Work Plan: Analysis of West Point Discharges 2017

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King County

Department of
Natural Resources and Parks
Wastewater Treatment Division

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West Point Wastewater Treatment Plant – 2/9/17 Flooding Incident

Work Plan for Analysis of West Point Discharges and Environmental Effects to Puget Sound

Background

Repairs are underway at the West Point Wastewater Treatment Plant for the treatment facilities that were damaged during the equipment failure and flooding incident of February 9, 2017. King County is working to restore operations of the secondary treatment process by April 30, 2017. While the restoration is underway, King County is actively implementing the routine West Point monitoring regime specified in the NPDES permit to demonstrate compliance with effluent limitations and monitoring requirements. This work plan describes supplemental monitoring and discharge analyses identified to provide information in addressing other relevant NPDES permit conditions, effects of discharge quality to water quality conditions in Puget Sound, assistance to Ecology's investigation of the incident, and related requests for environmental information from stakeholders.

Objectives of Supplemental Monitoring and Analyses

The focus and primary objectives of the supplemental monitoring and discharge effects analyses that are contemplated under this work plan are as follows:

- Provide comprehensive, representative, and accurate monitoring and analyses of West Point discharge conditions and effects to the marine environment of Puget Sound.
- Document West Point treatment performance and effluent quality improvements over time as repairs to West Point are made.
- Evaluate the potential for short-term water quality effects of wastewater discharges to Puget Sound while repairs to West Point are underway.
- Evaluate West Point effluent quality for correlations with any observed significant changes in marine water quality from bi-weekly offshore marine monitoring program data.
- Evaluate the potential long-term water quality and sediment quality effects in Puget Sound (if any).

Methods of Information Collection and Analysis

The following describes the existing monitoring that is under way for the West Point incident and proposed initial set of supplemental monitoring and discharge analyses to be conducted.

Effluent Monitoring and Analysis

King County is currently conducting routine monitoring at West Point, as well as collecting supplemental discharge information while repairs are underway, as shown in **Table 1** and described below.

- Routine Monitoring: The routine daily/weekly/monthly/quarterly sampling and analysis of influent[1] and effluent sampling and analyses required in the NPDES permit have been conducted during the incident.

[1] Normal influent sampler location is currently unavailable due to the flooding; thus, comparable analyses such as TSS/BOD are being affected and will depend on restoration of normal sample collection.

- Supplemental Monitoring: King County will collect effluent samples for priority pollutants (i.e., trace metals and organic compounds) has been periodically monitored beginning February 28th, and will continue on a bi-weekly basis until the plant restoration is complete.

Monitoring data is being reported to Ecology, and will be compiled for dissemination to broader audiences (as needed). Additionally, analyses will be conducted to compare concentration and loading conditions over the duration of time that reduced treatment conditions exist at West Point until operations are fully restored and the plant returns to compliance with effluent limitations. The analyses of temporary flow and constituent loading changes while West Point repairs are being made will be used to support all other analyses under this work plan.

Supplemental monitoring of temporary emergency bypasses and flow shedding to the County's other treatment facilities (Brightwater, South Plant, and three CSO treatment facilities) are not contemplated at this time based on the authorized use of these facilities to provide equivalent treatment during high flow events. Flow management activities during the West Point restoration process are anticipated to involve minimal changes relative to the long-term average operations at the County's other facilities.

Analysis of Near-Field and Far-Field Effects and Descriptive Plume Modeling

- Near-Field Analysis: The near-field effects of the effluent discharge (i.e., immediate vicinity of the West Point main outfall) involves potential changes in short-term marine water quality conditions and long-term solids deposition, which will be evaluated as follows.
    - Effluent Mixing Water Quality Analysis. The potential short-term receiving water contaminant concentrations that occur within the near-field zone of initial effluent mixing from the West Point outfall diffuser will be evaluated with mass-balance calculations consistent with Ecology's methods used in the NPDES permit renewal process. The calculation procedure is based on King County's previous effluent dilution modeling conducted in 2013 for the current West Point NPDES permit to represent conservative (worst-case) hydraulic conditions of tidal mixing in combination with maximum daily and maximum monthly average effluent discharge rate scenarios. Conservative assumptions also are used for effluent and background seawater contaminant concentrations consistent with Ecology's methods. In the case of the West Point incident, the contaminant concentrations in the influent will be used to represent the effluent concentrations where the current reduced level of treatment results in minimal removal of solids. The effluent mixing water quality analysis will be used to evaluate receiving water concentrations at the edge of the initial zone of mixing in comparison to acute and chronic aquatic life water quality criteria. The analyses will be periodically updated as new effluent data becomes available while repairs to West Point are underway.
    - Sediment Quality Analysis. The potential long-term sediment quality changes will primarily be documented through the collection of samples via the permit-specified monitoring schedule in late August/September 2017 timeframe. Descriptive analyses and information also will be prepared regarding the system-wide solids discharges occurring as a result of the West Point incident and estimated effects relative to compliance with state Sediment Management Standards.

- Far-Field Analysis: The effects of effluent discharges to far-field locales and the greater contaminant transport cycling in Puget Sound, will be evaluated with mass balance analyses for those contaminants that exhibit substantial change in concentration or loading under reduced treatment conditions compared to normal West Point operations. Suitable constituents for such analysis may include dissolved oxygen, total nitrogen, total phosphorus, or total suspended solids (for effects on turbidity and light).
- Descriptive Plume Modeling: King County has received inquiries from media/public/agency stakeholders to provide information regarding the geographic extent of effluent dispersion in Puget Sound that occurs from West Point, such as "how far" and "where" does the discharge travel once released. King County will prepare graphical analyses to visually demonstrate effluent dispersion areas for representative discharge assumptions, contaminant concentrations, and reasonable time-scales of direct effects (i.e., areas of concentration changes relative to acute and chronic environmental effects). The analyses will be based on available sources of information including King County's NPDES permit documents, previous hydraulic studies conducted at West Point, and output from a three-dimensional model for Puget Sound.

Information Coordination, Dissemination, and Reporting

Information generated from the monitoring and analyses conducted under this work plan will be disseminated through the County's online dedicated web page for the West Point restoration, as well as written documentation (reports, Power Point presentations, etc.). The proposed structure of the web landing page, shown below with the existing "Marine Monitoring Program" will direct viewers to the information of interest, with the following structure and descriptive tag lines. Each sub-landing page would have online information presentations and/or descriptions of the analyses and hyperlinks to work products.

/West Point Restoration

/West Point marine water quality monitoring

/West Point environmental monitoring

/West Point treatment plant monitoring data

/Discharge effects on Puget Sound

/Discharge dispersion in Puget Sound

Specific information products envisioned for various proposed audience groups are described below.

Online Presentation of West Point Influent and Effluent Data

The routine and supplemental West Point monitoring data for the time period since the February 9th flooding incident will be periodically posted. Excel spreadsheet files will present the raw data, and King County will provide brief informational statements to provide the viewer with general information regarding the status of the information collection, content, and explanations of any results of apparent or real significance.

Discharge Effects on Puget Sound – Written/Prepared Work Products

As specific analyses described above are completed, the online site will serve as a repository of prepared work products.

- "Fact Sheet – West Point Operations and Incident Discharges": A brief document that will describe basic information on the West Point discharges including normal operations, and changes occurring as a result of the flooding incident, such as maps, locations of discharges, volume and timing of discharges, and relative magnitude to other meaningful parameters for Puget Sound.
- Effluent Mixing Water Quality Analysis (near-field): A brief written document that describes the near-field zone of effluent mixing, spreadsheet that is based on Ecology's methodology and conservative assumptions, calculation results, and conclusions will be provided online and updated periodically as new laboratory data becomes available.
- Sediment Loading and Sediment Quality Analysis (near-field): A brief "Fact Sheet"-type document will be prepared immediately that evaluates the system-wide solids discharges and estimated effects to sediment quality. The permit-required sediment quality report for sampling scheduled in Aug./Sep. 2017 will be completed in early 2018.
- Descriptive Analysis of Discharge Effects to Puget Sound: A brief "Fact Sheet"-type document could be prepared to evaluate discharge effects to constituents that are indirectly associated with water quality conditions in Puget Sound.

Discharge Dispersion in Puget Sound

A number of inquiries from stakeholders have requested information on where does effluent that is discharged from West Point travel within Puget Sound.

- Discharge Plume: A brief "Fact Sheet"-type document could be prepared to describe effluent plume dispersion from the West Point outfall based on available historical dye tracing and modeling studies, as well as modeling information used for the NPDES permit process.

Coordination with Agencies

- King County will provide the monitoring and analysis work plan to the NPDES permit officer at Ecology's NW Regional Office for review and input regarding the sufficiency of analyses for their investigation.
- King County will coordinate with WA DFW in reviewing work plans, and providing available in-kind laboratory analytical support for their biennial fish tissue analysis program, specifically for the four additional sampling sites to be monitored to evaluate the effects of the West Point incident.

Table 2. West Point Restoration – Effluent Sampling and Analysis Plan

Locations	Parameters	Frequency	Report Availability
West Point System - Influent/Effluent Discharge (permit required and supplemental)			
Influent (required)	Flow, TSS, BOD	Daily (routine)	Data will updated and posted online twice per month.
Effluent (required)	Flow, TSS, BOD, fecal coliform, residual chlorine, pH	Daily (routine)	
Effluent (required)	Nutrients (N & P parameters)	Weekly (routine)	
Effluent (required)	Whole Effluent Toxicity	Quarterly in 2017 (acute on 3/21; chronic in April)	
Influent & Effluent (required)	Priority pollutants (metals, organics), cyanide, phenolic compounds	Quarterly (routine on 2/28)	
Influent/Effluent (supplemental)	• *Priority pollutants (metals)* • *Priority pollutants (organics)*	• *3/6, 3/8, 3/13, 3/15, 3/20, 4/10, 4/24, 5/9* • *3/8, 3/20, 4/10, 4/24, 5/9* ** sampling to continue until permit compliance achieved*	
Outfall Sediment (required)	Metals/organics & benthic infauna (per WA Sed. Mgt. Stds.)	1/permit cycle (in Aug./Sep. 2017)	Anticipated early 2018
Marine Monitoring			
12 Offshore Stations	LAB ANALYSES: Nutrients (N, P, Si), TSS, fecal bacteria, chlorophyll, Secchi disk transparency, algae FIELD ANALYSES: Temperature, salinity, density, dissolved oxygen, fluorescence, light transmissivity/intensity	2/month (routine)	Reports will be prepared twice per month. First report posted online 3/17/17 for samples collected on Feb. 21/22.
4 Offshore Stations (and additional site near West Point)	*Same parameters as above.*	*Weekly (supplemental for next couple of months)*	
20 Beach Stations	Nutrients, fecal bacteria, temperature, salinity	Monthly (routine)	