the operations of each agency's system while balancing risks to both entities, and include the following items:

- Overview of those interdependent portions of the County's regional wastewater, conveyance, and treatment system and the City's Wastewater Collection System;
- Methods to accommodate each agency's operational objectives while complying with their contractual obligations;
- Shared operational objectives for the County and the City's combined systems;

- Organizational structure;
- Modes of operation (dry, wet, transition) for identified CSO facilities;
- Each agency's operational decision hierarchy;
- Identified CSO facilities, if any, that may be beneficial to jointly operate and/or monitor;
- Real-time communication plans/protocols;
- Emergency and special operations protocols;
- A process for incorporating the Joint Plan into the design of new capital projects for the combined system, including the County and City's CSO long-term control plans; and
- A process for updating the Joint Plan every three years.

Development of the Joint Plan began in January 2013. The project team, comprised of staff from both agencies, has begun the educational phase of the project and is working to complete the following tasks in the next three years:

- Characterize and document each agency's current operations;
- Document each agency's existing organization structure;
- Document each agency's existing operational decision hierarchy and modes of operation;
- Conduct educational activities (e.g., facility tours);
- Analyze historical system behavior as it relates to operations;
- Determine the extent of each agency's system that will be included in the plan;
- Research available data and analysis tools related to system operations;
- Work with management and internal stakeholder groups to prioritize and finalize joint operational objectives; and
- Develop an operational alternatives assessment approach.

A progress report on development of the Joint Plan will be prepared and submitted to EPA and Ecology in December 2013.

2.4 CMOM Program Performance Plan

Capacity, Management, Operations, and Maintenance (CMOM) Programs are intended to provide a flexible, dynamic framework for municipalities to identify and incorporate widely-accepted wastewater industry practices to:

- Better manage, operate, and maintain collection systems, and
- Reduce sanitary sewer overflow (SSO) events.

The goal of CMOM planning is to identify current performance gaps, select performance goals, and design CMOM activities to meet the goals. Information collection and management practices are used to track how well each CMOM activity is meeting the performance goals, and whether overall system efficiency is improving. On an ongoing basis, activities are reviewed and adjusted 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 FOG Control Program Inspector;
- Revising and re-implementing a Chemical Root Control Program;
- Implementing a geographic based system for scheduling pipe cleaning preventive 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 to review and adjust priorities. The 2009 gap analysis provided SPU 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 their wastewater collection system.

SPU worked to prioritize these initiatives; identify the level of effort required from SPU staff, consultants, and contractors 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 Program Performance Plan. This Plan was submitted to EPA and Ecology on December 31, 2012. Actual 2012 and planned 2013 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 suspected 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 manage 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. SPU is implementing the plan and will review and update it each year as appropriate in order to continue focusing efforts on the worst FOG problems. Actual 2012 and planned 2013 Plan activities are described in Section 3.3 of this report.

2.6 Floatables and Solids Observation Program Plan

SPU began observing outfalls for solids or floatables associated with CSO events in 2008. Difficulties with completing visual observations led SPU and EPA to agree in November 2010 that SPU would temporarily suspend earlier visual observation efforts. In 2012, SPU began developing a revised and more realistic floatables observation program. SPU submitted the revised Floatables and Solids Observation Plan to EPA and Ecology on December 31, 2012. The plan will be reviewed and updated as appropriate each year. Actual 2012 and planned 2013 Plan activities 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 2012 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 and cleaning; 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 eight 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. SPU continued to use COTools and adjust pipe maintenance frequencies in 2012.

Pump station electrical and mechanical components are replaced as necessary during routine pump station maintenance. Preventive maintenance programs monitor the condition of wearable components, such as bearings, so they can be replaced before failure, avoiding extensive damage and reduced pump service life.

In 2008, SPU completed a pilot program implementing Reliability Centered Maintenance (RCM) for six 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, and it adds discipline and documentation to the decision-making process around operations, spare parts inventory, maintenance strategies, and data collection. As part of the RCM pilot program, maintenance strategies were developed for each of the six pump stations, taking into consideration site-specific conditions and the consequences of failure. In 2010, SPU finished developing RCM-based maintenance strategies for all 68 wastewater pump stations. The RCM Strategies were used to create maintenance tasks and intervals (work orders) that were implemented in 2011. Data collected from these maintenance work orders is analyzed and used to adjust future maintenance tasks and intervals. In 2012, SPU continued to adjust maintenance frequencies using the RCM-based strategies and field data.

A summary of 2012 O&M accomplishments is included as Table 3-1. A summary of 2010-2012 SSO performance is included as Table 3-2 and the 2012 SSO details are provided in Table A-1. Table 3-2 shows that SPU has operated as a high performance collection system utility (less than 4 SSOs per 100 miles per year) in each of the last three years. Table 3-2 also shows that the number of SSOs per year tends to be higher in years with more rain. (2010 and 2012 were wetter than average years and had higher numbers of SSOs. Also, as shown in Table A-1, 13 of the 56 SSOs in 2012 occurred during heavy rain on November 19, the week of Thanksgiving.)

SPU analyzes each SSO and identifies appropriate follow-up actions, including system modifications and/or increased maintenance where appropriate. In order to remain in the high performing utility band, SPU expects to spend roughly the same amount of effort on system O&M in 2013 and plans to continue implementing the CMOM Program Performance Plan (see Sections 2.4 and 3.2).

Table 3-1. 2012 O&M Accomplishments	
Activity	**Quantity**
Miles of mainline pipe cleaned	256.61
Miles of mainline pipe inspected via CCTV	111.94
Miles of mainline pipe rehabilitated	3.44
Number of pump station inspections [1]	146
Number of maintenance holes inspected	1791
Number of force mains inspected and repaired/replaced/rehabilitated	1
Number of CSO structure inspections [2]	271
Number of CSO structure cleanings [2]	68
Number of CSO HydroBrake inspections [2]	210
Number of CSO HydroBrake cleanings [2]	53
Linear feet of pipe receiving chemical treatment to inhibit root growth	60,819
Number of catch basins inspected	29,615
Number of catch basins cleaned based on inspection results	5,835

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.*

Table 3-2. 2010-2012 SSO Performance		
Year	**Number of SSOs**	**SSOs/100 miles of Sewer**
2010	56	3.7
2011	36	2.4
2012	56	3.7

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 2012, 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 detail in Section 4.1 of this report; projects with construction in 2012 are summarized below:

- In the Windermere Area (Basin 13), SPU removed the HydroBrake and replaced the device with an automated slide gate that modulates based on the sewer system level downstream to balance the use of the storage system.
- In the North Union Bay Area (Basin 18A), SPU raised the overflow weir to maximize storage in the 141,000 gallon in-line detention pipe, constructed a new sewer that conveys flows from the local side sewers away from the CSO Facility (allowing safe and full use of the storage), and augmented the HydroBrake discharge by adding a slotted opening above the HydroBrake.
- In the West Seattle Area (Basin 95), SPU extended an existing storm drain along Fauntleroy Way SW to collect additional road surface runoff and reduce flow to the combined sewer system. The project was bid and awarded in Summer 2012 and construction will be completed in 2013.

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 Fats, Oils, and Grease (FOG) 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 conducted in 2012 are summarized in Section 2.5 of this report. FOG Control inspection and enforcement activities conducted in 2012 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. In 2011, monitoring and controls for SPU's first sewer system control 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). This project is the first phase of a larger Windermere basin control scheme that will reduce the number and volume of sewer overflows at Outfall 13 and bring the basin into compliance.

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 2012, 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. The goal is to have all monitoring locations transmit real-time data to the Control Center by the end of 2014. The program also includes the upgrade of SCADA equipment in all of SPU's wastewater pump stations. Approximately half of the stations were upgraded in 2011, and the remainder were upgraded in 2012. Efforts also are underway to upgrade the Wonderware SCADA software used in the Control Center. This work will be completed early 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 has not had any dry weather overflows (DWOs) since 2009.

If SPU were to have a DWO, SPU would investigate to identify the cause and take action to 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. The CSO structure and adjacent pipes would be cleaned immediately following any DWOs, and SPU would review and analyze the cleaning results. SPU also looks at the rolling five-year history of DWOs 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, and appropriate follow-up actions were taken. See Section 4.7 of this report for information on recently completed pump station backup power improvements.

To help prevent DWOs, SPU analyzes data collected during inspection and cleaning of combined sewer overflow control structures and conducts condition assessments of the control structures to identify maintenance that may be needed. Proper maintenance of control structures helps to prevent DWOs resulting from damaged control structure elements. In addition, all combined system overflow locations have alarming set points such that a potential DWO condition triggers an alarm and subsequent analyst or field crew assessment of the situation. Also, in 2012 SPU implemented a new DWO monthly review meeting that focuses on prevention.

A summary of the DWOs from 2007-2012 is included in Table 3-3.

Table 3-3. Dry Weather Overflows (DWOs) and Combined Sewer Overflows (CSOs) Exacerbated by System Maintenance Issues 2007 – 2012

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

[1] *CSOs exacerbated by system maintenance issues were not reported prior to 2008.*

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 2012, SPU crews:
  - Inspected 29,615 catch basins,
  - Cleaned 5,835 catch basins,
  - Replaced 852 traps, and
  - Repaired 84 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 2012 include:

- Public education programs,
- Solid waste collecting 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.

In 2012, the City of Seattle banned single-use plastic shopping bags, greatly decreasing the possibility of single-use plastic shopping bags being comingled in combined sewer flows.

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.

SPU also supports public education programs on waste collection and 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.

More recently, SPU has established itself as one of the national leaders in green stormwater infrastructure (GSI) efforts, encouraging installation of rain gardens and cisterns on private properties and 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.

SPU, together with King County and Seattle King County Public Health, maintains a sewage overflow notification and posting program. Signs are posted at each outfall identifying the outfall and warning of possible sewage overflows. The signs include a phone number for the CSO Hotline, staffed by Seattle King County Public Health. In addition to managing the CSO Hotline, Seattle King County Public Health's website provides detailed information about CSOs, potential public health hazards, and the cautions the public may take to protect themselves.

Figure 3-2. Example of Outfall Signage

In addition, King County has hosted a website providing notification of recent and current King County CSO overflows since December 2007. 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 2012, the public notification web pages were viewed 9,930 times, with a peak one-day use of 1,053 views on November 19, 2012.

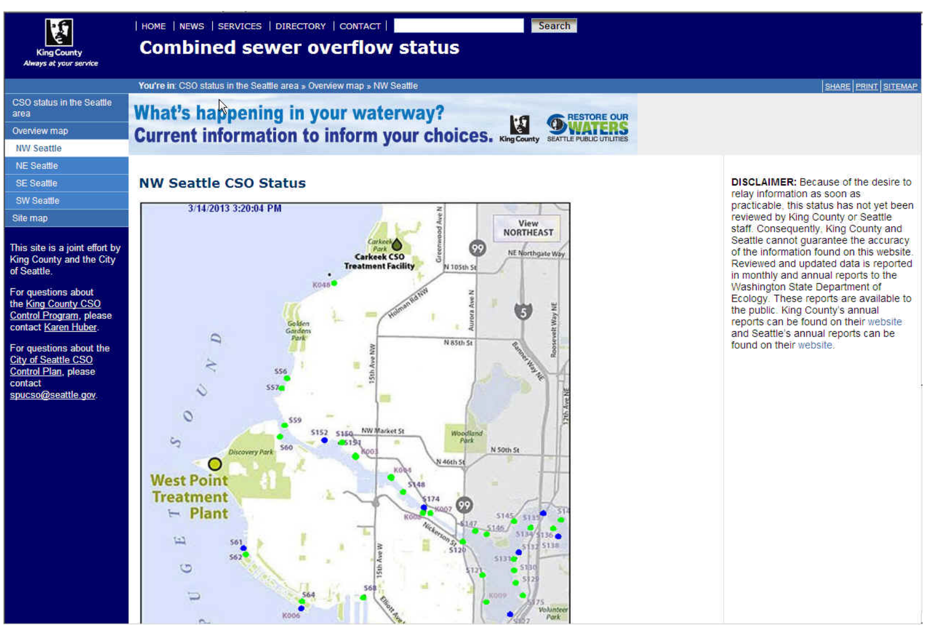

Figure 3-3. King County/SPU Real-Time Overflow Notification Website

In addition, SPU conducted 12 public meetings in 2012 for specific CSO reduction projects. Information about the public notification web site has been part of the information presented at these 12 meetings. And finally, if sewage contamination of surface waters occurs due to side sewer breaks or illicit connections or discharges, SPU posts warning signs at impacted waterways until the problem is resolved.

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 Program Performance Activities

As of December 31, 2012, SPU has made the following progress on initiatives identified in the CMOM Program Performance Plan:

- Risk Based Scheduling of sewer pipe cleaning was implemented in 2012 and will continue to be refined in 2013.
- Planning and Scheduling Centralization was implemented in 2012. SPU will continue to refine roles and responsibilities of staff, processes, and procedures to take full advantage of the new CMMS software roll out in 2013.
- Maximo 7 Reimplementation – Maximo is SPU's CMMS software and Maximo 7 is the new version to be 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.
- Cleaning Optimization Tool (COTools) Enhancement – COTools enhancements were implemented in 2012 and are in full use.
- Standard Operating Procedures (SOP) for sewer mainline cleaning were reviewed and revised in 2012.
- Sewer Mainline Cleaning field staff training – Two, three-week duration training sessions were completed in 2012. Two, three-week duration training sessions will be conducted in 2013. The 2013 training sessions will emphasize changes in the sewer mainline cleaning SOP.
- Sewer Cleaning Quality Assurance Quality Control Plan – This plan was developed in 2012 and will be implemented in 2013.

- Repair, Rehabilitation, and Replacement (3R) Process and Tool – The 3R tool development began in 2012 and will be completed in 2013. Implementation is anticipated to occur in early 2014.
- CCTV SOP – Development of the CCTV (Closed Circuit Television) SOP is in progress and will be completed in early 2013.
- CCTV Training Plan – Development of this plan is in progress and will be completed in 2013.
- CCTV Quality Assurance Quality Control Plan – Development of this plan is in progress and will be completed in 2013.
- Sanitary Sewer Overflow (SSO) Response SOP – Development of this SOP began in late 2012 and will be completed in the fourth quarter of 2013.

Additional initiatives planned for 2013 are as follows:

- Begin development of a Long-term FOG Data Management Plan,
- Begin evaluation of a Scheduled Proactive Wastewater Pipe Cleaning Program,
- Begin Phase 2 of the Pump Station and Force Main Assessment Program,
- Begin review and update of the CSO Control Structure Inspection and Cleaning SOP,
- Begin development of the CSO Control Structure Training Plan,
- Begin development of the CSO Control Structure Inspection and Cleaning Quality, Assurance Quality Control Plan,
- Perform a workload analysis and develop a staffing plan for maintenance of drainage and wastewater assets, and
- Begin evaluation of Chemical Root Control Program effectiveness.

3.3 FOG Control Program Activities

In 2012, FOG Control Program staff worked with both residential and commercial customers to reduce the amount of FOG discharged into the wastewater collection system. Inspectors collected data from a portion of the approximately 4,600 FSEs in the City of Seattle. The data collected will be used to project the priority and interval of future inspections. FOG Inspectors also pursued compliance inspections in fifteen high priority hot spot areas that had grease related SSOs in the past or required excessive sewer cleaning due to grease. These activities have resulted in:

- Installation of grease interceptors in four high priority hot spot areas,
- Increased grease interceptor maintenance,
- An increase in the use of kitchen Best Management Practices to reduce FOG discharge,
- Reduced wastewater collection system pipe cleaning frequencies,

- Changes in some pipe cleaning practices from destructive hydrocutting to jet cleaning,
- Decreases in the amount of FOG accumulation at a wastewater collection system pump station, and
- Completion of two Notices of Violation issued in 2009.

SPU inspects commercial FSEs to ensure their compliance with the Seattle Municipal Code. Initial 2012 FSE visits focused on gathering information on grease pretreatment devices, cooking equipment, oil recycling, and contact information. During the latter part of the year, the focus changed to compliance inspections in defined FOG hot spot areas. In 2012, the FOG team:

- Completed 1,343 Commercial FSE Inspections
- Issued 45 Correction Notices (enforcement actions), including:
  - 25 requiring grease interceptor maintenance,
  - 8 requiring installation of grease interceptors,
  - 9 requiring implementation of kitchen best management practices, and
  - 3 requiring plumbing modifications.

The FOG team conducted education and outreach for both commercial and residential customers. SPU sponsored four community and commercial events and was able to have a presence at each event. The booth had information, inspectors, and a “Can the FOG” game. (See Figure 3-4.) The game was an alternative way to teaching children about the importance of FOG’s “Cool it, can it, trash it” motto in a fun, interactive way. Door to door

Figure 3-4. FOG Control Program “Can the FOG” Game

residential outreach is conducted in neighborhoods that experience FOG related SSOs. (Note that, in 2012, 12 SSOs had FOG as a contributing factor, as shown in Table A-1.) In 2012, the FOG team was able to reach approximately 340 single and multi-family residential properties.

Ongoing FOG Control Program efforts will focus on hot spot characterization, commercial and residential outreach, inspections, and compliance as appropriate.

3.4 Floatable Solids Observation Program Activities

SPU began observing outfalls for solids or floatables associated with CSO events in 2008. Difficulties with completing visual observations led SPU and EPA to agree that SPU would temporarily suspend visual observation efforts. SPU submitted a revised observation plan on December 31, 2012 and conducted sewer camera observations in 2011 and 2012. A brief summary of the earlier visual observation efforts and the more recent sewer camera observations follows.

Review of 2008-2010 Observation Efforts

While SPU is not aware of an issue with solids and floatables associated with overflow events from Seattle's combined sewer system, SPU had not performed documented activities to confirm the absence or presence of a solids and floatables issue prior to 2008. During 2008 meetings with EPA regarding the CSO program, SPU proposed to observe overflow events at fifty outfalls over the course of five years, focusing on ten outfalls per year, to document existing conditions regarding solids and floatables resulting from CSO events. This proposal assumed that overflow events at these locations would be representative of overflow events at all of the City's CSO outfalls.

The initial proposal proved to be much more difficult to implement than anticipated. Outfall discharge points several hundred feet from shore, infrequency of overflow events, and time lags in communication of monitoring equipment all contributed to the challenge. Overflows that customarily occur at outfalls just a few times per year proved to be difficult to catch and observe, particularly in a short amount of time. In addition, lack of daylight during overflow events (Seattle's overflows are far less frequent during the long days of summer than they are during the short dark days of winter) contributed to difficulty visually observing events.

During approximately eighteen months of effort from mid 2008 through January 2010, SPU was only able to observe overflow events at five of the selected outfalls, documenting three separate events at those five locations. When visual observations were completed, no significant floatables were observed that could conclusively be determined to be from CSO overflow events.

2011 and 2012 Observations

Because of poor success in visually observing CSO events, SPU investigated the possibility of utilizing a sewer camera to observe overflows within sewer structures. Temporary camera installation is feasible when there is a large enough sewer structure at or past the overflow weir and power supply is available. The video camera is set up to start recording when the monitoring system indicates that an overflow is occurring, thus side-stepping the issues associated with personnel notification and deployment. As shown in Table 3-4, beginning in 2011 and continuing through 2012, SPU collected sewer camera video observations of overflow events at three outfalls. SPU's strategy has been to leave the camera in place at a CSO installation until three overflow events have been captured on video.

Table 3-4. 2011 and 2012 Sewer Camera Observations and Results

Outfall No.	Receiving Water Body	Observation Date	Video Length (minutes)	Solids/ Floatables Observed?
152	Salmon Bay	6/14/2011	7:55	No
152	Salmon Bay	7/25/2011	5:08	No
152	Salmon Bay	2/17/2012	5:02	No
150	Salmon Bay	9/10/2012	17:20	Yes
150	Salmon Bay	10/14/2012	16:32	Yes
150	Salmon Bay	10/18/2012	29:28	Yes
44	Lake Washington	12/16/2012	28:52	No
44	Lake Washington	12/19/2012	35:39	Yes

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. SPU is assessing the upstream catch basins in Basin 150 to make certain that catch basin traps are installed and in working order. SPU is also evaluating floatables structures or other means of controlling floatables as part of the repair of Outfall 150. At Outfall 44, small bits of material were observed during one of the two CSO events. In 35 minutes of video, 18 small pieces were viewed.

Based on observations to date, SPU continues to believe that floatables are not a significant issue in Seattle. Camera assisted floatables observation will however continue in 2013.

3.5 Annual Review of Operations and Maintenance Manuals

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

Job Plans (there are several dozen for drainage and wastewater maintenance tasks) were reviewed in 2012 and many have been revised or partially revised. Completion of Job Plan revisions will take place in 2013 as part of the Maximo Reimplementation Project. The Maximo Reimplementation Project configures the Computerized Maintenance Management System (CMMS) to better support SPU's drainage and wastewater system maintenance processes and provides a newer version of the software. All Job Plans attached to maintenance work orders will require revision to align with the new software.

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 2012 and work that we plan to complete in 2013.

SPU is continuing to apply a program management model to oversee and direct the delivery of capital projects. During 2012, 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 risks and applying lessons learned across capital projects. 2012 project spending is summarized in Table 4-1.

Table 4-1. 2012 CSO Project Spending

Project Name	Amount Spent
Long Term Control Plan	$3,551,957
Integrated Plan	$167,204
CSO Retrofits	$2,971,927
Ballard Roadside Raingardens	$331,859
Delridge Roadside Raingardens	$143,129
Windermere CSO Reduction Project	$5,983,866
Genesee CSO Reduction Project	$3,080,076
N Henderson CSO Reduction Projects	$2,472,561
S Henderson CSO Reduction Projects	$637,690
Central Waterfront CSO Reduction Project	$123,455
Pump Station Backup Generator Program	$701,163
Outfall Rehabilitation Program	140,722
Total	$20,305,609

4.1 Retrofits and Flow Diversion Program

SPU made significant progress on a variety of combined sewer system retrofit projects in 2012, 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. In 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 effectives of the weir adjustments and confirmed all assumptions. In addition, the monitoring showed that between October 2010 and December 2012, 35 CSOs were avoided because the weirs were raised.

4.1.2 CSO Structure Seal-up Project

In 2011, SPU identified two outfalls (Outfall 37 in the Genesee area and Outfall 116 in the Duwamish area) and three overflow structures (structures where flows from Sub-basin 41A in the Genesee Area and Sub-basins 111E and 111F in the Duwamish Area combine with flows from other sub-basins in the same area) that have not overflowed since at least 1998 and have a very low probability of ever overflowing based on current collection system capacity and computer modeling of the sewer system. A decision was made to seal these structures because of the low likelihood of an overflow and to allow SPU to avoid the costs associated with long-term flow monitoring. During 2011, SPU completed the site analysis, videotaped (CCTV'd) the pipes to be sealed, completed the design, and acquired the necessary permits. Construction work was completed in March 2012. The photos in Figure 4-1 show before and after seal-up at Overflow Structure 41A.

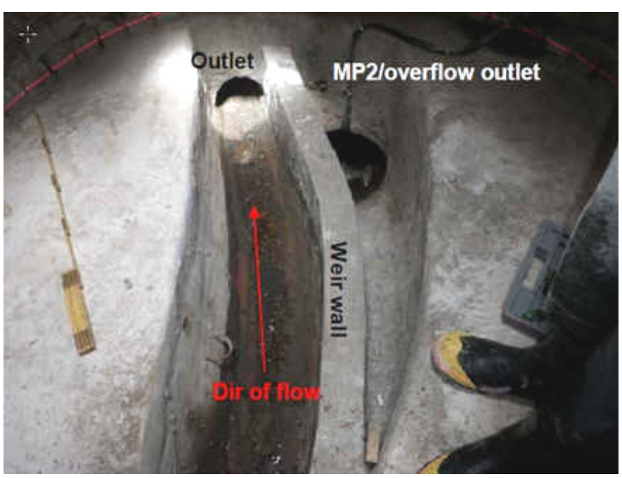

Figure 4-1. Before and After Seal-up at Overflow Structure 41A

4.1.3 Windermere Retrofit (Basin 13)

The NPDES permit requires 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. Figure 4-2 shows the new slide gate.

Figure 4-2. New Slide Gate in Basin 13 (Windermere Area)

4.1.4 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 SPUs long term goal of an average of no more than one overflow per year.

The project is currently in a post-project performance monitoring phase that will continue through 2013. Figure 4-3 shows the side sewer interceptor pipe being installed within the existing storage pipe and slotted opening.

Figure 4-3. New Side Sewer Interceptor Pipe (North Union Bay Area)

Design of a retrofit at the overflow structure for Sub-basin 18B will begin in 2013. The existing HydroBrake is not performing in alignment with its design performance curve. The retrofit consists of replacing the HydroBrake with an automated slide gate.

4.1.5 West Seattle Retrofit (Basin 95)

This retrofit project extends 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 is anticipated to be completed during the first half of 2013.

4.1.6 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 will begin in 2013. The NPDES permit requires completion of project construction by November 1, 2015.

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 will complete this work in 2013. Design and construction will be completed in 2014 and 2015, respectively.

4.1.8 Henderson Retrofits (Basins 47, 49)

SPU analyzed retrofits for controlling sewage overflows at Overflow Structure 47C and Outfall 49 in 2012 and will begin designing the retrofits in 2013. The retrofit for Overflow Structure 47C consists of raising the overflow weir to maximize storage. The retrofit for Basin 49 consists 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.

4.1.9 Additional 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 be able to reduce the frequency of CSOs. In each area, SPU will analyze retrofit and flow diversion alternatives for reducing combined sewer overflows (CSOs) and meeting water quality standards. A preferred alternative for each area is anticipated to be selected by the end of 2013.

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:

- 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.
- RainWise – City of Seattle program that provides homeowners with rebates for installing rain gardens and cisterns on their own property.

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

4.2.1 RainWise Program

Starting in 2010, RainWise 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 two and a half years, over 400 contractors, landscape designers and similar professionals have been trained in 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 47 active contractors listed on the site that are available to bid and install systems for RainWise customers. Each year, the program offers two training opportunities for interested contractors to enter the program. For 2012, a contractor fair was offered to connect interested participants with participating 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 2012 installation controls the runoff from 1,293 square feet of roof area. Typical RainWise installations are shown in Figure 4-4.

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

In 2012, the RainWise program helped fund 114 projects in the Ballard, North Union Bay, Delridge, and Windermere CSO basins. Since program inception, 209 installations have been completed, with 192 of them in the Ballard Area (Basins 150 and 151). These installations control approximately 5.2 acres of impervious roof area and an estimated 3.1 million gallons per year of stormwater, and provide an estimated 48,897 gallons of CSO control volume in the Ballard basins alone.

In 2013, RainWise rebates will be offered in the Montlake, Duwamish, Portage Bay, Fremont/Wallingford, Madison Park, Leschi, Genesee, and Henderson CSO basins. In addition, a memorandum of agreement with King County will make RainWise rebates available to CSO basins within the City of Seattle under the County's jurisdiction.

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 2012 includes the following:

- Engaging with the community to explain the combined sewage overflow problem in Ballard and the possible solutions (NDS and storage), and conducting a community survey to gather information about existing drainage issues in the community.
- Soil explorations (soil borings and groundwater monitoring wells) to better define the underlying soil and groundwater conditions.

Analysis and NDS siting of the project will continue into early 2014, followed by design, and then the start of construction in the summer of 2015.

SPU also started post-project performance flow monitoring for the first Ballard NDS project. This work includes monitoring the facilities on two of the project blocks. The monitoring work has two components: controlled flow tests and continuous flow monitoring. The controlled flow tests, which occurred in September of 2012 and will occur again in the Spring of 2013, involve 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 will continue to collect data until the middle of 2013, so that we have approximately a year of continuous flow monitoring data. Both data sets will be used to calibrate our existing models for these bioretention systems and report on project performance. Pictures of the completed Ballard 2010 NDS project are shown in Figure 4-5.

Figure 4-5. Completed Ballard NDS 2010 Project

4.2.3 Delridge Roadside Raingardens

SPU began developing and analyzing alternatives for the Delridge NDS 2015 project in August 2012. This project is looking at opportunities to 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 will conduct more public engagement to site the facilities and develop the 5% design for up to 20 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 will be constructed near Magnuson Park on the south side of NE 65th Street. It will include 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 in 2012. Construction began in October 2012 and is scheduled to be completed be completed in late 2014. The following regulatory deadlines were met in 2012:

	Deadline	Completed
Submit construction quality assurance plan	August 31, 2012	August 16, 2012
Submit final plans and specifications	August 31, 2012	August 30, 2012
Begin construction (NTP)	December 31, 2012	October 9, 2012

There are no 2013 regulatory deadlines for the Windermere CSO Reduction Project. We anticipate completion of the project by the end of 2014, well ahead of the August 30, 2015 regulatory requirement.

In 2013, SPU will install shoring, carry out excavation, and begin construction of the underground storage tank, facility vault, and conveyance pipelines. A recent construction photo is included as Figure 4-6.

Figure 4-6. Windermere CSO Reduction Project Construction

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 will be constructed in two parking lots along Lake Washington Boulevard S at 49th Avenue S and at 53rd Avenue S. It will include 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 60% design in 2012 and is working to complete 90% design in January 2013 and final design in June 2013. The first phase of construction is scheduled to begin in April 2013, and the entire project is scheduled to be completed in late 2014.

There were no 2012 regulatory deadlines. In 2013, the regulatory requirements and SPU's projected completion dates are as follows:

	Deadline	Schedule
Basin 43		
Submit 90% plans and specifications	January 31, 2013	January 25, 2013 (Done)
Submit construction quality assurance plan	June 30, 2013	December 10, 2012 (Done)
Submit final plans and specifications for approval	June 30, 2013	June 6, 2013
Begin construction (NTP)	August 31, 2013	April 25, 2013

Basins 40 and41		
Submit 90% plans and specifications	January 31, 2014	January 25, 2013 (Done)
Submit construction quality assurance plan	June 30, 2014	December 10, 2012 (Done)
Submit final plans and specifications	June 30, 2014	June 6, 2013
Start construction (NTP)	August 31, 2014	April 25, 2013

Note that SPU's schedule for both sites is the same, even though the regulatory deadlines are different. We do not currently anticipate any problems with meeting these deadlines.

In 2013, SPU will install shoring, carry out excavation, and construct the underground storage tanks, facility vaults, and site utilities.

4.5 Henderson CSO Reduction Projects

The Henderson CSO Reduction Projects will reduce the number and volume of sewage overflows from Outfalls 44 and 45 (North Henderson) and Outfalls 46, 47, 49, and 171 (South Henderson).

4.5.1 North Henderson (Basins 44 and 45)

In 2012, SPU:

- Submitted the draft Engineering Report on the August 30, 2012 due date.
- Completed the alternatives evaluation, selecting the preferred option for reducing the number and volume of sewage overflows from Outfalls 44 and 45.
- Completed evaluating the environmental impacts of the options for controlling sewage overflows from Basin 44 and issued a Draft Environmental Impact Statement (DEIS).
- Conducted a public hearing on the Basin 44 DEIS.
- Completed the environmental review process for the preferred Basin 45 control option.
- Purchased the parcel at 5560 South Holly Street to build the proposed Basin 45 storage facility.
- Attended stakeholder group meetings to present information and obtain input on the control alternatives for Basins 44 and 45.

In 2012 SPU did not encounter any issues that affected meeting regulatory deadlines. It should also be noted that SPU submitted the final Henderson North Engineering Report on the January 31, 2013 due date.

On January 3, 2013, SPU issued the Final Basin 44 EIS. A coalition of property owners who live adjacent to the proposed project site filed an appeal on January 17, 2013. The public hearing was held on March 25, 2013, and the project schedule will be updated once the appeal is concluded.

4.5.2 Henderson South (Basins 46, 47, 49, and 171)

In Henderson South, in 2012, SPU:

- Met the only 2012 regulatory deadline by submitting the final Engineering Report by the March 30, 2012 due date.
- Completed the environmental review process for the preferred control option for Basin 47 on March 20, 2012.
- Initiated design of the project that will control Sub-basin 47B and Basin 171 (the 52nd Avenue South CSO Reduction Project). In 2012, SPU completed 30% and 60% design of the conveyance line to the King County Henderson Pump Station.

In 2013, SPU will complete 90% design and final design and will solicit construction bids. Construction is expected to begin by Fall 2013.

4.5.3 Pump Station 9 (Basin 46)

The Pump Station 9 Project will reduce the number and volume of sewage overflows from Outfall 46. During 2012, a project team was formed to identify and analyze options for increasing pumping capacity at Pump Station No. 9. After reviewing the options, SPU decided to replace the existing pumps with two new higher capacity pumps. The project is currently in design with the goal of completing a majority of the design by the end of 2013.

4.6 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 between 2013 and 2015, and construction will be completed between 2016 to 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.

4.7 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. Emergency plugs allow for a portable generator to easily and quickly provide power to the station during a power outage. 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. These nine pump stations had 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. Other permanent generators were installed at three locations (Pump Stations 62, 63, and 77), by April 30, 2012. This work was completed on schedule and was reported to Ecology and EPA on January 31 and April 30 of 2012. SPU has obtained the required land use variance approved by the Seattle City Council and has applied for a building permit to install the remaining generator, at Pump Station 39, by the end of 2013.

4.8 Outfall Rehabilitation Program

The 2010 NPDES permit required that SPU complete repairs on Outfalls 64, 95, and 150 by December 31, 2014 and complete repairs on Outfalls 45, 72, 129, and 138 by November 1, 2015. SPU completed a conditions assessment of these outfalls in March 2012, consisting of the following activities:

- Initial site visits,
- Records research of record drawings, inspector's notebooks, sewer cards, GIS records, and maintenance work order histories,
- Underwater dive inspections,
- Dye-testing,

- Cleaning,
- In-pipe imaging using CCTV technology, and
- Synthesis and analysis of records and field data.

The records research indicated that the damaged wood stave pipe at Outfall 138 was replaced between 1992 and 1995 with a ductile iron pipe. In addition, it was during the records research that SPU determined there was a high likelihood Outfall 72 would be decommissioned as part of the Central Waterfront construction (see Section 4.6). Consequently, SPU identified two potential substitute outfalls for inclusion in the conditions assessment. These substitutions subsequently were approved by Ecology as part of the September 13, 2012 NPDES permit modification (see Section 1.2). The modified 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 is partially filled with sediment, has a 12-inch hole at the crown of the pipe approximately 14 feet upstream of the outlet end, and will require cleaning and repair, predominantly staged offshore. Outfall 95 is partially filled with sediment and will require cleaning, predominantly staged offshore. SPU is working with City Purchasing to develop a blanket contract to perform the work at Outfalls 64 and 95 prior to the end of 2013.

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. Outfall 150 has deteriorated under an existing pedestrian pier and will need to be replaced. A project team has been formed to develop and analyze alternatives and complete the majority of the design for these two new outfalls by the end of 2013.

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 2012 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 gages located throughout the City of Seattle, as shown in Figure 1-1. No changes to the network of 17 permanent rain gages were made in 2012.

5.2 Flow Monitoring Program

During 2012, SPU's flow monitoring consultant operated and maintained 103 monitoring points. An additional 19 monitoring points were operated and maintained by SPU staff, for a total of 122 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 2012 Monitoring Results

Two tables summarizing 2012 precipitation monitoring results are included in the following pages of this Report:

- Table 5-1 provides precipitation by gage 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:

- 2012 precipitation amounts varied from one part of the City to another;
- 2012 precipitation amounts varied by month, with the peak month occurring in November when an average of 9.36 inches was recorded and the driest month occurring in August when an average of 0.00 inches was recorded;
- Average annual precipitation was 47.66 inches for 2012, which was almost 12 inches above the average annual precipitation for 2011 (35.83 inches), over 2 inches above the average annual precipitation for the last really wet year (2010, at 45.61 inches), and more than 10 inches above the average over the previous four years.

Several tables summarizing 2012 flow monitoring and flow monitor performance are included in the following pages of this report:

- Table 5-3 show the 2012 flow monitor performance by outfall and month;
- Table 5-4 provides the details of all 2012 CSOs by outfall and date;
- Table 5-5 includes the most recent 5-year overflow frequency for each outfall and compares 2012 and baseline CSO conditions;
- Table 5-6 compares 2008-2012 CSOs by outfall;
- Table 5-7 compares 2008-2012 CSOs by receiving water body;
- Table 5-8 shows which outfalls met the performance standard for controlled outfalls in 2012 and in 2011.

Observations and conclusions from these tables include:

- 2012 cumulative average system-wide “up-time” and cumulative average individual “up-times” of all but one flow monitoring station were over 99%. It should be noted that the flow monitor at Outfall 132 on the east side of Lake Union malfunctioned and had to be replaced in January and again in February. As a result, the up-time of the flow monitor at Outfall 132 was only 93.5% in January and 89.5% in February, and averaged 98.6% for the year as a whole. SPU’s hydrologic/hydraulic model for Basin 132 was used to simulate the rainfall that occurred in January and February and determine that no sewage overflows occurred during these monitoring outages.

- 2012 had the highest number of CSOs in the last five years, corresponding with 2012 being the wettest of the last five years.
- The water body receiving the greatest CSO volume in 2012 was Salmon Bay, followed by Lake Washington, followed by Lake Union, the Ship Canal, and Union Bay.
- Over one-third of the 2012 CSO volume (over 52 MG of the 154 MG) is from Outfall 152 (Ballard), which serves the largest drainage area of any of the outfalls.
- Six outfalls contributed over 70 percent of the 2012 CSO volume: Outfall 152 in Ballard (52.4 MG), Outfalls 147 and 174 in the Fremont Wallingford Area (14.6 MG and 10.2 MG, respectively), Outfalls 44 and 47 in the Henderson Area (12.3 MG and10.0 MG, respectively), and Outfall 18 in the North Union Bay Area (9.5 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.
- Three outfalls that were reported to be uncontrolled in 2011 are now believed to be controlled. The weir at Outfall 25 was raised in 2008 and modeling shows it is now controlled. There were five CSOs at Outfall 34 in 2006 and five CSOs at Outfall 68 in 2007 that likely were due to clogged HydroBrakes. Increased inspection and cleaning has resolved the clogging problems, and improved monitoring and modeling confirm that these outfalls are now controlled.

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

In 2012, SPU submitted a Post-Construction Monitoring Quality Assurance Project Plan (QAPP) and Sediment Sampling & Analysis Plan (SAP) for controlled Outfall 62. SPU received comments from Ecology, incorporated responses to comments, and resubmitted a final QAPP and SAP for Outfall 62 Post Construction Monitoring to Ecology in 2012. In 2013, SPU plans to begin implementation of the approved QAPP.

In 2012, SPU submitted a Sediment Sampling & Analysis Plan (SAP) for uncontrolled Outfalls 107, 147, and 152. SPU received comments from Ecology, and will resubmit a final Sediment SAP to Ecology in 2013. In 2013, SPU plans to begin implementation of the approved SAP.

Table 5-1. 2012 Precipitation by Gage and by Month (inches)												
Rain Gage	**January**	**February**	**March**	**April**	**May**	**June**	**July**	**August**	**September**	**October**	**November**	**December**
RG01	4.99	3.61	6.72	2.27	1.89	3.48	1.73	0.00	0.38	5.85	9.83	8.81
RG02	4.71	2.76	5.31	2.13	2.69	3.21	1.56	0.00	0.25	5.32	8.75	6.50
RG03	5.32	2.83	6.57	2.19	2.36	3.27	1.27	0.00	0.20	5.87	9.56	7.94
RG04	5.28	2.98	5.99	2.15	2.12	3.40	1.76	0.00	0.27	5.87	8.91	7.56
RG05	5.77	2.83	6.13	2.41	2.10	2.19	1.08	0.00	0.03	6.34	8.66	6.93
RG07	4.94	2.95	6.42	2.13	1.85	3.14	2.65	0.00	0.38	6.24	10.26	8.85
RG08	4.91	2.64	5.49	1.72	1.83	2.78	1.76	0.00	0.28	5.83	9.60	8.06
RG09	5.62	3.21	6.77	2.37	2.18	3.65	1.71	0.00	0.26	6.92	10.38	8.92
RG11	4.60	2.39	6.24	2.05	2.55	2.54	1.22	0.00	0.06	5.54	9.03	7.31
RG12	4.91	2.60	6.14	1.98	2.16	3.02	1.97	0.00	0.16	6.04	9.91	7.97
RG14	5.82	2.64	6.81	2.33	2.87	2.84	1.10	0.00	0.07	6.42	9.84	8.21
RG15	4.94	2.68	6.41	2.32	2.36	2.81	1.04	0.00	0.05	5.96	8.78	7.29
RG16	5.94	3.48	7.79	2.29	2.57	2.81	1.05	0.00	0.03	6.36	9.14	8.30
RG17	6.11	3.45	7.41	2.63	2.39	2.93	1.98	0.00	0.05	6.75	9.05	7.93
RG18	6.00	3.29	7.52	2.50	2.57	3.14	1.34	0.00	0.06	6.57	9.31	7.91
RG25	5.24	2.52	6.40	2.35	2.35	3.26	1.42	0.00	0.11	5.56	8.89	7.38
RG30	6.72	3.64	8.24	2.77	2.67	3.09	1.37	0.00	0.08	6.59	9.18	8.21
Monthly Average	**5.40**	**2.97**	**6.61**	**2.27**	**2.32**	**3.03**	**1.53**	**0.00**	**0.16**	**6.12**	**9.36**	**7.89**

Table 5-2. 2008-2012 Average Precipitation by Month (inches)					
Month/Year	**2008**	**2009**	**2010**	**2011**	**2012**
January	4.08	3.86	6.90	5.04	5.40
February	1.27	1.79	3.64	3.42	2.97
March	3.81	3.66	3.32	6.73	6.61
April	2.04	2.90	3.34	3.59	2.27
May	0.85	4.17	3.34	3.10	2.32
June	1.85	0.23	2.25	1.34	3.03
July	0.65	0.11	0.24	0.78	1.53
August	2.79	0.91	0.73	0.06	0.00
September	0.67	2.30	3.88	1.12	0.16
October	2.15	5.48	4.35	2.94	6.12
November	5.24	9.53	4.79	5.91	9.36
December	3.93	2.75	8.83	1.80	7.89
Annual Total	**29.31**	**37.69**	**45.61**	**35.83**	**47.66**

Table 5-3. 2012 Flow Monitor Performance by Outfall and Month																										
NPDES #	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sept		Oct		Nov		Dec		2012 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	34.1	95.3	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	34.1	99.6
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	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
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	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
19	0.0	100.0	0.0	100.0	51.1	93.1	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	51.1	99.4
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	32.8	95.5	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	32.8	99.6
24	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	12.0	98.4	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	12.0	99.9
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	26.8	96.3	0.0	100.0	0.0	100.0	0.0	100.0	26.8	99.7
30	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	1.2	99.8	0.0	100.0	28.8	96.1	1.3	99.8	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	31.3	99.6
31	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
32	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
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		2012 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	71.8	90.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	71.8	99.2
37	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	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	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	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	4.3	100.0
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	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
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
56	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	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	0.7	99.9	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.7	100.0
68	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	18.7	97.4	34.7	95.3	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	53.4	99.4
69	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	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

NPDES #	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sept		Oct		Nov		Dec		2012 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 (%)
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	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
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	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	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	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
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
116	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	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	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	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	41.5	94.2	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	41.5	99.5
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	48.4	93.5	70.5	89.5	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	118.9	98.6

NPDES #	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sept		Oct		Nov		Dec		2012 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 (%)
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	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
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
138	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
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	45.6	93.9	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	45.6	99.5
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	0.5	99.9	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.5	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	57.7	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	57.7	99.3
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	88.4	88.1	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	88.4	99.0
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:	52.7	99.9	71.0	99.9	51.1	99.9	105.2	99.8	70.8	99.9	94.3	99.9	197.4	99.7	1.3	100.0	26.8	100.0	0.0	100.0	0.0	100.0	0.0	100.0	670.6	99.9

Table 5-4. 2012 CSO Details by Outfall and Date

Permit No.	Outfall No.	Facility Name	Receiving Water	CSO Event				
				Starting Date	Duration (hours)	Volume, gallons	Precipitation (inches)	Storm Duration (hours)
WA0031682	**012**	City of Seattle	Lake Washington	11/19/2012	10.87	58,966	3.43	76.58
				Total	10.87	58,966	3.43	76.58
				Average	10.87	58966	3.43	76.58
WA0031682	**013**	City of Seattle	Lake Washington	01/21/2012	2.10	43,571	1.22	17.50
				07/20/2012	2.67	62,070	0.63	8.68
				10/30/2012	12.97	293,168	2.87	115.28
				11/19/2012	19.50	3,121,074	3.49	83.25
				11/23/2012	10.55	120,571	1.12	26.43
				11/30/2012	12.08	792,578	1.64	66.97
				12/20/2012	1.00	38,958	1.44	32.62
				Total	60.87	4,471,990	12.41	350.73
				Average	8.70	638,856	1.77	50.10
WA0031682	**014**	City of Seattle	Lake Washington	*No combined sewer overflow during 2012*				
WA0031682	**015**	City of Seattle	Lake Washington	11/19/2012	12.20	188,222	3.43	76.25
				11/30/2012	2.58	9	1.61	57.97
				Total	14.78	188,231	5.04	134.22
				Average	7.39	94,116	2.52	67.11
WA0031682	**016**	City of Seattle	Lake Washington	*No combined sewer overflow during 2012*				
WA0031682	**018**	City of Seattle	Union Bay	03/29/2012	4.17	39,730	1.18	65.52
				06/05/2012	8.63	106,175	0.66	33.75
				06/07/2012	5.73	24,534	0.53	10.85
				06/22/2012	22.40	75,587	1.13	28.43

Permit No.	Outfall No.	Facility Name	Receiving Water	CSO Event				
				Starting Date	Duration (hours)	Volume, gallons	Precipitation (inches)	Storm Duration (hours)
				07/20/2012	1.27	23,641	0.58	7.20
				11/19/2012	15.83	7,690,619	3.48	81.08
				11/30/2012	7.30	996,311	1.64	64.82
				12/20/2012	5.60	584,889	1.45	33.83
				Total	70.93	9,541,486	10.65	325.48
				Average	8.87	1,192,686	1.33	40.69
WA0031682	**019**	City of Seattle	Union Bay	*No combined sewer overflow during 2012*				
WA0031682	**020**	City of Seattle	Union Bay	11/19/2012	13.23	743,365	3.76	77.65
				11/30/2012	1.13	19,116	1.61	59.13
				Total	14.36	762,481	5.37	136.78
				Average	7.18	381,241	2.69	68.39
WA0031682	**022**	City of Seattle	Union Bay	11/19/2012	19.30	8,886	3.78	83.65
				11/30/2012	18.70	5,237	1.92	73.57
				12/20/2012	3.30	615	1.96	59.12
				12/25/2012	4.93	8,408	3.20	182.72
				Total	46.23	23,146	10.86	399.06
				Average	11.56	5,787	2.72	99.77
WA0031682	**024**	City of Seattle	Lake Washington	11/19/2012	11.00	1,179,613	3.45	75.82
				Total	11.00	1,179,613	3.45	75.82
				Average	11.00	1,179,613	3.45	75.82
WA0031682	**025**	City of Seattle	Lake Washington	11/19/2012	10.77	1,214,977	3.44	75.58
				Total	10.77	1,214,977	3.44	75.58
				Average	10.77	1,214,977	3.44	75.58

Permit No.	Outfall No.	Facility Name	Receiving Water	CSO Event				
				Starting Date	Duration (hours)	Volume, gallons	Precipitation (inches)	Storm Duration (hours)
WA0031682	**026**	City of Seattle	Lake Washington	*No combined sewer overflow during 2012*				
WA0031682	**027**	City of Seattle	Lake Washington	*No combined sewer overflow during 2012*				
WA0031682	**028**	City of Seattle	Lake Washington	03/15/2012	0.08	2,148	1.90	75.87
				11/19/2012	0.27	1,783	3.44	74.68
				Total	0.35	3,931	5.34	150.55
				Average	0.18	1,966	2.67	75.28
WA0031682	**029**	City of Seattle	Lake Washington	03/15/2012	1.73	8,070	1.97	77.60
				05/03/2012	2.33	24,736	1.10	53.07
				07/20/2012	0.08	147	0.59	5.92
				10/30/2012	1.02	1,175	2.24	103.98
				11/19/2012	17.22	181,450	3.45	80.32
				11/23/2012	2.20	11,843	0.90	16.37
				11/30/2012	11.33	52,541	1.61	64.08
				12/02/2012	0.43	280	2.76	101.95
				12/04/2012	1.88	6,134	3.53	134.52
				12/16/2012	1.18	1,457	0.86	34.65
				12/20/2012	4.05	11,593	1.55	33.08
				Total	43.45	299,426	20.56	705.54
				Average	3.95	27,221	1.87	64.14
WA0031682	**030**	City of Seattle	Lake Washington	05/03/2012	1.03	5,450	1.10	52.13
				11/19/2012	14.43	329,510	3.45	78.38
				11/30/2012	3.07	25,779	1.61	58.88
				Total	18.53	360,739	6.16	189.39
				Average	6.18	120,246	2.05	63.13

Permit No.	Outfall No.	Facility Name	Receiving Water	CSO Event				
				Starting Date	Duration (hours)	Volume, gallons	Precipitation (inches)	Storm Duration (hours)
WA0031682	**031**	City of Seattle	Lake Washington	11/19/2012	9.73	8,167	3.44	75.02
				11/30/2012	0.03	3	1.52	57.72
				Total	9.76	8,170	4.96	132.74
				Average	4.88	4,085	2.48	66.37
WA0031682	**032**	City of Seattle	Lake Washington	05/03/2012	1.27	11,420	1.10	52.33
				11/19/2012	14.22	192,498	3.45	78.18
				11/30/2012	3.97	33,938	1.61	60.12
				Total	19.46	237,856	6.16	190.63
				Average	6.49	79,285	2.05	63.54
WA0031682	**033**	City of Seattle	Lake Washington	11/19/2012	0.10	360	3.41	74.48
				Total	0.10	360	3.41	74.48
				Average	0.10	360	3.41	74.48
WA0031682	**034**	City of Seattle	Lake Washington	11/19/2012	11.13	229,082	3.45	76.38
				Total	11.13	229,082	3.45	76.38
				Average	11.13	229,082	3.45	76.38
WA0031682	**035**	City of Seattle	Lake Washington	11/19/2012	1.07	5,893	3.44	75.45
				Total	1.07	5,893	3.44	75.45
				Average	1.07	5,893	3.44	75.45
WA0031682	**036**	City of Seattle	Lake Washington	11/19/2012	11.93	38,677	3.45	76.28
				11/30/2012	0.72	1,415	1.59	58.35
				Total	12.65	40,092	5.04	134.63
				Average	6.33	20,046	2.52	67.32
WA0031682	**037**	City of Seattle	Lake Washington	*No combined sewer overflow during 2012*				

Permit No.	Outfall No.	Facility Name	Receiving Water	CSO Event				
				Starting Date	Duration (hours)	Volume, gallons	Precipitation (inches)	Storm Duration (hours)
WA0031682	**038**	City of Seattle	Lake Washington	11/19/2012	10.38	433,405	3.70	76.80
				Total	10.38	433,405	3.70	76.80
				Average	10.38	433,405	3.70	76.80
WA0031682	**040**	City of Seattle	Lake Washington	01/20/2012	15.90	449,080	1.51	28.70
				03/15/2012	13.83	354,799	3.68	151.07
				03/29/2012	1.13	20,995	1.57	64.87
				11/19/2012	19.67	1,654,903	3.84	83.73
				11/23/2012	5.43	204,400	1.15	19.50
				11/30/2012	12.67	593,093	2.10	66.57
				12/02/2012	1.87	43,306	3.10	103.90
				12/04/2012	2.57	57,845	4.02	135.83
				12/16/2012	6.37	117,316	1.28	42.12
				12/20/2012	4.30	106,502	2.86	125.42
				Total	83.74	3,602,239	25.11	821.71
				Average	8.37	360,224	2.51	82.17
WA0031682	**041**	City of Seattle	Lake Washington	01/20/2012	18.70	164,849	1.51	30.90
				02/01/2012	0.43	93	1.61	76.37
				03/15/2012	15.77	149,808	3.68	152.87
				03/29/2012	5.27	37,546	1.60	67.50
				05/03/2012	2.33	12,009	0.96	22.35
				07/20/2012	0.07	3	0.85	6.35
				10/30/2012	15.07	23,185	3.61	118.28
				11/19/2012	24.07	773,410	3.84	87.60
				11/23/2012	10.20	84,897	1.20	23.77
				11/30/2012	18.93	209,230	1.82	71.20
				12/02/2012	44.40	90,912	4.02	144.87

Permit No.	Outfall No.	Facility Name	Receiving Water	CSO Event				
				Starting Date	Duration (hours)	Volume, gallons	Precipitation (inches)	Storm Duration (hours)
				12/16/2012	14.23	101,061	1.30	46.68
				12/19/2012	19.93	100,944	2.87	130.05
				Total	189.40	1,747,947	28.87	978.79
				Average	14.57	134,457	2.22	75.29
WA0031682	**042**	City of Seattle	Lake Washington	03/15/2012	5.63	17,045	3.51	143.67
				11/19/2012	14.27	373,218	3.70	79.33
				11/30/2012	6.53	63,505	2.10	63.83
				Total	26.43	453,768	9.31	286.83
				Average	8.81	151,256	3.10	95.61
WA0031682	**043**	City of Seattle	Lake Washington	01/20/2012	17.75	298,385	1.51	28.98
				03/15/2012	13.68	264,915	3.68	150.87
				03/29/2012	3.57	40,772	1.60	65.90
				05/03/2012	1.10	7,306	0.96	21.42
				07/20/2012	0.33	1,928	0.87	6.52
				10/18/2012	13.67	119,007	0.85	15.32
				10/30/2012	13.10	26,497	3.59	116.52
				11/19/2012	19.25	1,195,272	3.84	83.00
				11/23/2012	23.04	169,723	1.20	20.90
				11/30/2012	13.70	380,130	2.10	66.53
				12/02/2012	1.95	21,434	3.10	103.62
				12/04/2012	2.27	26,957	4.00	135.20
				12/16/2012	7.25	88,471	1.28	42.33
				12/20/2012	4.67	52,874	2.86	125.42
				Total	135.33	2,693,671	31.44	982.53

Permit No.	Outfall No.	Facility Name	Receiving Water	CSO Event				
				Starting Date	Duration (hours)	Volume, gallons	Precipitation (inches)	Storm Duration (hours)
				Average	9.67	192,405	2.25	70.18
WA0031682	**044**	City of Seattle	Lake Washington	01/02/2012	2.63	100,214	0.56	5.90
				01/04/2012	13.30	358,595	1.40	59.67
				01/20/2012	51.93	1,586,266	1.77	56.93
				01/29/2012	25.47	451,227	0.98	31.87
				02/01/2012	7.33	222,210	1.62	76.92
				02/17/2012	3.90	21,296	0.49	7.38
				03/05/2012	0.50	1,174	0.35	3.78
				03/11/2012	2.83	7,078	0.93	37.02
				03/12/2012	12.50	78,958	1.75	85.18
				03/15/2012	55.42	1,154,727	4.35	187.93
				03/29/2012	10.33	329,059	1.60	69.83
				05/03/2012	2.63	68,538	0.96	22.12
				06/07/2012	0.03	24	0.69	9.93
				07/20/2012	3.32	99,010	0.94	7.42
				10/18/2012	3.80	1,801	0.77	5.42
				10/29/2012	4.10	5,528	1.69	68.27
				10/31/2012	24.63	511,330	3.62	116.52
				11/19/2012	31.43	3,502,992	4.02	94.97
				11/23/2012	12.33	808,919	1.20	24.47
				11/30/2012	91.75	1,749,298	4.02	143.80
				12/16/2012	14.43	566,895	1.30	46.55
				12/19/2012	25.07	702,171	2.87	131.12
				Total	399.66	12,327,310	37.88	1293.00
				Average	18.17	560,332	1.72	58.77
WA0031682	**045**	City of Seattle	Lake Washington	01/20/2012	6.75	1,201	1.51	19.40
				02/01/2012	0.32	442	1.58	75.77

Permit No.	Outfall No.	Facility Name	Receiving Water	CSO Event				
				Starting Date	Duration (hours)	Volume, gallons	Precipitation (inches)	Storm Duration (hours)
				03/15/2012	13.52	106,558	3.68	150.70
				03/29/2012	2.85	2,567	1.56	64.43
				05/03/2012	0.68	581	0.89	19.92
				07/20/2012	2.22	4,742	0.89	6.32
				10/18/2012	0.30	319	0.40	1.82
				10/29/2012	0.23	47	1.40	62.65
				10/31/2012	21.87	3,032	3.55	115.78
				11/19/2012	19.20	539,601	3.84	82.40
				11/23/2012	4.87	84,093	1.13	18.13
				11/30/2012	97.95	101,966	4.05	149.73
				12/16/2012	9.77	20,621	1.28	41.58
				12/19/2012	19.03	24,028	2.77	122.18
				Total	199.56	889,798	28.53	930.81
				Average	14.25	63,557	2.04	66.49
WA0031682	**046**	City of Seattle	Lake Washington	03/15/2012	5.67	2,983	3.50	143.18
				11/19/2012	10.33	24,612	3.70	76.25
				Total	16.00	27,595	7.20	219.43
				Average	8.00	13,798	3.60	109.72
WA0031682	**047**	City of Seattle	Lake Washington	01/20/2012	8.80	103,642	1.94	20.12
				02/01/2012	0.35	1,328	1.65	76.17
				03/15/2012	6.57	796,076	3.99	144.00
				03/29/2012	1.32	6,960	1.53	64.07
				07/20/2012	0.60	15,061	0.82	6.13
				10/30/2012	0.13	90	2.64	103.47

Permit No.	Outfall No.	Facility Name	Receiving Water	CSO Event				
				Starting Date	Duration (hours)	Volume, gallons	Precipitation (inches)	Storm Duration (hours)
				11/19/2012	15.10	7,304,466	3.56	78.43
				11/23/2012	3.40	817,816	1.19	16.60
				11/30/2012	10.67	886,470	1.70	59.40
				12/02/2012	34.27	39,640	3.88	134.42
				12/16/2012	5.18	22,324	1.30	40.57
				12/20/2012	3.08	7,059	2.98	125.13
				Total	89.47	10,000,932	27.18	868.51
				Average	7.46	833,411	2.27	72.38
WA0031682	**048**	City of Seattle	Lake Washington	*No combined sewer overflow during 2012*				
WA0031682	**049**	City of Seattle	Lake Washington	01/21/2012	6.40	209,423	1.94	20.12
				03/15/2012	4.28	109,128	3.99	144.43
				11/19/2012	13.97	1,358,822	3.56	79.08
				11/23/2012	3.23	134,712	1.20	17.73
				11/30/2012	7.37	172,020	1.95	64.42
				Total	35.25	1,984,105	12.64	325.78
				Average	7.05	396,821	2.53	65.16
WA0031682	**056**	City of Seattle	Puget Sound	*No combined sewer overflow during 2012*				
WA0031682	**057**	City of Seattle	Puget Sound	*No combined sewer overflow during 2012*				
WA0031682	**059**	City of Seattle	Salmon Bay	01/21/2012	3.43	80,451	1.40	18.20
				11/19/2012	2.08	14,957	3.51	70.48
				Total	5.51	95,408	4.91	88.68

Permit No.	Outfall No.	Facility Name	Receiving Water	CSO Event				
				Starting Date	Duration (hours)	Volume, gallons	Precipitation (inches)	Storm Duration (hours)
				Average	2.76	47,704	2.46	44.34
WA0031682	**060**	City of Seattle	Salmon Bay	03/15/2012	0.20	11,154	1.69	75.75
				07/03/2012	0.17	5,163	0.71	19.60
				10/30/2012	0.63	17,234	2.82	111.68
				11/19/2012	8.20	518,151	3.59	72.08
				11/30/2012	0.23	3,492	1.60	57.97
				12/17/2012	1.33	172,716	1.83	86.30
				Total	10.76	727,910	12.24	423.38
				Average	1.79	121,318	2.04	70.56
WA0031682	**061**	City of Seattle	Elliott Bay	*No combined sewer overflow during 2012*				
WA0031682	**062**	City of Seattle	Elliott Bay	11/19/2012	6.80	237	3.97	75.30
				Total	6.80	237	3.97	75.30
				Average	6.80	237	3.97	75.30
WA0031682	**064**	City of Seattle	Elliott Bay	*No combined sewer overflow during 2012*				
WA0031682	**068**	City of Seattle	Elliott Bay	11/19/2012	7.00	2,801,197	3.69	70.83
				Total	7.00	2,801,197	3.69	70.83
				Average	7.00	2,801,197	3.69	70.83
WA0031682	**069**	City of Seattle	Elliott Bay	05/21/2012	0.23	44,198	0.71	30.80
				11/19/2012	10.47	232,895	3.89	74.57
				Total	10.70	277,093	4.60	105.37
				Average	5.35	138,547	2.30	52.69

Permit No.	Outfall No.	Facility Name	Receiving Water	CSO Event				
				Starting Date	Duration (hours)	Volume, gallons	Precipitation (inches)	Storm Duration (hours)
WA0031682	**070**	City of Seattle	Elliott Bay	*No combined sewer overflow during 2012*				
WA0031682	**071**	City of Seattle	Elliott Bay	03/15/2012	0.78	40,350	1.82	74.33
				05/03/2012	1.00	33,459	0.93	21.48
				07/20/2012	1.37	59,942	0.67	7.02
				11/19/2012	11.17	466,903	3.89	74.97
				11/21/2012	0.15	28	5.19	111.03
				Total	14.47	600,682	12.50	288.83
				Average	2.89	120,136	2.50	57.77
WA0031682	**072**	City of Seattle	Elliott Bay	*No combined sewer overflow during 2012*				
WA0031682	**078**	City of Seattle	Elliott Bay	*No combined sewer overflow during 2012*				
WA0031682	**080**	City of Seattle	Elliott Bay	*No combined sewer overflow during 2012*				
WA0031682	**083**	City of Seattle	Puget Sound	*No combined sewer overflow during 2012*				
WA0031682	**085**	City of Seattle	Puget Sound	*No combined sewer overflow during 2012*				
WA0031682	**088**	City of Seattle	Puget Sound	*No combined sewer overflow during 2012*				
WA0031682	**090**	City of Seattle	Puget Sound	*No combined sewer overflow during 2012*				
WA0031682	**091**	City of Seattle	Puget Sound	*No combined sewer overflow during 2012*				

Permit No.	Outfall No.	Facility Name	Receiving Water	CSO Event				
				Starting Date	Duration (hours)	Volume, gallons	Precipitation (inches)	Storm Duration (hours)
WA0031682	**094**	City of Seattle	Puget Sound	*No combined sewer overflow during 2012*				
WA0031682	**095**	City of Seattle	Puget Sound	11/19/2012	0.22	4,276	3.74	74.70
				Total	0.22	4,276	3.74	74.70
				Average	0.22	4,276	3.74	74.70
WA0031682	**099**	City of Seattle	West Waterway - Duwamish River	03/15/2012	0.33	7,043	2.93	143.07
				11/19/2012	16.97	1,818,811	3.83	81.87
				11/30/2012	7.10	456,400	1.91	64.95
				12/04/2012	0.63	8,474	3.81	135.55
				12/20/2012	4.97	204,134	2.74	122.87
				Total	30.00	2,494,862	15.22	548.31
				Average	6.00	498,972	3.04	109.66
WA0031682	**107**	City of Seattle	East Waterway - Duwamish River	03/15/2012	1.33	84,733	2.72	138.17
				03/29/2012	1.03	12,294	1.42	63.23
				05/03/2012	0.63	12,428	0.84	21.77
				11/19/2012	11.03	242,586	3.72	75.00
				Total	14.02	352,041	8.70	298.17
				Average	3.51	88,010	2.18	74.54
WA0031682	**111**	City of Seattle	Duwamish River	11/19/2012	26.23	314,968	3.73	76.23
				Total	26.23	314,968	3.73	76.23
				Average	26.23	314,968	3.73	76.23
WA0031682	**116**	City of Seattle	Duwamish River	*No combined sewer overflow during 2012*				
WA0031682	**120**	City of Seattle	Lake Union	*No combined sewer overflow during 2012*				

Permit No.	Outfall No.	Facility Name	Receiving Water	CSO Event				
				Starting Date	Duration (hours)	Volume, gallons	Precipitation (inches)	Storm Duration (hours)
WA0031682	**121**	City of Seattle	Lake Union	*No combined sewer overflow during 2012*				
WA0031682	**124**	City of Seattle	Lake Union	*No combined sewer overflow during 2012*				
WA0031682	**127**	City of Seattle	Lake Union	*No combined sewer overflow during 2012*				
WA0031682	**129**	City of Seattle	Lake Union	*No combined sewer overflow during 2012*				
WA0031682	**130**	City of Seattle	Lake Union	*No combined sewer overflow during 2012*				
WA0031682	**131**	City of Seattle	Lake Union	*No combined sewer overflow during 2012*				
WA0031682	**132**	City of Seattle	Lake Union	*No combined sewer overflow during 2012*				
WA0031682	**134**	City of Seattle	Lake Union	*No combined sewer overflow during 2012*				
WA0031682	**135**	City of Seattle	Lake Union	*No combined sewer overflow during 2012*				
WA0031682	**136**	City of Seattle	Lake Union	*No combined sewer overflow during 2012*				
WA0031682	**138**	City of Seattle	Portage Bay	11/19/2012	11.58	620,636	3.76	76.25
				11/30/2012	0.67	28,653	1.60	58.30
				Total	12.25	649,289	5.36	134.55
				Average	6.13	324,645	2.68	67.28
WA0031682	**139**	City of Seattle	Portage Bay	05/21/2012	0.13	8,488	0.68	30.27
				11/19/2012	10.47	311,915	3.70	74.92

Permit No.	Outfall No.	Facility Name	Receiving Water	CSO Event				
				Starting Date	Duration (hours)	Volume, gallons	Precipitation (inches)	Storm Duration (hours)
				Total	10.60	320,403	4.38	105.19
				Average	5.30	160,202	2.19	52.60
WA0031682	**140**	City of Seattle	Portage Bay	03/15/2012	5.53	3,881	1.95	74.75
				05/21/2012	0.13	4,099	0.67	30.20
				06/07/2012	0.03	2,110	0.60	9.08
				11/19/2012	12.27	427,241	3.76	76.38
				Total	17.96	437,331	6.98	190.41
				Average	4.49	109,333	1.75	47.60
WA0031682	**141**	City of Seattle	Portage Bay	*No combined sewer overflow during 2012*				
WA0031682	**144**	City of Seattle	Lake Union	*No combined sewer overflow during 2012*				
WA0031682	**145**	City of Seattle	Lake Union	*No combined sewer overflow during 2012*				
WA0031682	**146**	City of Seattle	Lake Union	*No combined sewer overflow during 2012*				
WA0031682	**147**	City of Seattle	Lake Union	01/02/2012	3.83	107,387	0.55	4.43
				01/04/2012	5.27	280,004	1.27	48.87
				01/20/2012	15.67	108,870	1.42	21.88
				01/22/2012	0.43	11,896	1.66	54.32
				01/24/2012	0.17	1,486	0.22	7.97
				01/25/2012	6.40	54,096	0.82	47.12
				01/29/2012	21.42	27,469	0.56	21.65
				02/01/2012	4.00	98,468	0.56	11.77
				02/17/2012	2.87	66,678	0.49	32.75
				02/18/2012	0.08	156	0.72	61.30
				02/24/2012	11.58	4,257	0.38	23.50
				03/11/2012	0.08	31	0.86	38.22
				03/12/2012	3.08	101,644	1.59	77.13

Permit No.	Outfall No.	Facility Name	Receiving Water	CSO Event				
				Starting Date	Duration (hours)	Volume, gallons	Precipitation (inches)	Storm Duration (hours)
				03/14/2012	28.67	150,494	3.10	145.38
				03/17/2012	23.27	11,441	3.82	207.07
				03/28/2012	61.73	322,201	2.08	102.75
				04/05/2012	0.08	3,573	0.10	0.93
				04/25/2012	3.00	16,094	0.39	25.17
				05/03/2012	23.10	59,735	0.97	39.83
				05/21/2012	0.38	70,648	0.64	30.23
				06/05/2012	17.58	26,583	0.87	40.52
				06/07/2012	7.28	80,047	0.64	9.38
				06/22/2012	25.33	50,386	1.18	27.92
				07/03/2012	1.02	147,865	0.44	4.73
				07/13/2012	0.53	39,485	0.14	0.97
				07/20/2012	4.17	156,303	0.69	7.62
				09/10/2012	0.27	6,456	0.26	0.53
				10/14/2012	20.55	33,276	0.95	83.43
				10/18/2012	26.23	195,645	1.03	26.72
				10/21/2012	2.35	5,215	1.30	71.58
				10/27/2012	8.55	6,669	0.69	31.38
				10/28/2012	5.00	69,855	1.21	63.47
				10/30/2012	53.12	1,474,466	4.49	142.33
				11/02/2012	0.25	2,101	0.12	1.62
				11/04/2012	4.73	61,482	0.62	56.27
				11/11/2012	5.62	1,510	0.53	13.30
				11/16/2012	0.03	7	0.22	2.98
				11/18/2012	79.50	5,255,239	5.23	116.48
				11/23/2012	15.93	440,872	1.24	25.17
				11/30/2012	113.97	2,629,491	4.21	149.63
				12/12/2012	0.60	10,060	0.31	18.55
				12/14/2012	0.57	6,615	0.94	66.22
				12/16/2012	10.10	560,063	1.27	39.87
				12/19/2012	31.33	1,531,494	2.30	35.58

Permit No.	Outfall No.	Facility Name	Receiving Water	CSO Event				
				Starting Date	Duration (hours)	Volume, gallons	Precipitation (inches)	Storm Duration (hours)
				12/23/2012	0.17	7	2.69	112.08
				12/25/2012	5.13	348,229	3.41	155.22
				12/26/2012	17.17	24	3.87	205.17
				Total	672.19	14,636,073	63.05	2510.99
				Average	14.30	311,406	1.34	53.43
WA0031682	**148**	City of Seattle	Lake Washington - Ship Canal	*No combined sewer overflow during 2012*				
WA0031682	**150**	City of Seattle	Salmon Bay	01/02/2012	0.92	3,229	0.36	2.72
				01/04/2012	7.97	91,422	1.23	53.27
				01/20/2012	6.17	1,573	1.40	21.03
				01/26/2012	0.28	22,952	0.70	47.62
				01/29/2012	21.25	4,649	0.44	21.78
				02/01/2012	0.58	44,050	0.43	8.57
				02/17/2012	0.33	1,073	0.24	30.78
				02/28/2012	0.17	1,188	0.29	7.55
				03/12/2012	0.58	97	0.40	10.65
				03/15/2012	0.68	205,591	1.69	76.08
				03/28/2012	42.25	11,448	1.48	83.77
				04/25/2012	0.33	5,000	0.26	23.78
				05/04/2012	0.33	358	0.93	40.32
				06/05/2012	0.42	87	0.24	23.97
				06/07/2012	0.08	17	0.55	10.35
				06/22/2012	0.25	21	0.46	7.17
				07/03/2012	11.42	412,538	0.72	21.12
				07/13/2012	0.33	2,247	0.25	1.30
				07/20/2012	3.08	34,378	0.56	6.70
				09/10/2012	0.17	90	0.27	0.38
				10/14/2012	0.35	1,038	0.60	62.73
				10/18/2012	2.00	75,726	0.49	2.80
				10/27/2012	0.57	5,131	0.39	24.95

Permit No.	Outfall No.	Facility Name	Receiving Water	CSO Event				
				Starting Date	Duration (hours)	Volume, gallons	Precipitation (inches)	Storm Duration (hours)
				10/29/2012	0.53	44,087	0.99	64.75
				10/30/2012	51.05	485,187	4.48	143.68
				11/18/2012	74.47	2,801,959	4.94	111.52
				11/23/2012	15.57	22,572	0.98	25.08
				11/30/2012	97.67	524,425	3.81	149.53
				12/16/2012	9.57	43,440	1.80	79.07
				12/19/2012	26.17	25,777	1.93	31.73
				12/25/2012	2.47	97	2.93	153.37
				Total	378	4,871,447	36	1,348
				Average	12	157,143	1	43
WA0031682	**152**	City of Seattle	Salmon Bay	01/02/2012	4.17	662,143	0.50	4.88
				01/04/2012	10.17	1,177,610	1.23	53.80
				01/09/2012	1.25	7,087	0.17	2.33
				01/14/2012	2.00	52,277	0.19	8.22
				01/20/2012	53.83	3,071,102	1.67	57.82
				01/24/2012	7.17	87,462	0.27	10.33
				01/25/2012	10.92	325,610	0.74	51.42
				01/29/2012	21.75	216,806	0.44	22.20
				02/01/2012	4.25	458,191	0.45	9.00
				02/13/2012	0.50	733	0.23	8.42
				02/17/2012	31.58	320,129	0.59	61.37
				02/24/2012	17.25	110,122	0.33	18.12
				02/28/2012	16.17	124,530	0.42	17.97
				03/05/2012	0.58	4,855	0.17	3.53
				03/09/2012	33.67	84,948	0.69	38.25
				03/12/2012	10.08	369,613	0.49	12.90
				03/14/2012	73.58	1,591,624	2.23	125.15
				03/18/2012	1.08	5,662	2.33	158.00
				03/19/2012	2.42	319	0.13	4.03
WA0031682	**152**	City of Seattle	Salmon Bay (continued)	03/28/2012	75.92	1,824,344	1.97	117.27

Permit No.	Outfall No.	Facility Name	Receiving Water	CSO Event				
				Starting Date	Duration (hours)	Volume, gallons	Precipitation (inches)	Storm Duration (hours)
				04/03/2012	0.33	7,863	0.11	9.15
				04/11/2012	0.67	31,668	0.13	2.28
				04/19/2012	14.93	25,408	0.35	15.87
				04/25/2012	3.33	160,275	0.36	26.78
				04/29/2012	0.85	11,597	0.14	2.98
				05/01/2012	0.08	108	0.13	0.88
				05/03/2012	27.68	371,363	0.93	40.75
				05/21/2012	4.70	11,052	0.45	30.40
				05/24/2012	0.17	4,951	0.07	0.73
				06/05/2012	14.00	179,525	0.57	37.13
				06/07/2012	8.75	226,494	0.55	10.60
				06/22/2012	25.75	301,970	0.88	28.07
				06/26/2012	0.42	14,981	0.20	10.28
				07/03/2012	13.08	1,696,094	0.79	22.62
				07/13/2012	0.58	50,622	0.25	1.55
				07/20/2012	3.67	649,714	0.57	7.03
				09/10/2012	5.25	30,879	0.27	5.38
				10/14/2012	23.83	65,251	0.87	82.88
				10/18/2012	26.75	489,348	0.74	26.97
				10/21/2012	21.67	389	0.22	36.52
				10/27/2012	11.08	80,215	0.54	32.97
				10/29/2012	5.17	270,434	0.99	64.97
				10/30/2012	52.42	4,513,036	4.08	144.80
				11/02/2012	0.42	1,445	0.12	1.87
				11/04/2012	5.00	74,192	0.63	56.53
				11/11/2012	7.50	92,388	0.57	9.38
				11/13/2012	0.50	344	1.03	53.35
				11/16/2012	119.00	15,236,505	5.04	120.83
				11/23/2012	17.58	1,128,452	0.99	25.83
				11/28/2012	148.58	7,157,117	3.71	150.45
				12/12/2012	2.25	207,156	0.43	15.75

Permit No.	Outfall No.	Facility Name	Receiving Water	CSO Event				
				Starting Date	Duration (hours)	Volume, gallons	Precipitation (inches)	Storm Duration (hours)
				12/13/2012	7.75	194,335	0.56	10.63
				12/15/2012	62.25	2,117,892	1.90	104.88
				12/19/2012	39.25	5,522,134	1.97	42.78
				12/22/2012	36.08	161,126	2.42	114.62
				12/25/2012	6.75	763,181	3.02	156.62
				12/26/2012	2.18	37,605	3.28	189.80
				Total	1098.59	52,382,276	55.10	2479.92
				Average	19.27	918,987	0.97	43.51
WA0031682	**161**	City of Seattle	Lake Washington	*No combined sewer overflow during 2012*				
WA0031682	**165**	City of Seattle	Lake Washington	03/15/12	0.35	6,724	3.19	137.53
				11/19/12	10.08	47,746	3.70	76.17
				Total	10.43	54,470	6.89	213.70
				Average	5.22	27,235	3.45	106.85
WA0031682	**168**	City of Seattle	Longfellow Creek	03/15/2012	17.17	717,003	3.87	164.15
				11/19/2012	30.07	4,647,035	4.03	97.53
				Total	47.24	5,364,038	7.90	261.68
				Average	23.62	2,682,019	3.95	130.84
WA0031682	**169**	City of Seattle	Longfellow Creek	11/19/2012	16.03	2,587,257	3.80	82.73
				Total	16.03	2,587,257	3.80	82.73
				Average	16.03	2,587,257	3.80	82.73
WA0031682	**170**	City of Seattle	Longfellow Creek	11/19/2012	0.90	12,286	3.72	75.80
				Total	0.90	12,286	3.72	75.80
				Average	0.90	12,286	3.72	75.80
WA0031682	**171**	City of Seattle	Lake Washington	01/04/2012	0.05	124	1.22	48.72

Permit No.	Outfall No.	Facility Name	Receiving Water	CSO Event				
				Starting Date	Duration (hours)	Volume, gallons	Precipitation (inches)	Storm Duration (hours)
				01/20/2012	14.42	225,924	1.94	29.77
				02/01/2012	0.47	4,471	1.66	76.37
				03/15/2012	6.63	175,022	3.99	143.97
				03/29/2012	1.40	17,006	1.54	64.23
				07/20/2012	0.60	24,764	0.83	6.30
				10/30/2012	0.30	915	1.86	103.57
				11/19/2012	15.78	1,156,170	3.56	79.25
				11/23/2012	3.83	187,239	1.19	17.07
				11/30/2012	10.83	234,103	1.95	64.32
				12/02/2012	34.50	96,660	3.89	134.65
				12/16/2012	5.33	51,526	1.32	40.73
				12/20/2012	3.33	25,519	2.98	125.37
				Total	97.47	2,199,443	27.93	934.32
				Average	7.50	169,188	2.15	71.87
WA0031682	**174**	City of Seattle	Lake Washington Canal	01/02/2012	1.12	62,719	0.52	3.97
				01/04/2012	2.70	249,210	1.26	48.63
				02/01/2012	0.93	43,092	0.56	11.77
				03/12/2012	1.25	94,412	1.59	76.97
				03/15/2012	2.15	111,831	3.07	142.03
				03/29/2012	2.95	273,906	1.52	64.38
				05/21/2012	0.03	835	0.59	29.97
				07/20/2012	1.15	85,676	0.66	7.18
				10/18/2012	1.80	24,613	0.65	3.45
				10/30/2012	15.13	1,139,350	4.10	116.80
				11/19/2012	49.70	3,651,620	5.13	113.32

Permit No.	Outfall No.	Facility Name	Receiving Water	CSO Event				
				Starting Date	Duration (hours)	Volume, gallons	Precipitation (inches)	Storm Duration (hours)
				11/23/2012	106.03	258,595	0.83	17.70
				11/30/2012	49.07	1,685,297	2.89	101.87
				12/04/2012	2.63	312,262	4.04	135.00
				12/16/2012	5.13	475,798	0.25	36.27
				12/19/2012	22.72	1,547,139	2.30	35.50
				12/25/2012	2.60	245,786	3.41	155.12
				Total	267.09	10,262,141	33.37	1099.93
				Average	15.71	603,655	1.96	64.70
WA0031682	**175**	City of Seattle	Lake Union	*No combined sewer overflow during 2012*				

Table 5-5. Comparison of 2012 and Baseline Flows by Outfall								
Outfall Number	2008 - 2012 Average CSO Frequency (#/year)	2012 CSO Discharge Events			Receiving Waters of Overflow	2010 Baseline CSO		2012 CSOs Compared to 2010 Baseline CSO
		Frequency (#/year)	Duration (hours)	Volume (gallons)		Frequency (#/year)	Volume (MG/year)	
012	0.4	1	10.87	58,966	Lake Washington	0[1]	0[1]	Above
013	4.4	7	60.87	4,471,990	Lake Washington	12[1]	6.7[1]	Below
014	0.2	0	0.00	0	Lake Washington	0[1]	0[1]	Equals
015	3.6	2	14.78	188,231	Lake Washington	1.2[1]	0.3[1]	Frequency above, Volume below
016	0.2	0	0.00	0	Lake Washington	0[2]	0	Equals
018	5.6	8	70.93	9,541,486	Union Bay	6.6[2]	0.5	Above
019	0.0	0	0.00	0	Union Bay	0.2[2]	0	Frequency below, Volume equals
020	2.2	2	14.36	762,481	Union Bay	2.6[2]	0.1	Frequency below, Volume above
022	1.4	4	46.23	23,146	Union Bay	0.7[2]	0.1	Frequency above, Volume below
024	0.6	1	11.00	1,179,613	Lake Washington	0.2[2]	0	Above
025	1.0	1	10.77	1,214,977	Lake Washington	2.8[2]	1.6	Below
026	0	0	0.00	0	Lake Washington	0.3[2]	0	Frequency below, Volume equals
027	0	0	0.00	0	Lake Washington	0[2]	0	Equals
028	8.0	2	0.35	3,931	Lake Washington	15[2]	0.4	Below
029	5.0	11	43.45	299,426	Lake Washington	4.7[2]	0.3	Frequency above, Volume below
030	1.4	3	18.53	360,739	Lake Washington	5.4[2]	0.7	Below
031	8.0	2	9.76	8,170	Lake Washington	9.3[2]	0.5	Below
032	3.6	3	19.46	237,856	Lake Washington	8.4[2]	0.3	Below
033	0.4	1	0.10	360	Lake Washington	0.2[2]	0	Above
034	0.6	1	11.13	229,082	Lake Washington	1.4[2]	0.5	Below
035	1.0	1	1.07	5,893	Lake Washington	2.0[3]	0.3	Below
036	2.0	2	12.65	40,092	Lake Washington	2.7[2]	0.1	Below
037	0.0	0	0.00	0	Lake Washington	0[4]	0[4]	Equals
038	0.6	1	10.38	433,405	Lake Washington	0.7[4]	0.4[4]	Above
040	5.2	10	83.74	3,602,239	Lake Washington	6.0[4]	0.8[4]	Above
041	9.2	13	189.40	1,747,947	Lake Washington	7.5[4]	0.9[4]	Above
042	1.4	3	26.43	453,768	Lake Washington	0.6[4]	0.02[4]	Above
043	8.8	14	135.33	2,693,671	Lake Washington	7.0[4]	0.7[4]	Above
044	16.6	22	399.66	12,327,310	Lake Washington	13[5]	9.3[5]	Above
045	10.2	14	199.56	889,798	Lake Washington	5.9[5]	1.1[5]	Frequency above, Volume below

Outfall Number	2008 - 2012 Average CSO Frequency (#/year)	2012 CSO Discharge Events			Receiving Waters of Overflow	2010 Baseline CSO		2012 CSOs Compared to 2010 Baseline CSO
		Frequency (#/year)	Duration (hours)	Volume (gallons)		Frequency (#/year)	Volume (MG/year)	
046	7.2	2	16.00	27,595	Lake Washington	6.5[5]	0.9[5]	Below
047	8.4	12	89.47	10,000,932	Lake Washington	5.6[5]	1.8[5]	Above
048	0.0	0	0.00	0	Lake Washington	0[5]	0[5]	Equals
049	3.6	5	35.25	1,984,105	Lake Washington	1.6[5]	0.8[5]	Above
056	0.0	0	0.00	0	Puget Sound	0[2]	0	Equals
057	0.0	0	0.00	0	Puget Sound	0[2]	0	Equals
059	0.6	2	5.51	95,408	Salmon Bay	0.2[2]	0.4	Frequency above, Volume below
060	3.0	6	10.76	727,910	Salmon Bay	1.7[3]	0.8	Frequency above, Volume below
061	0.2	0	0.00	0	Elliott Bay	0[2]	0	Equals
062	0.8	1	6.80	237	Elliott Bay	0.7[3]	0	Above
064	0.0	0	0.00	0	Elliott Bay	0.1[2]	0	Frequency below, Volume equals
068	0.6	1	7.00	2,801,197	Elliott Bay	1.4[2]	1.3	Below
069	1.8	2	10.70	277,093	Elliott Bay	4.4[6]	1.4[6]	Below
070	0.2	0	0.00	0	Elliott Bay	0.9[6]	0.2[6]	Below
071	5.2	5	14.47	600,682	Elliott Bay	4.3[3]	1.3	Frequency above, Volume below
072	0.0	0	0.00	0	Elliott Bay	1.2[6]	0.3[6]	Below
078	0.0	0	0.00	0	Elliott Bay	0.3[2]	0.2	Below
080	0.0	0	0.00	0	Elliott Bay	0[2]	0	Equals
083	0.0	0	0.00	0	Puget Sound	0[2]	0	Equals
085	0.0	0	0.00	0	Puget Sound	0[2]	0	Equals
088	0.0	0	0.00	0	Puget Sound	0.3[2]	0.2	Below
090	0.0	0	0.00	0	Puget Sound	0.2[2]	0	Frequency below, Volume equals
091	0.0	0	0.00	0	Puget Sound	0[2]	0	Equals
094	0.0	0	0.00	0	Puget Sound	0.1[2]	0	Frequency below, Volume equals
095	3.0	1	0.22	4,276	Puget Sound	3.0[2]	0.4	Below
099	2.2	5	30.00	2,494,862	W Waterway - Duwamish River	0.5[7]	2.8	Frequency above, Volume below
107	6.8	4	14.02	352,041	E Waterway - Duwamish River	3.8[2]	1.9	Frequency above, Volume below
111	2.4	1	26.23	314,968	Duwamish River	3.0[3]	7.9	Below
116	0.0	0	0.00	0	Duwamish River	0[2]	0	Equals
120	0.0	0	0.00	0	Lake Union	0[2]	0	Equals
121	0.0	0	0.00	0	Lake Union	0.1[2]	0	Frequency below, Volume equals

Outfall Number	2008 - 2012 Average CSO Frequency (#/year)	2012 CSO Discharge Events			Receiving Waters of Overflow	2010 Baseline CSO		2012 CSOs Compared to 2010 Baseline CSO
		Frequency (#/year)	Duration (hours)	Volume (gallons)		Frequency (#/year)	Volume (MG/year)	
124	0.0	0	0.00	0	Lake Union	0[2]	0	Equals
127	0.4	0	0.00	0	Lake Union	0.7[2]	0.1	Below
129	0.0	0	0.00	0	Lake Union	0.1[2]	0	Frequency below, Volume equals
130	0.0	0	0.00	0	Lake Union	0[3]	0	Equals
131	0.0	0	0.00	0	Lake Union	0.1[2]	0	Frequency below, Volume equals
132	0.2	0	0.00	0	Lake Union	0.7[3]	0	Frequency below, Volume equals
134	0.0	0	0.00	0	Lake Union	0[2]	0	Equals
135	0.2	0	0.00	0	Lake Union	0.3[3]	0	Frequency below, Volume equals
136	0.0	0	0.00	0	Lake Union	0[2]	0	Equals
138	1.8	2	12.25	649,289	Portage Bay	2.3[2]	2.0	Below
139	1.2	2	10.60	320,403	Portage Bay	0.7[3]	1.4	Frequency above, Volume below
140	4.4	4	17.96	437,331	Portage Bay	4.1[2]	0.3	Frequency below, Volume above
141	0.0	0	0.00	0	Portage Bay	0.1[2]	0	Frequency below, Volume equals
144	0.0	0	0.00	0	Lake Union	0.1[2]	0.2	Below
145	0.0	0	0.00	0	Lake Union	0[2]	0	Equals
146	0.0	0	0.00	0	Lake Union	0[2]	0	Equals
147	49.0	47	672.19	14,636,073	Lake Union	33[2]	19	Frequency above, Volume below
148	0.6	0	0.00	0	Lake Washington Ship Canal	0[2]	0	Equals
150/151	21.8	31	378.01	4,871,447	Salmon Bay	15[2]	2.0	Above
152	41.6	57	1098.59	52,382,276	Salmon Bay	15[2]	9.7	Above
161	0.0	0	0.00	0	Lake Washington	0[2]	0	Equals
165	1.0	2	10.43	54,470	Lake Washington	1.1[4]	0.02[4]	Above
168	2.0	2	47.24	5,364,038	Longfellow Creek	3.9[2]	1.6	Below
169	1.4	1	16.03	2,587,257	Longfellow Creek	2.2[2]	49	Below
170	0.8	1	0.90	12,286	Longfellow Creek	0.4[2]	0.1	Frequency above, Volume below
171	7.6	13	97.47	2,199,443	Lake Washington	4.1[5]	0.75	Above
174	12.0	17	267.09	10,262,141	Lake Washington Ship Canal	11[2]	5.9	Above
175	0.2	0	0.00	0	Lake Union	0.7[3]	0	Frequency below, Volume equals
Total	**294**	**355**	**4,296**	**154,232,337**		**252**	**140**	

Notes:

1. Baseline frequency and volume were determined using long-term (31 year) model simulations as reported in the Windermere CSO Reduction Project Engineering Report, November 18, 2009.
2. Baseline frequency calculated using a 9-year average (2001~2009) of overflow frequencies as reported in the City of Seattle's CSO Annual Report to Ecology.
3. Baseline frequency calculated using a 3-year average (2007~2009) of overflow frequencies as reported in the City of Seattle's CSO Annual Report to Ecology.
4. Baseline frequency and volume were determined using long-term (31-year) model simulations as reported in Technical Memorandum to SPU: Genesee Confidence Bounds; November 17, 2009; prepared by Dan O'Leary, CH2M HILL.
5. Baseline frequency and volume were determined using long-term (31-year) model simulations as reported in Technical Memorandum to SPU: Henderson Confidence Bounds; December 15, 2009; prepared by Dustin Atchison, CH2M HILL.
6. Baseline frequency and volume were determined using long -term (31 year) model simulations as reported in "Major Project Decisions for Alaskan Way Viaduct Seawall Replacement Project Stormwater and CSO Control For vine, University, Madison and Washington Basins, April 2009."
7. Baseline frequency calculated using a 2-year average (2008~2009) of overflow frequencies as reported in the City of Seattle's CSO Annual Report to Ecology.
8. Baseline volume calculated using 3-year average (2007~2009) of overflow volume as reported in the City of Seattle's CSO Annual Report to Ecology, unless otherwise noted.

Table 5-6. 2008-2012 Summary Comparison of CSOs by Outfall

NPDES #	Overflow Frequency (# per Year)					Overflow Event Duration (Hours)					Overflow Volume (Gallons per Year)					Receiving Waters
	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012	
12	0	0	1	0	1	0	0.00	12.40	0.00	10.87	0	0	223,010	0	58,966	Lake Washington
13	2	4	5	4	7	3	14.13	70.70	49.66	60.87	38,552	1,157,651	6,526,814	1,397,291	4,471,990	Lake Washington
14	0	1	0	0	0	0	0.08	0.00	0.00	0.00	0	163	0	0	0	Lake Washington
15	0	8	4	4	2	0	16.95	41.45	4.03	14.78	0	242,956	1,409,738	22,529	188,231	Lake Washington
16	0	1	0	0	0	0	1.00	0.00	0.00	0.00	0	6	0	0	0	Lake Washington
18	3	8	5	4	8	31	23.19	75.72	20.39	70.93	18,017	2,949,987	17,174,989	1,772,295	9,541,486	Union Bay
19	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0	Union Bay
20	0	3	3	3	2	0	3.33	24.13	17.03	14.36	0	68,255	1,943,677	189,159	762,481	Union Bay
22	0	1	1	1	4	0	2.42	19.00	2.23	46.23	0	14,101	1,193,468	6,285	23,146	Union Bay
24	0	1	1	0	1	0	0.73	13.77	0.00	11.00	0	41,390	2,181,178	0	1,179,613	Lake Washington
25	1	2	1	0	1	3	1.80	13.50	0.00	10.77	467,545	34,467	2,402,363	0	1,214,977	Lake Washington
26	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0	Lake Washington
27	0	0	0	0	0	0	0.00	0.00	0.00	0.000	0	0	0	0	0	Lake Washington
28	26	8	2	2	2	227	37.65	0.38	0.11	0.35	529,472	50,283	324	1,204	3,931	Lake Washington
29	5	4	2	3	11	73	31.12	10.78	38.41	43.45	296,184	617,548	42,839	24,029	299,426	Lake Washington
30	2	1	0	1	3	5	3.75	0.00	0.03	18.53	66,356	89,479	0	13	360,739	Lake Washington
31	4	12	11	11	2	8	88.00	116.21	99.19	9.76	75,212	548,679	957,983	356,655	8,170	Lake Washington
32	1	7	3	4	3	1	16.22	25.53	44.43	19.46	20,354	136,956	1,111,491	368,002	237,856	Lake Washington
33	0	1	0	0	1	0	0.08	0.00	0.00	0.10	0	7,875	0	0	360	Lake Washington
34	0	1	1	0	1	0	0.53	16.57	0.00	11.13	0	8,590	833,946	0	229,082	Lake Washington
35	0	3	0	1	1	0	19.25	0.00	0.25	1.07	0	16,387	0	1,815	5,893	Lake Washington
36	0	5	2	1	2	0	42.48	19.43	14.43	12.65	0	232,619	256,969	16,852	40,092	Lake Washington
37	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0	Lake Washington
38	0	1	1	0	1	0	7.42	18.97	0.00	10.38	0	365,042	2,144,838	0	433,405	Lake Washington

NPDES #	Overflow Frequency (# per Year)					Overflow Event Duration (Hours)					Overflow Volume (Gallons per Year)					Receiving Waters
	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012	
40	1	6	5	4	10	4	35.97	37.93	48.06	83.74	506,843	1,154,534	3,207,479	814,849	3,602,239	Lake Washington
41	9	14	5	5	13	107	153.63	78.73	84.48	189.4	1,806,286	1,668,410	1,623,574	557,594	1,747,947	Lake Washington
42	0	1	1	2	3	0	10.25	19.13	6.86	26.43	0	158,728	1,377,285	82,769	453,768	Lake Washington
43	3	11	9	7	14	8	64.03	99.23	76.79	135.33	1,267,475	1,682,131	2,825,223	1,136,935	2,693,671	Lake Washington
44	12	16	16	17	22	125	188.85	318.67	270.03	399.66	675,753	7,722,187	9,887,390	7,331,324	12,327,310	Lake Washington
45	5	11	10	11	14	35	42.08	124.83	85.31	199.56	310,614	855,264	1,322,252	159,235	889,798	Lake Washington
46	9	9	12	4	2	85	22.27	167.11	28.50	16.00	659,497	18,393	4,197,631	88,604	27,595	Lake Washington
47	3	12	8	7	12	20	82.85	42.87	67.29	89.47	91,062	13,644,914	10,900,742	1,044,960	10,000,932	Lake Washington
48	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0	Lake Washington
49	1	6	4	2	5	12	45.10	29.98	19.15	35.25	9,138	1,769,188	4,552,799	634,667	1,984,105	Lake Washington
56	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0	Puget Sound
57	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0	Puget Sound
59	0	0	0	1	2	0	0.00	0.00	0.17	5.51	0	0	0	915	95,408	Salmon Bay
60	0	3	4	2	6	0	3.30	11.90	25.03	10.76	0	215,743	466,164	174,145	727,910	Salmon Bay
61	0	0	1	0	0	0	0.00	1.23	0.00	0.00	0	0	50,026	0	0	Elliott Bay
62	0	0	0	3	1	0	0.00	0.00	0.24	6.80	0	0	0	239	237	Elliott Bay
64	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0	Elliott Bay
68	0	1	1	0	1	0	1.25	12.77	0.00	7.00	0	120,387	1,840,469	0	2,801,197	Elliott Bay
69	1	3	1	2	2	1	15.02	26.87	0.46	10.70	67,617	303,675	214,775	57,940	277,093	Elliott Bay
70	0	1	0	0	0	0	0.08	0.00	0.00	0.00	0	5,302	0	0	0	Elliott Bay
71	2	9	7	3	5	5	28.65	54.68	39.08	14.47	150,785	496,549	1,352,572	129,452	600,682	Elliott Bay
72	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0	Elliott Bay
78	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0	Elliott Bay
80	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0	Elliott Bay
83	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0	Puget Sound
85	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0	Puget Sound

NPDES #	Overflow Frequency (# per Year)					Overflow Event Duration (Hours)					Overflow Volume (Gallons per Year)					Receiving Waters
	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012	
88	0	0	1	0	0	0	0.00	10.38	0.00	0.00	0	0	342,740	0	0	Puget Sound
90	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0	Puget Sound
91	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0	Puget Sound
94	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0	Puget Sound
95	3	7	3	1	1	3	9.45	10.42	0.03	0.22	13,630	263,424	179,782	744	4,276	Puget Sound
99	0	1	2	3	5	0	6.75	22.77	29.97	30.00	0	1,434,480	1,620,161	715,775	2,494,862	W Waterway - Duwamish River
107	2	11	12	5	4	13	67	71.30	64.33	14.02	627,357	3,379,938	4,167,734	767,499	352,041	E Waterway - Duwamish River
111	0	6	3	2	1	0	6	20.27	17.85	26.23	0	1,445,180	7,724,604	723	314,968	Duwamish River
116	0	0	0	0	0	0	0	0.00	0.00	0.00	0	0	0	0	0	Duwamish River
120	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0	Lake Union
121	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0	Lake Union
124	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0	Lake Union
127	1	1	0	0	0	2	1.33	0.00	0.00	0.00	148,282	3,509	0	0	0	Lake Union
129	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0	Lake Union
130	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0	Lake Union
131	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0	Lake Union
132	0	0	0	1	0	0	0.00	0.00	0.08	0.00	0	0	0	2,559	0	Lake Union
134	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0	Lake Union
135	0	1	0	0	0	0	0.17	0.00	0.00	0.00	0	56	0	0	0	Lake Union
136	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0	Lake Union
138	1	2	1	3	2	1	4.25	15.17	15.05	12.25	40,855	379,444	1,098,144	124,027	649,289	Portage Bay
139	0	1	2	1	2	0	0.17	13.33	0.03	10.60	0	2,884	399,306	2,638	320,403	Portage Bay
140	1	7	8	2	4	1	16.05	48.48	0.15	17.96	1,715	57,937	755,672	3,107	437,331	Portage Bay
141	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0	Portage Bay
144	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0	Lake Union
145	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0	Lake Union

NPDES #	Overflow Frequency (# per Year)					Overflow Event Duration (Hours)					Overflow Volume (Gallons per Year)					Receiving Waters
	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012	
146	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0	Lake Union
147	50	45	63	40	47	536	616.65	801.28	391.91	672.2	9,884,390	25,119,846	23,213,300	9,748,238	14,636,073	Lake Union
148	0	0	1	2	0	0	0.00	0.78	0.69	0.00	0	0	19,092	6,883	0	Lake Washington Ship Canal
150/151	2	22	29	25	31	2	163.08	244.24	208.64	378.0	62,108	3,168,871	2,848,612	2,497,818	4,871,447	Salmon Bay
152	11	29	63	48	57	15	449.06	999.37	640.68	1098.6	364,243	20,546,673	40,356,610	40,634,362	52,382,276	Salmon Bay
161	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0	Lake Washington
165	1	1	1	0	2	1	4.67	11.30	0.00	10.43	201	34,446	118,552	0	54,470	Lake Washington
168	0	6	2	0	2	0	80.35	110.83	0.00	47.24	0	4,767,226	4,824,814	0	5,364,038	Longfellow Creek
169	1	1	2	2	1	6	9.33	36.30	6.50	16.03	190,191	934,903	6,874,940	614,501	2,587,257	Longfellow Creek
170	0	2	1	0	1	0	23.47	5.17	0.00	0.90	0	16,622	40,069	0	12,286	Longfellow Creek
171	4	10	5	6	13	60	56.50	72.09	68.67	97.47	4,244,351	2,436,795	3,344,191	828,364	2,199,443	Lake Washington
174	6	14	13	10	17	15	99.28	122.91	93.30	267.09	937,097	6,170,717	9,846,389	5,877,361	10,262,141	Lake Washington Ship Canal
175	0	1	0	0	0	0	0.08	0.00	0.00	0.00	0	269	0	0	0	Lake Union
Total	**173**	**343**	**339**	**260**	**355**	**1,408**	**2,617**	**4,121**	**2,580**	**4,296**	**23,571,182**	**106,561,059**	**189,996,720**	**78,194,356**	**154,232,337**	

Table 5-7. 2008-2012 Summary Comparison of CSOs by Receiving Water

Receiving Waters of Overflow	Overflow Frequency (# per Year)					Overflow Event Duration (Hours)					Overflow Volume (Gallons per Year)				
	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012
Duwamish River	0	6	3	2	1	0	6	20	18	26	0	1,445,180	7,724,604	723	314,968
East Waterway	2	11	12	5	4	13	67	71	64	14	627,357	3,379,938	4,167,734	767,499	352,041
Elliott Bay	3	14	10	8	9	6	45	96	40	39	218,402	925,913	3,457,842	187,631	3,679,209
Lake Union	51	48	63	41	47	538	618	801	392	672	10,032,672	25,123,680	23,213,300	9,750,797	14,636,073
Lake Washington	89	157	110	96	149	777	987	1,362	1,006	1,518	11,064,895	34,695,081	61,448,611	14,867,691	44,714,009
Lake Washington - Ship Canal	6	14	14	12	17	15	99	124	94	267	937,097	6,170,717	9,865,481	5,884,244	10,262,141
Longfellow Creek	1	9	5	2	4	6	113	152	7	64	190,191	5,718,751	11,739,823	614,501	7,963,581
Portage Bay	2	10	11	6	8	2	20	77	15	41	42,570	440,265	2,253,122	129,772	1,407,023
Puget Sound	3	7	4	1	1	3	9	21	1	0.22	13,630	263,424	522,522	744	4,276
Salmon Bay	13	54	96	76	96	17	615	1,256	875	1,493	426,351	23,931,287	43,671,386	43,307,240	58,077,041
Union Bay	3	12	9	8	14	31	29	119	40	132	18,017	3,032,343	20,312,134	1,967,739	10,327,113
West Waterway	0	1	2	3	5	0	7	23	30	30	0	1,434,480	1,620,161	715,775	2,494,862
TOTAL:	**173**	**343**	**339**	**260**	**355**	**1,408**	**2,615**	**4,122**	**2,581**	**4,296**	**23,571,182**	**106,561,059**	**189,996,720**	**78,194,356**	**154,232,337**

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 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
	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012						
12									0	0	0	0	0	0	0	0	0	1	0	1	0.2	Yes	0.1	Yes	N/A	2, 3
13	8	9	14	16	19	15	15	8	10	5	14	8	9	25	4	2	4	5	4	7	10.1	No	10.3	No	Windermere H&H Report, July 2010	4
14															1	0	1	0	0	0	0.3	Yes	0.4	Yes	N/A	3, 5
15	0	0	0	3	1	2	0	0	0	0	2	0	1	4	1	0	8	4	4	2	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	0.2	Yes	0.2	Yes	N/A	2, 3
18	1	2	2	7	5	5	2	0	3	2	3	4	4	11	2	3	8	5	4	8	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	0.2	Yes	0.2	Yes	N/A	2, 3
20	0	0	0	3	2	1	1	0	0	0	2	1	0	3	1	0	3	3	3	2	1.3	No	2.6	No	LTCP Long Term Simulation Results February 2013	4
22	0	0	0	2	1	0	0	0	0	0	2	3	0	1	1	0	1	1	1	4	0.9	Yes	0.5	Yes	LTCP Long Term Simulation Results February 2013	4
24	0	0	0	4	1	1	0	0	0	0	2	2	0	4	1	0	1	1	0	1	0.9	Yes	0.3	Yes	LTCP Long Term Simulation Results February 2013	4
25	0	0	0	3	0	0	0	0	0	0	2	1	0	3	1	1	2	1	0	1	0.75	Yes	2.4	No	LTCP Long Term Simulation Results February 2013	4, 6
26	0	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	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	0.0	Yes	LTCP Long Term Simulation Results February 2014	4
28	1	0	0	3	1	0	0	0	1	1	1	1	0	2	1	26	8	2	2	2	2.6	No	12.5	No	LTCP Long Term Simulation Results February 2013	4
29	1	0	1	4	1	1	1	0	3	1	2	2	0	5	1	5	4	2	3	11	2.4	No	4.3	No	LTCP Long Term Simulation Results February 2013	4
30	1	0	0	2	0	1	0	0	1	1	1	1	0	1	1	2	1	0	1	3	0.9	Yes	0.7	Yes	LTCP Long Term Simulation Results February 2013	7
31	15	11	18	22	11	21	14	2	17	13	18	13	19	32	10	4	12	11	11	2	13.8	No	9.6	No	LTCP Long Term Simulation Results February 2013	4
32	3	5	8	10	5	7	4	1	13	4	4	4	4	15	5	1	7	3	4	3	5.5	No	7.5	No	LTCP Long Term Simulation Results February 2013	4
33	0	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	1	0	0	1	0.3	Yes	0.2	Yes	LTCP Long Term Simulation Results February 2013	4
34	0	0	0	4	1	1	1	0	1	1	2	1	0	3	1	0	1	1	0	1	1.0	Yes	1.3	No	LTCP Long Term Simulation Results February 2013	4, 8
35	1	0	0	3	0	0	0	0	1	1	2	2	0	1	1	0	3	0	1	1	0.9	Yes	0.5	Yes	LTCP Long Term Simulation Results February 2013	4, 9
36	1	1	1	6	0	3	2	0	3	1	2	2	1	6	1	0	5	2	1	2	2	No	2.5	No	LTCP Long Term Simulation Results February 2013	4
37																0	0	0	0	0	0	Yes	0	Yes	N/A	3,4
38	1	0	0	2	0	1	0	0	1	0	2	1	0	2	1	0	1	1	0	1	0.7	Yes	0.5	Yes	InfoWorks V9.5 H&H Model - Extracted Data Set From Long Term Simulation Run.	4
40	1	4	8	10	6	5	2	3	9	4	6	4	4	12	7	1	6	5	4	10	5.6	No	4	No	InfoWorks V9.5 H&H Model - Extracted Data Set From Long Term Simulation Run.	4
41	3	4	9	11	8	9	3	3	11	5	7	5	9	15	7	9	14	5	5	13	7.8	No	8.3	No	InfoWorks V9.5 H&H Model - Extracted Data Set From Long Term Simulation Run.	4
42	0	0	0	3	0	1	0	0	1	2	1	1	0	0	0	0	1	1	2	3	0.8	Yes	1	Yes	InfoWorks V9.5 H&H Model - Extracted Data Set From Long Term Simulation Run.	4
43	1	4	9	10	7	8	3	3	11	5	7	4	5	13	7	3	11	9	7	14	7.1	No	7.5	No	InfoWorks V9.5 H&H Model - Extracted Data Set From Long Term Simulation Run.	4
44	9	12	16	18	22	20	12	8	14	10	18	16	13	29	9	12	16	16	17	22	15.5	No	15.3	No	InfoWorks V9.5 H&H Model - Extracted Data Set From Long Term Simulation Run.	4
45	5	10	13	24	15	20	10	6	16	11	18	22	17	21	19	5	11	10	11	14	13.9	No	9.3	No	InfoWorks V9.5 H&H Model - Extracted Data Set From Long Term Simulation Run.	4
46	2	7	9	11	12	9	4	3	13	4	8	7	8	13	5	9	9	12	4	2	7.6	No	8.5	No	InfoWorks V9.5 H&H Model - Extracted Data Set From Long Term Simulation Run.	4
47	8	9	12	19	11	10	8	9	10	17	28	32	27	39	34	3	12	8	7	12	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	Yes	0	Yes	N/A	3, 4

Outfall Number	Number of Overflows Per Year [1]																				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
	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012						
49	0	1	1	3	1	1	0	0	1	1	2	0	4	11	2	1	6	4	2	5	2.3	No	3.3	No	InfoWorks V9.5 H&H Model - Extracted Data Set From Long Term Simulation Run.	4
56									0	0	0	0	0	0	0	0	0	0	0	0	0.0	Yes	0.0	Yes	N/A	2, 3
57									0	0	0	0	0	0	0	0	0	0	0	0	0.0	Yes	0.0	Yes	N/A	2, 3
59									0	0	1	0	0	0	1	0	0	0	1	2	0.4	Yes	0.3	Yes	N/A	2, 3
60	0	0	4	8	3	1	4	1	2	0	2	1	4	4	3	0	3	4	2	6	2.6	No	1.5	No	LTCP Long Term Simulation Results February 2013	4
61									0	0	0	0	0	0	0	0	0	1	0	0	0.1	Yes	0.1	Yes	N/A	2, 3
62									0	0	0	0	0	0	0	0	0	0	3	1	0.3	Yes	0.3	Yes	N/A	2, 3
64									0	0	0	0	0	1	0	0	0	0	0	0	0.1	Yes	0.1	Yes	N/A	2, 3
68	0	0	1	3	0	0	0	0	1	0	2	0	1	1	1	0	1	1	0	1	0.7	Yes	1.3	No	LTCP Long Term Simulation Results February 2013	4, 10
69	1	0	2	3	2	3	0	1	1	1	2	1	1	2	1	1	3	1	2	2	1.5	No	2.2	No	LTCP Long Term Simulation Results February 2013	4
70	0	0	0	2	1	1	0	0	1	0	0	1	0	1	1	0	1	0	0	0	0.45	Yes	0.5	Yes	AWVSRP Modeling Support Alternative Modeling Report May 2012, Appendix D	4
71	0	1	0	4	2	1	0	0	1	0	3	1	1	2	1	2	9	7	3	5	2.15	No	4.7	No	AWVSRP Modeling Support Alternative Modeling Report May 2012, Appendix D	4
72	0	1	0	2	1	0	0	0	0	0	2	0	0	1	1	0	0	0	0	0	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	0.3	Yes	0.3	Yes	N/A	2, 3
80									0	0	0	0	0	0	0	0	0	0	0	0	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	Yes	0.0	Yes	N/A	2, 3
85									0	0	0	0	0	0	0	0	0	0	0	0	0.0	Yes	0.0	Yes	N/A	2, 3
88									0	0	0	1	0	0	2	0	0	1	0	0	0.3	Yes	0.4	Yes	N/A	2, 3
90									0	0	0	0	1	1	0	0	0	0	0	0	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	Yes	0.0	Yes	N/A	2, 3
94									0	0	1	0	0	0	0	0	0	0	0	0	0.1	Yes	0.1	Yes	N/A	2, 3
95									3	1	2	0	4	6	1	3	7	3	1	1	2.7	No	2.8	No	N/A	2, 3
99	0	0	2	3	1	2	2	0	3	0	1	1	2	1	1	0	1	2	3	5	1.5	No	1.5	No	LTCP Long Term Simulation Results February 2013	4
107									6	5	1	7	1	0	1	2	11	12	5	4	4.6	No	4.6	No	N/A	2, 3
111	1	0	0	3	3	2	0	0	2	1	3	1	3	2	1	0	6	3	2	1	1.7	No	2.8	No	LTCP Long Term Simulation Results February 2013	4
116									0	0	0	0	0	0	0	0	0	0	0	0	0.0	Yes	0.0	Yes	N/A	2, 3
120									0	0	0	0	0	0	0	0	0	0	0	0	0.0	Yes	0.0	Yes	N/A	2, 3
121									0	0	0	1	0	0	0	0	0	0	0	0	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	Yes	0.0	Yes	N/A	2, 3
127									0	0	0	1	0	3	0	1	1	0	0	0	0.5	Yes	0.5	Yes	N/A	2, 3
129									0	1	0	0	0	0	0	0	0	0	0	0	0.1	Yes	0.1	Yes	N/A	2, 3
130																0	0	0	0	0	0	Yes	0	Yes	N/A	3, 4
131									0	0	0	0	0	0	1	0	0	0	0	0	0.1	Yes	0.1	Yes	N/A	2, 3
132																0	0	0	1	0	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	Yes	0.0	Yes	N/A	2, 3
135																0	1	0	0	0	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	Yes	0.0	Yes	N/A	2, 3
138	0	0	1	5	2	1	0	0	1	0	2	3	0	3	1	1	2	1	3	2	1.4	No	2.4	No	LTCP Long Term Simulation Results February 2013	4
139	0	0	0	2	4	2	0	0	1	0	1	3	1	2	1	0	1	2	1	2	1.15	No	1.5	No	LTCP Long Term Simulation Results February 2013	4
140	0	3	1	7	7	3	0	2	2	3	6	5	6	5	1	1	7	8	2	4	3.7	No	4.4	No	LTCP Long Term Simulation Results February 2013	4

Outfall Number	Number of Overflows Per Year [1]																				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
	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012						
141									0	0	0	0	0	1	0	0	0	0	0	0	0.1	Yes	0.1	Yes	N/A	2, 3
144									0	0	0	0	0	0	1	0	0	0	0	0	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	Yes	0.0	Yes	N/A	2, 3
146									0	0	0	0	0	0	0	0	0	0	0	0	0.0	Yes	0.0	Yes	N/A	2, 3
147	28	32	43	50	41	32	32	27	26	29	31	29	37	45	35	50	45	63	40	47	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	0.3	Yes	0.3	Yes	N/A	2, 3
150/151	8	7	18	24	29	15	19	11	16	10	14	6	15	23	11	2	22	29	25	31	17	No	17	No	LTCP Long Term Simulation Results February 2013	4
152	33	46	44	52	52	49	49	57	47	39	53	44	46	42	43	11	29	63	48	57	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	Yes	0.0	Yes	N/A	2, 3
165																1	1	1	0	2	1	Yes	0.8	Yes	N/A	3, 4
168	0	3	3	5	1	2	6	0	5	1	2	1	2	8	3	0	6	2	0	2	2.6	No	3.3	No	LTCP Long Term Simulation Results February 2013	4
169	0	3	3	5	1	2	6	0	5	1	2	1	2	8	3	1	1	2	2	1	2.45	No	2.2	No	LTCP Long Term Simulation Results February 2013	4
170																0	2	1	0	1	0.8	Yes	0.5	Yes	N/A	3, 4
171	4	3	6	10	9	8	2	4	4	10	6	3	8	12	6	4	10	5	6	13	6.7	No	6.3	No	InfoWorks V9.5 H&H Model - Extracted Data Set From Long Term Simulation Run.	4
174	1	5	5	12	10	9	6	1	8	3	5	6	10	21	6	6	14	13	10	17	8.4	No	11.1	No	LTCP Long Term Simulation Results February 2013	4
175																0	1	0	0	0	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. 2012 Sanitary Sewer Overflow (SSO) Details

SSO	ERTS Number	Date	Address	SSO Volume (gallons)	Recovered, cleaned (gallons)	Released (gallon)	Duration	Cause
1	631871	1/3/2011	853 NE 103rd St	unknown		0	limited	Roots
2	631408	1/4/2012	714 Harvard Ave E	900	900	0	180 min	Roots
3	631303	1/5/2012	4716 S Cloverdale St	200	200	0	90 min	Roots, debris and grease
4	631832	1/5/2012	1317 Willard Ave W	unknown		0	limited	Unopened side sewer during pipe relining
5	631869	1/9/2012	7350 Woodlawn Ave NE	unknown		0	limited	Roots
6	631643	1/13/2012	3529 NE 87th St	3	3	0	burp	Reverse jetting from SPU mx vehicle
7	631982	1/21/2012	5604 17th Ave NE	unknown		0	unknown	Roots
8	631984	1/27/2012	2767 44th Ave SW	unknown		0	limited	Structural defect
9	631768	1/30/2012	3011 Webster Pt Rd NE PS#55	100	100	0	unknown	Structural defect - forcemain
10	631889	2/7/2012	Dexter Ave N & N McGraw St	150	150	0	2 hours	Roots, debris
11	632323	2/16/2012	10401 Lake City Way NE	1270	1260	10	127 min	Paper towels, grease
12	632324	2/25/2012	1223 NE 65th St	20	20	0	intermitent	Roots, grease
13	632400	3/1/2012	S Lane St and 33rd Ave S	1	1	0	34 min	Structural defect
14	632734	3/15/2012	7200 SW Orchard St CSO#2	95,000	0	95,000	16 hours	Structural defect
15	632848	3/15/2012	1244 S Concord St	74,800	74,800	0	75 mins	Capacity
16	632757	3/17/2012	4803 & 4809 SW Juneau St	100	100	0	unknown	Structural defect
17	632916	3/27/2012	3702, 3703, 3706 39th Av SW	2720	2720	0	4 hours	Water tank drainage and roots
18	633205	4/10/2012	1812 E Calhoun St PS#25	500	0	500	4 hours	Force main break under generator pad
19	633274	4/12/2012	10434 & 10436 8th Ave NW	20	20	0	unknown	Sag and grease
20	635334	5/4/2012	10715 Interlake Ave N	7	7	0	unknown	Debris
21	633980	5/18/2012	12220 Aurora Ave N	30	30	0	unknown	Roots
22	634040	5/22/2012	2308 & 2312 Federal Ave E	50	59	0	unknown	Roots (5-yr repeat same cause)

SSO	ERTS Number	Date	Address	SSO Volume (gallons)	Recovered, cleaned (gallons)	Released (gallon)	Duration	Cause
23	634194	5/30/2012	660 S Andover St	50	50	0	unknown	Sag and grease
24	634531	6/15/2012	1414 & 1426 Broadway	100	100	0	unknown	Contractor plug for MH work
25	635155	7/13/2012	3215 3rd Ave W	50	50	0	unknown	Roots
26	635366	7/24/2012	11027 Arroyo Beach Pl SW	100	100	0	peak	Structural defect
27	635510	8/1/2012	1123 20th Ave E	50	50	0	1 week	Roots, debris
28	635541	8/1/2012	NE 86th St & Ravenna Ave E	574	286	288	240 min	Structural defect by contractor damage
29	636003	8/23/2012	1201 NE Campus Pkwy	16,000	16,000	0	unknown	Slurry in main by contractor
30	636258	9/4/2012	1753 NW 62nd St	1000	1000	0	unknown	Roots, grease
31	636373	9/11/2012	1631 16th Ave	540	540	0	unknown	Roots
32	636674	9/27/2012	4329 W Semple St	120	100	20	unknown	PS#1 pump down valve closed
33	636820	10/8/2012	714 Harvard Ave E	15	15	0	unknown	Storage tank release, grease, roots.
34	636966	10/15/2012	1316 26th Ave S	100	0	100	unknown	Construction slurry during core tap.
35	637043	10/18/2012	500 N 63rd St	480	480	0	unknown	Heavy roots and grease.
36	637044	10/18/2012	3120 NE 123rd St	750	750	0	unknown	Rags, mop and heavy grease.
37	637297	10/31/2012	10334 Bedford Ct NW PS#56	6912	0	6912	66 min	Capacity
38	637750	11/19/2012	2314 Alki Ave SW	unknown		0	limited	Capacity
39	637552	11/19/2012	12th Ave & E Spruce St	100	100	0	unknown	Rags, roots and grease.
40	637553	11/19/2012	8246 Interlake Ave N	1485	1485	0	unknown	Roots and grease.
41	637758	11/19/2012	8327 & 8331 Jones Ave NW	130	130		limited	Roots.
42	637694	11/19/2012	10334 Bedford Ct NW PS#56	1629	0	1629	27 min	Pipe, capacity and crew response.
43	637703	11/19/2012	5515 NE Ambleside Windy jr	150,000	150,000	0	12 hours	Lake line target and gate open set point.
44	637704	11/19/2012	various 27th Ave E	5000	5000	0	2 hours	Roots and grease.
45	637705	11/19/2012	Holman Rd NW & 6th Ave NW	48,000	48,000	0	4 hours	Capacity and difficulty cleaning near KC.
46	637706	11/19/2012	4961 SW Hinds St PS#53	102	0	102	15 min	Power failure.
47	637755	11/19/2012	1005 Belmont Pl E	3	3	0	limited	Roots.

SSO	ERTS Number	Date	Address	SSO Volume (gallons)	Recovered, cleaned (gallons)	Released (gallon)	Duration	Cause
48	637756	11/19/2012	7200 Delridge Way SW CSO#2	180,000	0	180,000	14 hours	Design and response being reviewed.
49	none[1]	11/19/2012	Broadview NW 105th/115th	unknown		0	storm	PDB/SWAMP storm documentation.
50	none[1]	11/19/2012	Broadview 12th Ave NW	unknown		0	storm	PDB/SWAMP storm documentation.
51	638108	12/10/2012	159 S Jackson St	1500	1500	0	3 hours	Structural defect.
52	638252	12/17/2012	333 Boren Ave N	1500	1500	0	6 hours	Structural defect.
53	638254	12/17/2012	123 N 70th St	15	15	0	limited	Structural blockage by protruding lateral.
54	638256	12/17/2012	1190 SW Spokane St PS#73	unknown			2.5 hours	High tide.
55	638348	12/20/2012	2534 39th Ave E PS#50	50	0	50	unknown	Mechanical damage.
56	638414	12/25/2012	2534 39th Ave E PS#50	50	0	50	unknown	Mechanical damage.

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. 2012 Pump Station Work Order Summary

Wastewater Pump Station Number	Inspection	Maintenance	Total Work Orders
WWPS001	1	14	15
WWPS002	4	16	20
WWPS004		34	34
WWPS005	6	31	37
WWPS006	2	18	20
WWPS007	3	13	16
WWPS009	2	26	28
WWPS010	2	18	20
WWPS011	3	33	36
WWPS013	5	59	64
WWPS017	3	82	85
WWPS018	2	16	18
WWPS019	2	16	18
WWPS020	4	16	20
WWPS021	9	15	24
WWPS022	1	17	18
WWPS025	3	13	16
WWPS028	1	16	17
WWPS030	2	15	17
WWPS031	2	17	19
WWPS035	6	69	75
WWPS036	6	35	41
WWPS037	3	19	22
WWPS038		33	33
WWPS039	1	15	16
WWPS042	1	14	15
WWPS043	2	15	17
WWPS044	3	18	21
WWPS045	3	18	21
WWPS046	1	35	36
WWPS047		33	33
WWPS048	2	18	20
WWPS049	5	66	71

Wastewater Pump Station Number	Inspection	Maintenance	Total Work Orders
WWPS050	4	34	38
WWPS051	1	66	67
WWPS053	2	15	17
WWPS054	1	15	16
WWPS055		34	34
WWPS056		33	33
WWPS057		15	15
WWPS058	2	15	17
WWPS059	2	13	15
WWPS060	2	12	14
WWPS061	2	13	15
WWPS062	2	60	62
WWPS063	2	14	16
WWPS064	3	13	16
WWPS065	1	13	14
WWPS066	2	14	16
WWPS067	1	15	16
WWPS069	4	18	22
WWPS070		14	14
WWPS071	2	14	16
WWPS072	2	18	20
WWPS073	3	18	21
WWPS074	2	28	30
WWPS075		34	34
WWPS076	1	66	67
WWPS077	2	11	13
WWPS078		32	32
WWPS080		32	32
WWPS081	1	13	14
WWPS082		34	34
WWPS083		33	33
WWPS084	1	12	13
WWPS114	8	33	41
WWPS118	3	15	18
Total	**146**	**1692**	**1838**

Table A-4. 2012 CSO Structure Inspection Summary			
Location	**Inspection Date**	**Inspection Findings**	**Inspection Severity**
NPDES13	08-Mar-12	NOPROB	NONE
NPDES13	18-Jun-12	NOPROB	NONE
NPDES13	06-Sep-12	NOPROB	NONE
NPDES13	11-Dec-12	SLUDGE	LIGHT
NPDES14	08-Mar-12	SAND	MEDIUM
NPDES14	18-Jun-12	DEBRIS	LIGHT
NPDES14	06-Sep-12	NOPROB	NONE
NPDES14	29-Nov-12	SLUDGE	LIGHT
NPDES15	08-Mar-12	NOPROB	NONE
NPDES15	18-Jun-12	NOPROB	NONE
NPDES15	06-Sep-12	NOPROB	NONE
NPDES15	29-Nov-12	SLUDGE	LIGHT
NPDES18	27-Mar-12	SAND	MEDIUM
NPDES18	25-Jun-12	DEBRIS	HEAVY
NPDES18	07-Sep-12	NOPROB	NONE
NPDES18	29-Nov-12	SLUDGE	LIGHT
NPDES19	26-Jun-12	NOPROB	NONE
NPDES20	26-Mar-12	DEBRIS	LIGHT
NPDES20	25-Jun-12	DEBRIS	LIGHT
NPDES20	17-Sep-12	NOPROB	NONE
NPDES20	14-Dec-12	SLUDGE	LIGHT
NPDES22	26-Mar-12	NOPROB	NONE
NPDES22	26-Jun-12	NOPROB	NONE
NPDES22	17-Sep-12	NOPROB	NONE
NPDES22	30-Nov-12	NOPROB	NONE
NPDES24	26-Mar-12	NOPROB	NONE
NPDES24	26-Jun-12	NOPROB	NONE
NPDES24	17-Sep-12	NOPROB	NONE
NPDES24	30-Nov-12	SLUDGE	LIGHT
NPDES25	26-Mar-12	NOPROB	NONE
NPDES25	26-Jun-12	NOPROB	NONE
NPDES25	17-Sep-12	NOPROB	NONE
NPDES25	30-Nov-12	GREASE	HEAVY
NPDES26	26-Mar-12	NOPROB	NONE
NPDES26	28-Jun-12	NOPROB	NONE
NPDES26	17-Sep-12	NOPROB	NONE
NPDES26	30-Nov-12	NOPROB	NONE
NPDES27	26-Jun-12	SAND	LIGHT

Location	Inspection Date	Inspection Findings	Inspection Severity
NPDES28	26-Jun-12	SAND	LIGHT
NPDES29	06-Mar-12	DEBRIS	LIGHT
NPDES29	14-Jun-12	DEBRIS	LIGHT
NPDES29	17-Sep-12	DEBRIS	MEDIUM
NPDES29	04-Dec-12	SLUDGE	LIGHT
NPDES30	06-Mar-12	NOPROB	NONE
NPDES30	14-Jun-12	NOPROB	NONE
NPDES30	19-Sep-12	NOPROB	NONE
NPDES30	06-Dec-12	NOPROB	NONE
NPDES31	11-Jun-12	NOPROB	NONE
NPDES32	05-Mar-12	SLUDGE	LIGHT
NPDES32	14-Jun-12	SLUDGE	LIGHT
NPDES32	06-Dec-12	DEBRIS	MEDIUM
NPDES34	05-Mar-12	SLUDGE	LIGHT
NPDES34	14-Jun-12	SLUDGE	LIGHT
NPDES34	06-Sep-12	NOPROB	NONE
NPDES34	06-Dec-12	SLUDGE	MEDIUM
NPDES35	05-Mar-12	DEBRIS	LIGHT
NPDES35	14-Jun-12	NOPROB	NONE
NPDES35	06-Sep-12	NOPROB	NONE
NPDES35	06-Dec-12	NOPROB	NONE
NPDES36	05-Mar-12	SLUDGE	LIGHT
NPDES36	14-Jun-12	SLUDGE	LIGHT
NPDES36	11-Sep-12	SLUDGE	HEAVY
NPDES36	07-Dec-12	DEBRIS	MEDIUM
NPDES37	26-Jun-12	NOPROB	NONE
NPDES38	05-Mar-12	NOPROB	NONE
NPDES38	13-Jun-12	GREASE	LIGHT
NPDES38	11-Sep-12	NOPROB	NONE
NPDES38	07-Dec-12	SLUDGE	HEAVY
NPDES39	06-Mar-12	DEBRIS	LIGHT
NPDES39	13-Jun-12	DEBRIS	LIGHT
NPDES39	11-Sep-12	NOPROB	NONE
NPDES39	07-Dec-12	NOPROB	NONE
NPDES40	05-Mar-12	SLUDGE	LIGHT
NPDES40	14-Jun-12	SLUDGE	LIGHT
NPDES40	11-Sep-12	NOPROB	NONE
NPDES40	04-Dec-12	DEBRIS	HEAVY
NPDES42	11-Jun-12	NOPROB	NONE
NPDES42	11-Sep-12	NOPROB	NONE

Location	Inspection Date	Inspection Findings	Inspection Severity
NPDES42	04-Dec-12	SLUDGE	MEDIUM
NPDES43	11-Jun-12	NOPROB	NONE
NPDES43	06-Sep-12	DEBRIS	HEAVY
NPDES43	04-Dec-12	DEBRIS	MEDIUM
NPDES44	05-Mar-12	SLUDGE	LIGHT
NPDES44	11-Jun-12	NOPROB	NONE
NPDES44	14-Sep-12	NOPROB	NONE
NPDES44	07-Dec-12	NOPROB	NONE
NPDES45	02-Mar-12	DEBRIS	MEDIUM
NPDES45	11-Jun-12	NOPROB	NONE
NPDES45	14-Sep-12	SAND	HEAVY
NPDES46	11-Jun-12	NOPROB	NONE
NPDES47	02-Mar-12	DEBRIS	MEDIUM
NPDES47	06-Sep-12	GREASE	MEDIUM
NPDES47	04-Dec-12	DEBRIS	MEDIUM
NPDES49	02-Mar-12	SLUDGE	LIGHT
NPDES49	11-Jun-12	NOPROB	NONE
NPDES49	14-Sep-12	NOPROB	NONE
NPDES49	04-Dec-12	SLUDGE	LIGHT
NPDES56	05-Mar-12	NOPROB	NONE
NPDES56	18-Jun-12	NOPROB	NONE
NPDES56	20-Sep-12	NOPROB	NONE
NPDES56	27-Nov-12	NOPROB	NONE
NPDES57	05-Mar-12	NOPROB	NONE
NPDES57	18-Jun-12	NOPROB	NONE
NPDES57	20-Sep-12	NOPROB	NONE
NPDES57	27-Nov-12	NOPROB	NONE
NPDES59	05-Mar-12	NOPROB	NONE
NPDES59	18-Jun-12	NOPROB	NONE
NPDES59	20-Sep-12	NOPROB	NONE
NPDES59	27-Nov-12	NOPROB	NONE
NPDES60	27-Mar-12	NOPROB	NONE
NPDES60	18-Jun-12	NOPROB	NONE
NPDES60	18-Sep-12	NOPROB	NONE
NPDES60	28-Nov-12	SLUDGE	LIGHT
NPDES61	08-Mar-12	NOPROB	NONE
NPDES61	19-Jun-12	NOPROB	NONE
NPDES61	18-Sep-12	NOPROB	NONE
NPDES61	28-Nov-12	SLUDGE	LIGHT
NPDES62	08-Mar-12	NOPROB	NONE

Location	Inspection Date	Inspection Findings	Inspection Severity
NPDES62	19-Jun-12	NOPROB	NONE
NPDES62	18-Sep-12	NOPROB	NONE
NPDES62	28-Nov-12	NOPROB	NONE
NPDES63	08-Mar-12	UNK	NONE
NPDES63	19-Jun-12	NOPROB	NONE
NPDES63	18-Sep-12	NOPROB	NONE
NPDES63	28-Nov-12	NOPROB	NONE
NPDES64	27-Mar-12	NOPROB	NONE
NPDES64	19-Jun-12	NOPROB	NONE
NPDES64	18-Sep-12	NOPROB	NONE
NPDES64	28-Nov-12	NOPROB	NONE
NPDES68	20-Mar-12	SAND	MEDIUM
NPDES68	19-Jun-12	NOPROB	NONE
NPDES68	18-Sep-12	NOPROB	NONE
NPDES68	05-Dec-12	SLUDGE	LIGHT
NPDES70	06-Mar-12	DEBRIS	LIGHT
NPDES70	19-Sep-12	NOPROB	NONE
NPDES70	11-Dec-12	DEBRIS	LIGHT
NPDES95	27-Jun-12	NOPROB	NONE
NPDES99	01-Mar-12	DEBRIS	LIGHT
NPDES99	27-Jun-12	SLUDGE	LIGHT
NPDES99	11-Sep-12	NOPROB	NONE
NPDES99	11-Dec-12	SLUDGE	LIGHT
NPDES102	26-Jun-12	NOPROB	NONE
NPDES107	26-Jun-12	NOPROB	NONE
NPDES111	06-Mar-12	DEBRIS	LIGHT
NPDES111	26-Jun-12	DEBRIS	NONE
NPDES111	17-Sep-12	NOPROB	NONE
NPDES111	11-Dec-12	NOPROB	NONE
NPDES120	27-Mar-12	NOPROB	NONE
NPDES120	26-Jun-12	SAND	LIGHT
NPDES120	21-Sep-12	NOPROB	NONE
NPDES120	10-Dec-12	SAND	LIGHT
NPDES121	27-Mar-12	NOPROB	NONE
NPDES121	26-Jun-12	NOPROB	NONE
NPDES121	21-Sep-12	NOPROB	NONE
NPDES121	10-Dec-12	NOPROB	NONE
NPDES124	27-Mar-12	NOPROB	NONE
NPDES124	26-Jun-12	TIDEMAL	NONE
NPDES124	21-Sep-12	NOPROB	NONE

Location	Inspection Date	Inspection Findings	Inspection Severity
NPDES124	10-Dec-12	NOPROB	NONE
NPDES127	27-Mar-12	NOPROB	NONE
NPDES127	27-Jun-12	NOPROB	NONE
NPDES127	21-Sep-12	NOPROB	NONE
NPDES127	10-Dec-12	NOPROB	NONE
NPDES129	27-Mar-12	NOPROB	NONE
NPDES129	27-Jun-12	NOPROB	NONE
NPDES129	21-Sep-12	NOPROB	NONE
NPDES129	10-Dec-12	NOPROB	NONE
NPDES130	03-Oct-12	NOPROB	NONE
NPDES131	27-Mar-12	NOPROB	NONE
NPDES131	27-Jun-12	NOPROB	NONE
NPDES131	21-Sep-12	NOPROB	NONE
NPDES131	10-Dec-12	NOPROB	NONE
NPDES132	27-Mar-12	NOPROB	NONE
NPDES132	27-Jun-12	NOPROB	NONE
NPDES132	21-Sep-12	NOPROB	NONE
NPDES132	10-Dec-12	NOPROB	NONE
NPDES134	05-Mar-12	NOPROB	NONE
NPDES134	27-Jun-12	NOPROB	NONE
NPDES134	20-Sep-12	NOPROB	NONE
NPDES134	10-Dec-12	SAND	LIGHT
NPDES135	05-Mar-12	NOPROB	NONE
NPDES135	27-Jun-12	NOPROB	NONE
NPDES135	20-Sep-12	NOPROB	NONE
NPDES135	12-Dec-12	NOPROB	NONE
NPDES136	05-Mar-12	NOPROB	NONE
NPDES136	27-Jun-12	NOPROB	NONE
NPDES136	20-Sep-12	NOPROB	NONE
NPDES136	20-Dec-12	NOPROB	NONE
NPDES138	05-Mar-12	NOPROB	NONE
NPDES138	25-Jun-12	NOPROB	NONE
NPDES138	20-Sep-12	NOPROB	NONE
NPDES138	12-Dec-12	SLUDGE	MEDIUM
NPDES139	05-Mar-12	NOPROB	NONE
NPDES139	25-Jun-12	NOPROB	NONE
NPDES139	07-Sep-12	NOPROB	NONE
NPDES139	14-Dec-12	SLUDGE	LIGHT
NPDES140	15-Mar-12	NOPROB	NONE
NPDES140	25-Jun-12	SAND	LIGHT

Location	Inspection Date	Inspection Findings	Inspection Severity
NPDES140	07-Sep-12	NOPROB	NONE
NPDES140	30-Nov-12	SAND	MEDIUM
NPDES141	07-Mar-12	NOPROB	NONE
NPDES141	27-Jun-12	NOPROB	NONE
NPDES141	20-Sep-12	NOPROB	NONE
NPDES141	11-Dec-12	NOPROB	NONE
NPDES144	14-Mar-12	GREASE	HEAVY
NPDES144	28-Jun-12	NOPROB	NONE
NPDES144	20-Sep-12	NOPROB	NONE
NPDES144	06-Dec-12	GREASE	HEAVY
NPDES145	07-Mar-12	SAND	MEDIUM
NPDES145	27-Jun-12	NOPROB	NONE
NPDES145	20-Sep-12	NOPROB	NONE
NPDES145	06-Dec-12	NOPROB	NONE
NPDES146	05-Mar-12	NOPROB	NONE
NPDES146	26-Jun-12	NOPROB	NONE
NPDES146	20-Sep-12	NOPROB	NONE
NPDES146	06-Dec-12	NOPROB	NONE
NPDES147	05-Mar-12	NOPROB	NONE
NPDES147	26-Jun-12	NOPROB	NONE
NPDES147	20-Sep-12	NOPROB	NONE
NPDES147	06-Dec-12	NOPROB	NONE
NPDES148	05-Mar-12	SAND	HEAVY
NPDES148	19-Jun-12	NOPROB	NONE
NPDES148	20-Sep-12	NOPROB	NONE
NPDES148	06-Dec-12	SLUDGE	LIGHT
NPDES150	05-Mar-12	NOPROB	NONE
NPDES150	29-Jun-12	NOPROB	NONE
NPDES150	18-Sep-12	NOPROB	NONE
NPDES150	05-Dec-12	NOPROB	NONE
NPDES151	05-Mar-12	NOPROB	NONE
NPDES151	29-Jun-12	NOPROB	NONE
NPDES151	18-Sep-12	NOPROB	NONE
NPDES151	05-Dec-12	NOPROB	NONE
NPDES152	05-Mar-12	DEBRIS	LIGHT
NPDES152	29-Jun-12	DEBRIS	LIGHT
NPDES152	18-Sep-12	NOPROB	NONE
NPDES152	05-Dec-12	DEBRIS	LIGHT
NPDES161	05-Mar-12	NOPROB	NONE
NPDES161	25-Jun-12	NOPROB	NONE

Location	Inspection Date	Inspection Findings	Inspection Severity
NPDES161	06-Sep-12	NOPROB	NONE
NPDES161	28-Nov-12	NOPROB	NONE
NPDES168	01-Mar-12	DEBRIS	LIGHT
NPDES168	26-Jun-12	DEBRIS	MEDIUM
NPDES168	05-Sep-12	DEBRIS	MEDIUM
NPDES168	01-Nov-12	DEBRIS	MEDIUM
NPDES168	11-Dec-12	DEBRIS	MEDIUM
NPDES169	01-Mar-12	DEBRIS	LIGHT
NPDES169	27-Jun-12	DEBRIS	LIGHT
NPDES169	17-Sep-12	NOPROB	NONE
NPDES169	11-Dec-12	DEBRIS	MEDIUM
NPDES170	01-Mar-12	DEBRIS	HEAVY
NPDES170	26-Jun-12	SAND	LIGHT
NPDES170	17-Sep-12	DEBRIS	MEDIUM
NPDES170	10-Dec-12	DEBRIS	MEDIUM
NPDES171	02-Mar-12	NOPROB	NONE
NPDES171	11-Jun-12	NOPROB	NONE
NPDES171	14-Sep-12	NOPROB	NONE
NPDES171	10-Dec-12	NOPROB	NONE
NPDES174	05-Mar-12	NOPROB	NONE
NPDES174	19-Jun-12	NOPROB	NONE
NPDES174	20-Sep-12	NOPROB	NONE
NPDES174	06-Dec-12	NOPROB	NONE
NPDES175	27-Mar-12	NOPROB	NONE
NPDES175	28-Jun-12	NOPROB	NONE
NPDES175	21-Sep-12	NOPROB	NONE
NPDES175	10-Dec-12	NOPROB	NONE

Table A-5. 2012 CSO Structure Cleaning Summary

Location	Cleaning Date	Cleaning Tasks	Cleaning Severity	Cleaning Findings
NPDES13	02-May-12	CSO CLEANING - DUCK BILL - CSO22A - 017-259	HEAVY	DEBRIS
NPDES13	10-Oct-12	CLEAN FLOW CNTRL CHAMBER -NPDES13, CSO23, 017-225	MEDIUM	DEBRIS
NPDES13	18-Dec-12	CLEAM MH 071-225-NPDES13, CSO23-5880 SANDPOINT WY	LIGHT	DEBRIS
NPDES14	01-May-12	CLEAN MH 025-299-NPDES14,CSO21,-4303 55TH AV NE	LIGHT	DEBRIS
NPDES14	02-Oct-12	CLEAN MH 025-301 - NPDES14:CSO 21	LIGHT	DEBRIS
NPDES14	02-Oct-12	CLEAN MH 025-299- NPDES14,CSO21-4303 55TH AVE NE	LIGHT	DEBRIS
NPDES15	03-May-12	CLEAN MH 025-368 - NPDES15A, CSO19;20, 025-368	MEDIUM	DEBRIS
NPDES15	27-Sep-12	CLN MH 025-373-NPDES15A,CSO19;20-3855 51ST AVE NE	LIGHT	DEBRIS
NPDES18	29-Feb-12	CLEAN CHAMBER-MH 016-532- 4840 39TH AVE NE	MEDIUM	DEBRIS
NPDES18	16-May-12	CLEAN M/H WALLS - NPDES18, CSO24, 016-532	HEAVY	DEBRIS
NPDES18	10-Oct-12	CLEAN MH 016-532 -NPDES18, CSO24 -4840 38TH AVE NE	LIGHT	DEBRIS
NPDES26	26-Mar-12	JET CLEAN ML 038-298/038-311-200 E DENNY BLAINE PL	MEDIUM	SAND
NPDES29	09-Jan-12	WW FLOW CNTRL CLEAN/MAINT NPDES29, CSO18, 042-302	MEDIUM	DEBRIS
NPDES29	07-Mar-12	WW FLOW CNTRL CLEAN/MAINT NPDES29:CSO18 3 MONTHS	HEAVY	DEBRIS
NPDES29	07-Mar-12	WW FLOW CNTRL CLEAN/MAINT NPDES29, CSO18, 042-302	HEAVY	DEBRIS
NPDES29	18-Apr-12	WW FLOW CNTRL CLEAN/MAINT NPDES29, CSO18, 042-302	MEDIUM	DEBRIS
NPDES29	20-Sep-12	WW FLOW CNTRL CLEAN/MAINT 042 - 303	MEDIUM	DEBRIS
NPDES29	11-Oct-12	FLOW CNTRL CL HYDORBK- NPDES 29 - CSO 18	MEDIUM	DEBRIS
NPDES29	01-Nov-12	FLOW CNTRL CL HYDORBK- NPDES 29 - CSO 18	MEDIUM	DEBRIS
NPDES29	06-Nov-12	FLOW CNTRL MAINT. - NPDES29, CSO18, 042-302	MEDIUM	DEBRIS
NPDES29	05-Dec-12	CSO CLEANING -	MEDIUM	DEBRIS
NPDES32	09-Jan-12	WW FLOW CNTRL CLEAN/MAINT NPDES32, CSO16, 046-156	HEAVY	DEBRIS
NPDES32	06-Feb-12	WW FLOW CNTRL CLEAN/MAINT NPDES32, CSO16, 046-156	HEAVY	DEBRIS
NPDES32	07-Aug-12	WW FLOW CNTRL CLEAN/MAINT - 046-156	HEAVY	DEBRIS
NPDES32	11-Sep-12	CSO CLEANING - 046-157 - 046 - 156	HEAVY	GREASE/DEBRIS
NPDES32	06-Nov-12	FLOW CNTRL INSP - NPDES32, CSO16, 046-156	LIGHT	DEBRIS
NPDES32	06-Dec-12	CSO CLEANING	HEAVY	SLUDGE

Location	Cleaning Date	Cleaning Tasks	Cleaning Severity	Cleaning Findings
NPDES33	07-Jun-12	CSO CLEANING - HYDROBRAKE - 046-171 - NPDES33	MEDIUM	DEBRIS
NPDES34	06-Dec-12	CSO INSP - NPDES34:CSO15 3 MONTHS	HEAVY	DEBRIS
NPDES34	06-Dec-12	CSO INSP - NPDES34:CSO15 3 MONTHS	MEDIUM	DEBRIS
NPDES35	14-Sep-12	CSO CLEANING - MANUAL SLUICE GATE - 046-180	MEDIUM	DEBRIS
NPDES36	09-Jan-12	WW FLOW CNTRL CLN/MAIN NPDES36, CSO13, 046E-142	MEDIUM	DEBRIS
NPDES36	06-Feb-12	WW FLOW CNTRL CLEAN/MAINT NPDES36, CSO13, 046E-	MEDIUM	DEBRIS
NPDES36	07-Aug-12	FLOW CNTRL INSP - NPDES36, CSO13, 046E-142	HEAVY	DEBRIS
NPDES36	11-Oct-12	FLOW CNTRL CL HYDORBK - NPDES36 - CSO 13	MEDIUM	DEBRIS
NPDES36	07-Dec-12	CSO CLEANING	LIGHT	DEBRIS
NPDES38	09-Jan-12	WW FLOW CNTRL CLEAN/MAINT- NPDES38, CSO12, 059-498	MEDIUM	DEBRIS
NPDES38	10-Oct-12	FLOW CNTRL CL - SLUICE GATE NPDES38 - CSO 12	HEAVY	GREASE/DEBRIS
NPDES38	07-Dec-12	CSO CLEANING	MEDIUM	SLUDGE
NPDES40	22-May-12	WW FLOW CNTRL CLEAN/MAINT	MEDIUM	DEBRIS
NPDES40	05-Dec-12	CSO CLEANING	NONE	NO PROBLEM
NPDES42	06-Feb-12	WW FLOW CNTRL CLEAN/MAINT NPDES 42 - CSO 10 - 060	MEDIUM	DEBRIS
NPDES42	02-Mar-12	CSO CLEANING - NPDES42:CSO10 3 MONTHS	MEDIUM	DEBRIS
NPDES42	08-Mar-12	WW FLOW CNTRL CLEAN/MAINT NPDES42, CSO10, 060W-052	MEDIUM	DEBRIS
NPDES42	17-May-12	CSO CLEANING- NPDES42, CSO10, 060W-052	HEAVY	DEBRIS
NPDES42	01-Aug-12	WW FLOW CNTRL CLEAN/MAINT - NPDES42 CSO10 060W-052	HEAVY	DEBRIS
NPDES42	04-Sep-12	HYDROBRAKE CLEANING - NPDES42 - CSO 10	MEDIUM	DEBRIS
NPDES42	05-Sep-12	FLOW CNTRL CL HYDORBK - 4603 LAKE WASHINGTON BLV	HEAVY	DEBRIS
NPDES42	06-Nov-12	FLOW CNTRL CLEAINING - NPDES42, CSO10, 060W-052	MEDIUM	DEBRIS
NPDES42	05-Dec-12	CSO CLEANING	MEDIUM	SAND
NPDES43	06-Feb-12	WW FLOW CNTRL CLEAN/MAINT NPDES43, CSO9, 060W-047	MEDIUM	DEBRIS
NPDES43	17-May-12	CSO CLEANING - NPDES 43 - CSO 9 - 060W-047	HEAVY	DEBRIS
NPDES43	11-Sep-12	CSO MAINT - NPDES43:CSO9 MONTHS	HEAVY	DEBRIS
NPDES43	11-Oct-12	FLOW CNTRL CL HYDORBK- NPDES 43 - CSO 9 - 060W-	HEAVY	DEBRIS
NPDES43	05-Dec-12	CSO CLEANING	NONE	NO PROBLEM

Location	Cleaning Date	Cleaning Tasks	Cleaning Severity	Cleaning Findings
NPDES44	23-Feb-12	CLEAN HYDROBRAKE - NPDES 44A - CSO 8 - 067-274	MEDIUM	DEBRIS
NPDES45	01-Feb-12	WW FLOW CNTRL CLEAN/MAINT NPDES45, CSO29 074-159,	HEAVY	DEBRIS
NPDES45	07-Mar-12	WW FLOW CNTRL CLEAN/MAINT NPDES45, CSO29 074-159,	HEAVY	DEBRIS
NPDES45	07-Mar-12	WW FLOW CNTRL CLEAN/MAINT NPDES45 - CLN HYDROBRAKE	HEAVY	DEBRIS
NPDES45	13-Aug-12	FLOW CNTRL CLEANIN - NPDES45, CSO29 074-159, PST10	HEAVY	DEBRIS
NPDES45	06-Nov-12	FLOW CNTRL CLEANIN - NPDES45, CSO29 074-159, PST10	MEDIUM	DEBRIS
NPDES45	06-Nov-12	FLOW CNTRL CL HYDORBK CSO 29: PST 10	MEDIUM	DEBRIS
NPDES47	07-Mar-12	WW FLOW CNTRL CLEAN/MAINTNPDES47:CSO5,6,7 3 MONTH	MEDIUM	DEBRIS
NPDES47	05-Dec-12	CSO CLEANING	NONE	NO PROBLEM
NPDES47	11-Dec-12	CSO CLEANING - NPDES47:CSO5,6,7 3 MONTHS	NONE	NO PROBLEM
NPDES49	07-Mar-12	WW FLOW CNTRL CLEAN/MAINT NPDES49, CSO4 306-428	HEAVY	SAND
NPDES49	10-Dec-12	CSO CLEANING - NPDES49 CSO4	MEDIUM	SLUDGE
NPDES61	09-Apr-12	CLEAN CHAMBER 026-422 - NPDES61, CSO27;28	MEDIUM	DEBRIS
NPDES61	16-May-12	CLEAN CHAMBER - NPDES61, CSO27;28, 026-422	LIGHT	DEBRIS
NPDES61	10-Aug-12	FLOW CNTRL MAINT - NPDES61, CSO27;28, 026-013	NONE	NO PROBLEM
NPDES61	27-Sep-12	CLN MH 026-422-NPDES61,CSO27;28 2803 MAGNOLIA BL W	MEDIUM	DEBRIS
NPDES68	11-Apr-12	CLN HYDROBRAKE/CHAMBER-W BOSTON ST &15TH AV W	MEDIUM	SAND
NPDES70	07-Mar-12	CSO CLEANING NPDES70:CSO30 3 MONTHS	MEDIUM	DEBRIS
NPDES99	06-Feb-12	WW FLOW CNTRL CLEAN/MAINT NPDES99, CSO43, 055-478	MEDIUM	DEBRIS
NPDES99	17-Apr-12	WW FLOW CNTRL CLEAN/MAINT NPDES99, CSO43, 055-478	MEDIUM	DEBRIS
NPDES111	09-Feb-12	WW FLOW CNTRL CLEAN/MAINT STRUCTURE - 057-350	MEDIUM	DEBRIS
NPDES129	11-Apr-12	REPAIR INFILTRATION MH 030-052--2000 FAIRVIEW AV E	MEDIUM	DEBRIS
NPDES129	12-Apr-12	LOCATE M/H 030-053--2000 FAIRVIEW AVE E (paved over)	NONE	LOCATE
NPDES138	27-Feb-12	CLEAN CHAMBER-MH 023-434-2836 E SHELBY ST	MEDIUM	DEBRIS
NPDES138	27-Feb-12	CLEAN CHAMBER-MH 023-191-2836 E SHELBY ST	LIGHT	DEBRIS
NPDES138	01-May-12	CLEAN CHAMBER MH 023-434-NPDES138- 1216 E SHELBY	MEDIUM	DEBRIS
NPDES138	16-May-12	CLEAN M/H - NPDES138, CSO36, 023-434, PST20	LIGHT	DEBRIS
NPDES138	01-Oct-12	CLEAN MH 023-434 - NPDES138, CSO36, PST20	MEDIUM	DEBRIS

Location	Cleaning Date	Cleaning Tasks	Cleaning Severity	Cleaning Findings
NPDES140	29-Feb-12	JET CLEAN ML-MH 031-016/419-1804 W PARK DR E	MEDIUM	SAND
NPDES140	29-Feb-12	CLEAN CHAMBER-MH 031-001-1803 W PARK DR E	MEDIUM	SAND
NPDES140	16-May-12	CLEAN M/H - NPDES140, CSO31, 031-001, PST15	MEDIUM	DEBRIS
NPDES140	10-Sep-12	FLOW CNTRL CL HYDORBK - NPDES140 - CSO 31:PST 15	HEAVY	DEBRIS
NPDES140	01-Oct-12	CLEAN MH 031-001-NPDES140,CSO31,1800 E SHELBY ST	MEDIUM	DEBRIS
NPDES144	09-Apr-12	CLEAN M/H 023-439 - 303 NE NORTHLAKE WAY	HEAVY	GREASE
NPDES144	09-Apr-12	CLEAN M/H 023-058 - 3801 LATONA AVE NE	MEDIUM	DEBRIS
NPDES145	10-Apr-12	JET CLEAN ML 023-024/023-024- 2401 N NORTHLAKE WY	LIGHT	SAND
NPDES145	10-Apr-12	JET CLEAN ML 023-019/023-023 -2309 N NORTHLAKE WY	LIGHT	SAND
NPDES145	10-Apr-12	JET CLEAN ML 023-023/023-022 - 2321 N NORTHLAKE WY	HEAVY	SAND
NPDES148	09-Mar-12	JET CLEAN M/L 021-010 / 021-017 - 4222 NW 42ND ST	MEDIUM	SAND
NPDES148	09-Mar-12	JET CLEAN M/L 021-018 / 021-019 - 4222 NW 42ND ST	MEDIUM	SAND
NPDES148	09-Mar-12	JET CLEAN M/L 021-017 / 021-018 - 4222 NW 42ND ST	HEAVY	SAND
NPDES148	09-Mar-12	JET CLEAN M/L 021- 019/ 021-020 - 653 NW 41ST ST	MEDIUM	SAND
NPDES161	11-Apr-12	JET/HYDROCUT OVERFLOW-M/H 017-016--NE 65/65TH NE	LIGHT	ROOTS
NPDES168	10-Jan-12	CSO CLEANING 069-428 - 1 MONTHS	HEAVY	DEBRIS
NPDES168	03-Feb-12	FLOW CONTROL STRUCT CLEANING - 069-428 - 1 MONTHS	HEAVY	DEBRIS
NPDES168	19-Mar-12	FLOW CONTROL STRUCT CLEANING - 069-428 - 1 MONTHS	MEDIUM	DEBRIS
NPDES168	25-Apr-12	CSO CLEANING - SUPPORT TO REPLACE TRANSDUCERS	HEAVY	DEBRIS
NPDES168	26-Apr-12	FLOW CONTROL STRUCT CLEANING - 069-428 - 1 MONTHS	MEDIUM	DEBRIS
NPDES168	16-Jul-12	CSO 2 FLOW CONTR- NPDES168, CSO2 - 7200 DELRIDGE W	MEDIUM	DEBRIS
NPDES168	17-Jul-12	CSO 2 - FLOW CNTRL STRCT CLEANING - CSO2 069-428	HEAVY	DEBRIS
NPDES168	05-Sep-12	FLOW CNTRL STRUCT CLNG - NPDES168-CSO2 - 069-428	MEDIUM	DEBRIS
NPDES168	30-Oct-12	FLOW CNTRL STRUCT CLNG - NPDES168-CSO2 - 069-428	HEAVY	DEBRIS
NPDES168	26-Nov-12	WW FLOW CNTRL CLEAN/MAINT - 7200 DELRIDGE WAY SW	MEDIUM	DEBRIS
NPDES168	13-Dec-12	WW FLOW CNTRL MODIFY WIER - 7200 DELRIDGE WAY SW	MEDIUM	DEBRIS
NPDES168	24-Dec-12	FLOW CNTRL STRUCT CLNG - NPDES168-CSO2 - 069-428	MEDIUM	DEBRIS
NPDES169	03-Jan-12	CSO CLEANING- 22ND AVE SW/SW HENDERSON ST	MEDIUM	SAND

Location	Cleaning Date	Cleaning Tasks	Cleaning Severity	Cleaning Findings
NPDES169	12-Apr-12	CLEAN CHAMBER CSO 3 - NPDES 169	HEAVY	DEBRIS
NPDES169	12-Apr-12	NPDES169 - CSO 3 - CLEAN SUMP PUMP	MEDIUM	DEBRIS
NPDES169	06-Aug-12	CSO 3 - WW FLOW CNTRL CLEAN/MAINT - NPDES169 -	NONE	NO PROBLEM
NPDES169	11-Oct-12	CSO 3 CLEANING - NPDES169 - 2201 SW HENDERSON	MEDIUM	DEBRIS
NPDES170	06-Feb-12	WW FLOW CNTRL CLEAN/MAINT NPDES170, CSO1, 069-146	MEDIUM	DEBRIS
NPDES170	17-Apr-12	WW FLOW CNTRL CLEAN/MAINT NPDES170, CSO1, 069-146	MEDIUM	DEBRIS
NPDES170	22-May-12	WW FLOW CNTRL CLEAN/MAINT - 069-146	MEDIUM	GREASE/DEBRIS
NPDES170	20-Sep-12	WW FLOW CNTRL CLEAN/MAINT 069-144	MEDIUM	SAND
NPDES170	10-Dec-12	CSO CLEAN - NPDES170:CSO1 3 MONTHS	MEDIUM	DEBRIS
NPDES174	09-Mar-12	JET CLEAN ML 021-009/021-17 - 801 NW 42ND ST	LIGHT	DEBRIS