WPCF Operations
Outfall 015 Discharge Management:
Wet Weather Operations and Seasonal Flow Reduction

A. Background

The northern portion of the City of Everett sewage collection system is a combined sewer system that delivers large volumes of water to the Water Pollution Control Facility (WPCF) during rain events. The WPCF lagoon treatment train discharges to Outfall 015, commonly referred to as Final Effluent North (FEN), and provides storage and equalization capacity crucial for wet weather flow management and combined sewer overflow (CSO) minimization.

The WPCF NPDES discharge permit (Sections S5.G.3 and S6.F.7) includes operational requirements under the polybrominated diphenyl ether (PBDE) Reduction Program for a "Seasonal Flow Reduction" period during the March – June Chinook salmon outmigration period. During this period, flow to the "mechanical plant" trickling filter/solids contact (TF/SC) process train and Outfall 100 must be prioritized while discharge via Outfall 015 must be minimized to the extent practicable. Discharge monitoring reports (DMRs) documenting discharge from Outfall 015 during this period must contain an explanation for how operational protocols allowed for the discharge. Additionally, flow management decisions over the course of the entire year must be included in the PBDE Reduction Program section of the annual pretreatment report.

Unit processes governing capacity in the mechanical plant include the TF/SC process itself as well as disinfection, where disinfection capacity can be limiting. The City doses sodium hypochlorite for disinfection; the dose set to maintain compliance with total residual chlorine limits (0.5 mg/L monthly average and 0.75 mg/L weekly average) at Outfall 100. In absence of dechlorination, which is not viable in the existing current chlorine contact channel and South Effluent Pump Station (SEPS) configuration, the maximum chlorine dose is governed by meeting chlorine residual requirements. This effectively constrains disinfection capacity due to limiting the amount of hypochlorite that can be added. The City has added hypochlorite addition points upstream to the secondary clarifier weirs in effort to maximize chlorine contact time and disinfection capacity. While limiting chlorine dose to maintain permitted residual concentrations, elevated fecal coliform concentrations have occurred at the SEPS compliance sampling point at elevated flows and reduced secondary effluent quality.

Prior NPDES permits allowed sampling for fecal coliform and chlorine residual in the Outfall 100 pipeline near the former Kimberly-Clark mill site in addition to sampling at the SEPS compliance point during periods of high flow. Historical data for such instances of parallel sampling indicated that fecal coliform concentrations were reduced, and chlorine residual was depleted for the Kimberly-Clark site samples further downstream in the Outfall 100

pipeline closer to the actual outfall discharge. However, the current NPDES permit does not explicitly allow for such parallel sampling; thus, the limiting disinfection capacity the SEPS/Outfall 100 discharge system is constrained to a greater extent than with the provision for parallel sampling.

The amount of TF/SC secondary effluent that can be directed to the chlorine contact channel and SEPS/Outfall 100 is also affected by discharge from the City of Marysville, which has a contracted capacity of up to 10 MGD in Everett WPCF's chlorine contact channel and SEPS systems for Outfall 100 discharge. Recent Marysville flows to Everett WPCF are shown in Figure 1. When actively discharging to Everett WPCF, Marysville's discharge is typically between 4 and 8 MGD. For the March – June Seasonal Flow Reduction period of interest, Marysville's discharge averaged 6.1 MGD with maximum of 7.7 MGD when actively discharging to the City. Data show that Marysville discharge may occur throughout the March – June period. Marysville flows reduce the amount of TF/SC secondary effluent that can be directed to the chlorine contact channel and SEPS/Outfall 100. A future planned effluent flow control improvement project at Marysville is expected to reduce but not eliminate the amount of flow from Marysville to Everett during the high flow season.

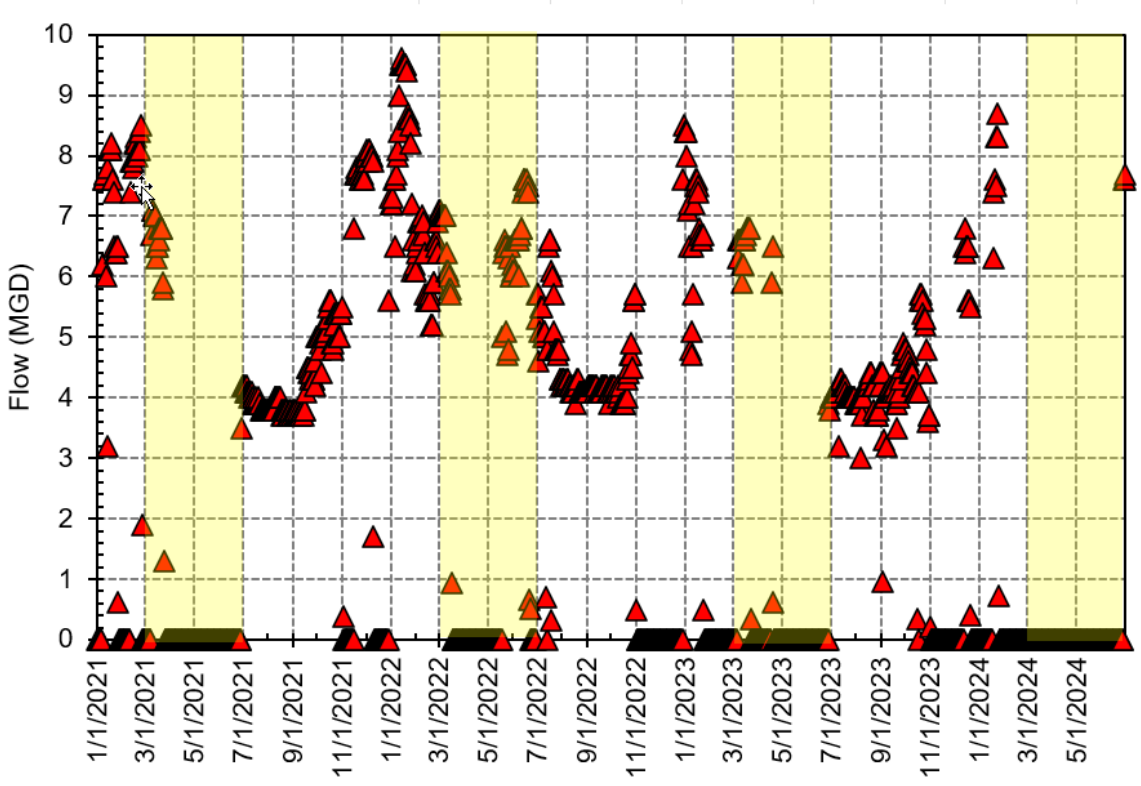

Figure 1. Marysville discharge to Everett WPCF with March – June periods highlighted

Managing the disinfection process performance and meeting Outfall 100 fecal coliform limits are part of overall flow management decision making. Outfall 100 effluent quality and flow from the Marysville may dictate that flows be reduced and directed to Outfall 015.

Overall, the dual requirements of managing CSOs as well as minimizing flows to Outfall 015 during March through June, which typically includes wet weather, creates a complex set of circumstances for WPCF management. Additionally, Outfall 100 effluent quality and lagoon berm structural integrity must be protected. This effluent flow strategy is intended to provide a year-round framework for SEPS/Outfall 100 and FEN/Outfall 015 discharge management to guide operations decisions and flow management during wet weather operations. It includes basic protocols applicable year-round as well as updated protocols specific to the March-June Seasonal Flow Reduction period in accordance with the NPDES Permit Section S5.G.3 and S6.F.7 requirements.

B. Outfall 015 Discharge Control Setpoints (Applicable Year-Round)

B.1. WPCF Flow Management Overview

Flow through the TF/SC system and Outfall 100 is manually controlled by operator-entered setpoints. The flow through the TF/SC system and Outfall 100 is affected by a variety of conditions including influent flow rates, TF/SC secondary effluent quality, and secondary effluent from the Marysville WWTP, as described above.

FEN/Outfall 015 discharge pumps can be operated in manual or level control modes. Level control is normally on during the high flow season November – June. Level control is normally taken off outside of the high flow season or when pond water quality does not meet Outfall 015 discharge limits. Operators shall check with the Chief Operator to see if there are discharge restrictions on Outfall 015 before initiating manual discharge.

Once brought online from out of service state, FEN/Outfall 015 must stay on until all permit-required samples are taken. This may require FEN/Outfall 015 to stay online at reduced flows even if threshold SEPS/Outfall 100 discharge flows identified in the Seasonal Flow Reduction strategy cannot be maintained due to decreasing plant influent flows. Additionally, the lagoon levels must be returned to the pre-storm state in the 9.4 – 9.7-foot range (NAVD88). The discharge management approach for returning lagoon levels to the pre-storm state will be affected by flow conditions out SEPS/Outfall 100 and whether the Seasonal Flow Reduction Period is in effect. Details are addressed in subsequent sections.

The level-based FEN/Outfall 015 discharge control table is shown below in Section B.2 below. The minimum pond level is approximately 9.4 feet and is required to provide a liquid volume buffer such that influent flows do not disturb settled solids. Discharge setpoints are based on pond water level and whether pond level is increasing or decreasing. This discharge control table has been established and inherently ramps FEN/Outfall 015 discharge up or down in response to wet weather and influent flow conditions. This established discharge control strategy is a vital part of wet weather influent combined sewer flow management and combined sewer overflow (CSO) control. The level-based control table inherently “right-sizes” FEN/Outfall 015 discharge proportionate to WPCF

influent flows to the extent practicable while maintaining appropriate capacity for accepting influent combined sewer flows and managing CSOs.

B.2. FEN/Outfall 015 Level Control

The FEN/Outfall 015 discharge control table setpoints are summarized in the table below.

Pond Level (NAVD88 ft.)	**Flow Setpoint (MGD)**
Increasing Pond Levels	
> 9.4	Operator Setpoint (<15)
> 9.7	15
> 9.8	25
> 10.0	35
> 10.2	45
Decreasing Pond Levels	
< 10.1	35
< 9.9	25
< 9.7	15
< 9.4	5 (small pump on VFD)
Manual off: Operator input	0 (OFF)

B.3. North Pond levels above 10.5 feet:

a. Follow steps in Part C.1
b. Ensure Trickling Filter Influent Flows to 9 MGD per Trickling Filter and set TFER flow to 3 MGD. Maximize flow through SEPS.
c. Periodically check secondary clarifier solids blanket. If the blanket rises, it may be necessary to increase TFER flow to maintain effluent water quality.
d. Notify Chief Operator or Plant Manager

B.4. North Ponds above 11.2 feet or Aeration Cell 2 above 11.5 feet:

a. Either of these levels should trigger a high pond level alarm in SCADA
b. Follow steps in Part B.3
c. Verify all AC-2 effluent gates are fully open.
d. Notify Public Works management in accordance with WPCF Operations Wet Weather Management Notifications SOP.

C. Additional Protocols for the Seasonal Flow Reduction Period (March – June)

C.1. General Flow Control Protocols for the Season

In addition to the general level-based controls for FEN/Outfall 015, the following guidelines shall apply to the Seasonal Flow Reduction period. Excursions from these guidelines must be thoroughly recorded, including reasoning and relevant effluent quality data.

- To the extent practicable, routine planned maintenance reducing the capacity of the TF/SC process and Outfall 100 discharge shall be planned for periods outside the Seasonal Flow Reduction Period.

- Operators shall proactively monitor weather forecasts, and if heavy rains are expected, operators shall proactively increase effluent flows at Outfall 100 and attempt to lower pond levels.

- Operators shall make manual effluent flow increases at Outfall 100 instead of Outfall 015 as feasible. Key operating conditions and historical experience for TF/SC and Outfall 100 are first provided as points of reference below. Thereafter, a **stepwise adaptive wet weather operating strategy** is described.

    - The maximum TF pump capacity is 27 MGD with all three pumps online and no recirculation. TF pump cavitation occurs above this flow rate. However, this forward flow rate is reduced by TF effluent recirculation (TFER) which is typically active and used to manage TF effluent quality. Forward flows up to 27 MGD without TFER have been accommodated at peak high flow conditions, but this requires careful observation of secondary clarifier performance.

    - With respect to TF/SC operation, historical operating experience has found 8 MGD forward flow per TF inclusive of 3 MGD total TFER (24 MGD total; 21 MGD secondary effluent flow) as a reliable sustained TF/SC operation during high flows balancing capacity and effluent quality. However, it possible that TFER could be reduced to maximize forward flow conveyed to secondary clarification and downstream processes.

    - With respect to disinfection, for chlorine residual concentrations within discharge limits at the SEPS sampling point, historical operating experience has shown that disinfection performance is typically reliable when Outfall 100 discharge is below 20 MGD, which includes TF/SC secondary effluent and City of Marysville flow.

    - Based on the above historical operating experience, Outfall 100 flow management during wet weather events will be a **stepwise adaptive approach** as follows. Operators will initially set TF/SC flows to 24 MGD

inclusive of 3 MGD total TFER (24 MGD total; 21 MGD secondary effluent flow). Outfall 100 discharge will be set to an initial maximum of 20 MGD. The incremental additional secondary effluent flow (e.g. 21 MGD minus 20 MGD) is needed for practical flow control upstream of the chlorine contact channel. In absence of Marysville flow, this 20 MGD of TF/SC secondary effluent will be disinfected and discharged via SEPS/Outfall 100. Flow from Marysville will displace and reduce this secondary effluent flow, and the displaced portion will be directed to the WPCF lagoon treatment system and potential discharge via FEN/Outfall 015. Actual Marysville discharge flow rate and water quality may vary, thus affecting the amount of TF/SC effluent that can be directed to the chlorine contact channel and SEPS/Outfall 100. This initial "typically safe" peak flow operating point will be set and held, with adjustments to be informed by effluent water quality results (specifically, disinfection performance and fecal coliform concentration). If fecal coliform concentrations are below discharge limits with appropriate margin of safety, discharge to Outfall 100 will be increased. This may be accomplished by one or more of the following: reducing secondary effluent directed to lagoons, increasing TF/SC total flow, and/or reducing TFER while maintaining or increasing TF/SC flow rate. Conversely, if fecal coliform concentrations are increasing and jeopardizing Outfall 100 discharge limits, flows to the Outfall 100 chlorine contact channel and/or across the TF/SC process will be reduced.

- Operators shall monitor Outfall 100 effluent quality and adjust flows to both maximize Outfall 100 discharge while maintaining appropriate effluent quality according to the stepwise adaptive strategy described above.

- If Outfall 100 flows are maximized and pond levels are increasing, operators shall increase flow at Outfall 015 according to the Outfall 015 Level Control Table in Section B.2.

- After FEN/Outfall 015 discharge is triggered by a wet weather event and all compliance samples have been obtained, the lagoon levels will be returned to pre-storm state in the 9.4 – 9.7-foot range. If the targeted 20 MGD SEPS/Outfall 100 discharge flow rate can be maintained, lagoon discharge will be governed by the level control table discharge rates for decreasing lagoon levels. If the targeted 20 MGD SEPS/Outfall 100 discharge flow rate cannot be maintained, a reduced FEN/Outfall 015 discharge rate will be used to return the lagoon levels to pre-storm state.

D. Notes on Prioritization and Emergency Conditions

- Avoiding a collection system shutdown and the resulting combined sewer overflows is a higher priority than avoiding a WPCF effluent limit violation.

- Avoiding physical damage to the plant (i.e., breaching a dike) is a higher priority than avoiding combined sewer overflows from collection system shutdowns.

E. Contact Numbers for Notifications

Job Title	Name	Office Phone	Cell
WPCF Chief Operator	Derek Kerlee	425-257-6790	425-249-6371
WPCF Plant Manager	Chris Merwede	425-257-7865	425-210-3464
PW Operations Superintendent	Jeff Marrs	425-257-8967	425-535-2242
Public Works Dispatch		425-257-8832	
After Hours PW Dispatch		425-257-8821	
Department of Ecology 24-hr Reporting Line Northwest Regional Office		206-594-0000	

F. Approval

Chief Operator: _____ 06/26/2025

Derek Kerlee Date

Plant Manager: _____ 06/26/2025

Chris Merwede Date