



STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

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February 2, 2021

Mark Isaacson, Director
King County Wastewater Treatment Division
King Street Center, KSC-NR-0500
201 S. Jackson St.
Seattle, WA 98104

Order Docket No.	19477
Site Location	King County West Point Treatment Plant 1400 Discovery Park Blvd. Seattle, WA 98199

Re: Administrative Order

Dear Mark Isaacson:

The Department of Ecology (Ecology) has issued the enclosed Administrative Order (Order) requiring King County Wastewater Treatment Division to comply with:

- **Chapter 90.48 Revised Code of Washington (RCW) – Water Pollution Control**
- **Chapter 173-220 Washington Administrative Code (WAC) – National Pollutant Discharge Elimination System permit program**
- **National Pollutant Discharge Elimination System (NPDES) Permit #WA0029181**

If you have questions, please contact Shawn McKone at 425-649-7037 or by email at shawn.mckone@ecy.wa.gov.

Sincerely,

A handwritten signature in black ink that reads "Rachel McCrea".

Rachel McCrea
Water Quality Section Manager
Northwest Regional Office

Enclosures: Administrative Order Docket #19477

Sent by Certified Mail: 9171 9690 0935 0233 2085 84

Mark Isaacson, Director

February 2, 2021

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ecc: Robert Waddle, Wastewater Operations Manager, King County
Jeff Lafer, NPDES Permit Administrator, King County
Eugene Sugita, Process Supervisor, King County
Laura Fricke, Municipal Unit Supervisor, Ecology
Greg Lipnickey, Municipal Compliance Specialist, Ecology
Shawn McKone, Facility Permit Manager, Ecology
PARIS: King County West Point WWTP, WA0029181

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

IN THE MATTER OF AN)
ADMINISTRATIVE ORDER)
AGAINST)
King County Wastewater Treatment)
Division)
Mark Isaacson, Director)

ADMINISTRATIVE ORDER
DOCKET #19477

To: Mark Isaacson, Director
King County Wastewater Treatment Division
King Street Center, KSC-NR-0500
201 S. Jackson St.
Seattle, WA 98104

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Chapter 90.48.120(2) RCW gives Ecology the authority to issue Administrative Orders requiring compliance whenever it determines that a person has or is about to violated Chapter 90.48 RCW.

DETERMINATION OF VIOLATION(s) AND ORDER TO COMPLY

Ecology's determination that violations have occurred is based on the violations listed below.

Background:

King County's Wastewater Treatment Division (WTD) owns and operates the West Point Wastewater Treatment Plant (WPTP) and associated regional facilities. Ecology regulates the facility under NPDES Permit No. WA0029181 (Permit). The WPTP, located in the City of Seattle, uses a high rate oxygen activated sludge process to provide secondary treatment for peak flows up to 300 million gallons per day (MGD). It provides primary treatment and disinfection for peak flows exceeding 300 MGD. The plant's rated peak hydraulic capacity is 440 MGD and its maximum monthly average design flow rating is 215 MGD.

Findings of Fact:

Special condition S10 of the Permit authorizes the WPTP to divert primary effluent from the Flow Diversion Structure (FDS) to the chlorine contact channel during wet weather operations when flows through the plant exceed 300 MGD. The FDS is a flow control point located between the primary clarifiers and the Intermediate Pump Station (IPS), which pumps primary effluent to the secondary treatment system. Ecology recognizes these diversions during wet weather as part of WTD's overall strategy to control combined sewer overflows from the regional collection system by maximizing the conveyance of treatable flow to the WPTP. Ecology considers secondary diversions initiated for reasons other than high wet weather flow as bypasses regulated by special condition S5.F of the permit and by 40 CFR 122.41(m).

Between January 1, 2018, and June 30, 2020, the WPTP reported 57 secondary diversion events. Forty-four events qualified as wet weather diversions authorized by special condition S10. Ecology considers the remaining 13 events as unanticipated, unauthorized bypasses. Of the unanticipated, unauthorized bypasses seven were due to a variety of mechanical or control issues that WTD has already addressed. The remaining six were due to issues with treatment plant's main electrical power system. Table 1 summarizes the six bypasses caused by electrical power issues that are the subject of this order.

Table 1. Secondary Bypasses Related to Power Disruptions (2018 to date)

Event No.	Bypass Date	ERTS No.	Bypass Duration (min.)	Bypass Volume (million gallons)	Event Description
1	1/20/2018	678625	21	0.43	Loss of power from the main Canal substation resulted in an automatic transfer of power to the back-up Broad Street substation. The resulting power disturbance caused the IPS pumps to go off-line. Secondary diversion occurred while IPS pumps were restarting.
2	3/17/2019	687853	37	1.0	A voltage sag to 59% of nominal voltage from the Canal Substation power feed caused pumps at both the IPS and EPS to shut down. This caused flow instability and increasing water levels in the plant. Water level in the IPS triggered a secondary diversion before backup pumps fully started and before the operators reestablished stable flow through the plant.
3 ¹	7/19/2019	690723	7	0.10	Power outages in two adjacent power feeds connected to the Canal substation caused voltage sags in the WPTP power feed (voltage reduced to 65% of nominal voltage). The voltage sags caused pumps in the IPS and EPS to go offline at a time when flows into the plant were high due to a heavy summer storm. Secondary diversion gates opened within one minute of the voltage sags.

Event No.	Bypass Date	ERTS No.	Bypass Duration (min.)	Bypass Volume (million gallons)	Event Description
4	9/7/2019	692925	45	2.50	Multiple lightning strikes on power transmission lines in the area caused four separate instances of voltage sags in the power feed from the Canal substation. The voltage sags caused pumps in the IPS and EPS to shut down at two different times, resulting in unauthorized secondary diversions. The first diversion (0.5 MG) occurred between 8:23 pm and 8:47 pm. The second diversion (2.0 MG) occurred between 9:27 pm and 9:48 pm. WTD also reported a third diversion of 1.5 MG that occurred between 10:26 pm and 12:32 am. However, this third diversion resulted from wet weather flows in excess of 300 MGD and was authorized by condition S10 of the Permit.
5	11/15/2019	694408	5	0.05	A lightning strike on a power transmission line in the area caused voltage in the Canal substation power feed to reduce to 55% of nominal voltage. The voltage sag caused IPS Pump No. 1 to go offline. The water level in the IPS wet well reached the secondary diversion level before the backup pump fully started.
6	5/20/2020	698352	14	0.350	A series of voltage sags in the Canal substation power feed caused IPS Pump No.1 and EPS Pump No. 2 to go offline. The water level in the IPS wet well reached the secondary diversion level before the backup pump fully started
¹ Event Number 3 on July 19, 2019 resulted in both a secondary diversion and a full plant bypass. The volume shown in this table represents the estimated volume of primary effluent that diverted around the secondary treatment process before the full plant diversion began. Ecology conducted a separate investigation into the 2.1-million-gallon full plant diversion.					

Power-related issues:

The WPTP primarily receives power from a dedicated service from Seattle City Light's (SCL) Canal substation. All power lines between the Canal substation and the WPTP run below ground. A secondary connection to SCL's Broad Street substation provides redundancy should a power outage occur in the Canal substation feed. The Broad Street power feed is not a dedicated power feed; the WPTP shares the feed with other SCL residential and commercial customers.

The WPTP has experienced several problems in recent years related to disturbances in incoming electrical power. In September 2019, WTD and Seattle City Light (SCL) hired Brown and Caldwell to conduct an independent power quality assessment (power assessment) of the WPTP. On September 16, 2020, Ecology received a copy of the study's final report dated May 28, 2020. The report provided the following assessments based on system reviews initiated in October 2019:

- Characterization of the voltage sags experienced at the WPTP.
- Evaluation of the impacts voltage sags have on critical systems at the WPTP.
- Identify recommended measures WTD should consider to reduce bypass events caused by voltage sags.

The power assessment noted that there are multiple factors inherent to the Canal substation that make the WPTP power feed susceptible to voltage sags. The report explains that the relatively remote location of the WPTP in relation to major power transmission lines means that the WPTP receives power at a lower voltage than WTD's other regional wastewater treatment facilities (Brightwater and South Treatment Plant). Both the Canal and the Broad Street substations provide power through 27 kilovolt (kV) "distribution level" service. In addition, substations that provide distribution level service generally connect to multiple parallel and interconnected power lines that distribute power to local neighborhoods. Due to the interconnections of the power grid, disturbances in one part of the substation's distribution network can cause a "ripple effect" of voltage sags in the other adjacent feeds from the substation. According to the report, the interconnected configuration of the power network combined with the lower 27 kV power feed makes the WPTP more vulnerable to adverse impacts from voltage sags than WTD's other regional treatment plants.

The power assessment found that from March 1, 2018, to February 6, 2020, the main cause of power disruptions at the WPTP were due to voltage sags. The report defines a voltage sag as an instance where the voltage of the power supplied to the WPTP is momentarily reduced. It further categorizes the voltage sags as either "significant" or "consequential". A significant voltage sag is one that could impact equipment operation and was defined as a voltage reduction to 85% or less of the facility's nominal voltage for 0.05 seconds or longer. A consequential voltage sag is one where the consultants expected impacts to equipment operation and was defined as a voltage reduction to 66% or less of the facility's nominal voltage for 0.05 seconds or longer.

Using data from power monitoring equipment connected to the Canal power feed to the WPTP, the report's authors concluded that the WPTP experiences approximately one consequential voltage sag every two months. The report also concludes that the root causes of the voltage sags were not related to the dedicated power feed to the WPTP, but were instead due to disturbances in other power feeds connected to the Canal substation. The report included a summary that identified seven days between March 17, 2019, and February 6, 2020, where equipment recorded consequential voltage sags. Four of these seven events correspond to unauthorized secondary bypasses listed in Table 1.

Corrective actions required:

For these reasons and in accordance with RCW 90.48.120(2), it is ordered that King County Wastewater Treatment Division take the following actions. These actions are required at the location known as King County West Point Treatment Plant located at 1400 Discovery Park Blvd., Seattle, WA 98199

Immediately upon receipt of this order and continuously thereafter King County Wastewater Treatment Division must:

1. Produce a report describing proposed changes to the Ovation (SCADA) system control logic for the IPS and effluent pumps that WTD evaluated and implemented to allow the pumps to operate longer during a voltage sag (see Near-term Action #2 in Attachment #1). The report must describe all implemented changes and all proposed changes considered but not implemented. For any change not implemented, discuss the reason for not implementing the change. Submit this report to Ecology by June 30, 2021.
2. Produce a report describing other process, mechanical, or operational strategies WTD can use to mitigate against unauthorized secondary diversions at the WPTP. The evaluation must identify potential strategies that prevent unauthorized secondary diversions and determine whether each strategy is feasible to implement. If prevention options are not feasible, identify strategies considered to minimize duration and volume of unauthorized diversions and to mitigate against possible water quality impacts of those diversions. Include in the report a schedule for implementing each feasible measure in the shortest time possible. Submit this report to Ecology by September 30, 2021.
3. Develop a strategic master plan for West Point's electrical system (see Near-term Action #1 in Attachment #1). As part of the master plan, identify near-term electrical system modifications WTD will complete in the next 3-5 years to improve overall power reliability and resiliency. The plan must evaluate as a potential modification the feasibility of installing voltage regulating equipment that can reduce the number of voltage sags observed at the West Point Treatment Plant (see Near-term Action #5 in Attachment #1). Include in the plan a detailed implementation schedule for the corrective actions. Submit the plan and schedule to Ecology by December 31, 2021.
4. Implement corrective actions according to the schedule in the strategic master plan (see corrective action 3) no later than December 31, 2025. If the master plan schedule proposes completion dates after December 31, 2025, WTD must demonstrate to Ecology that earlier completion is not feasible. Ecology will evaluate reasonable extension of this schedule date on a case-by-case basis.

FAILURE TO COMPLY WITH THIS ORDER

Failure to comply with this Order may result in the issuance of civil penalties or other actions, whether administrative or judicial, to enforce the terms of this Order.

YOUR RIGHT TO APPEAL

You have a right to appeal this Order to the Pollution Control Hearing Board (PCHB) within 30 days of the date of receipt of this Order. The appeal process is governed by Chapter 43.21B RCW and Chapter 371-08 WAC. "Date of receipt" is defined in RCW 43.21B.001(2).

To appeal you must do both of the following within 30 days of the date of receipt of this Order:

- **File your appeal and a copy of this Order with the PCHB. (See addresses below.) Filing means actual receipt by the PCHB during regular business hours.**
- **Serve a copy of your appeal and this Order on Ecology in paper form - by mail or in person. (See addresses below.) E-mail is not accepted.**

You must also comply with other applicable requirements in Chapter 43.21B RCW and Chapter 371-08 WAC.

Your appeal alone will not stay the effectiveness of this Order. Stay requests must be submitted in accordance with RCW 43.21B.320.

ADDRESS AND LOCATION INFORMATION

Street Addresses	Mailing Addresses
Department of Ecology Attn: Appeals Processing Desk 300 Desmond Drive SE Lacey, WA 98503	Department of Ecology Attn: Appeals Processing Desk PO Box 47608 Olympia, WA 98504-7608
Pollution Control Hearings Board 1111 Israel Road SW STE 301 Tumwater, WA 98501	Pollution Control Hearings Board PO Box 40903 Olympia, WA 98504-0903

CONTACT INFORMATION

Please direct all questions about this Order to:

Shawn McKone
Department of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008

Phone: 425-649-7037

Email: shawn.mckone@ecy.wa.gov

MORE INFORMATION

- **Pollution Control Hearings Board Website**
<http://www.eluho.wa.gov/Board/PCHB>
- **Chapter 43.21B RCW - Environmental and Land Use Hearings Office – Pollution Control Hearings Board**
<http://app.leg.wa.gov/RCW/default.aspx?cite=43.21B>

- **Chapter 371-08 WAC – Practice And Procedure**
<http://app.leg.wa.gov/WAC/default.aspx?cite=371-08>
- **Chapter 34.05 RCW – Administrative Procedure Act**
<http://app.leg.wa.gov/RCW/default.aspx?cite=34.05>
- **Ecology's Laws, rules, & rulemaking website**
<https://ecology.wa.gov/About-us/How-we-operate/Laws-rules-rulemaking>

SIGNATURE

Rachel McCrea

Rachel McCrea
Water Quality Section Manager
Water Quality Program
Northwest Regional Office

2/2/2021

Date

ATTACHMENT #1

**NEAR-TERM RECOMMENDED ACTION TABLE FROM
2020 WEST POINT POWER QUALITY ASSESSMENT REPORT**

This attachment includes copies of recommended near term action tables from the May 28, 2020 West Point Treatment Plant Power Quality Assessment Report that Ecology has referenced in the Corrective Actions of this order. The report was prepared by Brown and Caldwell for King County Wastewater Treatment Division and Seattle City Light.

Table 2. Near-Term Recommended Actions

#	Action Title	Action Description	Dependencies	Responsible Party
1	Strategic Master Plan	<p>Create a strategic master plan for West Point electrical systems that establishes the objectives and vision for future work at West Point, identifies a prioritized list of projects to meet those objectives, and describes the sequence for implementing planned projects. Recommended actions listed below should be further developed, described, and prioritized within the strategic master plan.</p> <p>Without a coordinated plan, there is opportunity for decisions on individual projects to have broad implications on other potential projects at West Point, which could limit flexibility and constrain opportunities for greater resiliency across systems. In addition, by defining a unified vision and objectives for improvements at West Point, projects can be identified, developed, and prioritized in a cohesive manner to meet WTD's objectives.</p>	All Actions	Primarily WTD with input and coordination with SCL
2	Ovation System Revisions	<p>Revise the Ovation system (SCADA) control logic associated with the effluent and intermediate pumps so that the pumps continue to operate after minor voltage sags rather than shut down.</p> <p>Implementing this action is expected to reduce the number of bypass events due to effluent and intermediate pump shutdowns (such as the July 19, 2019 event).</p>	None	WTD
3	Power Monitoring and Metering	<p>Complete a coordinated gap analysis to compare power monitoring and data capture systems between SCL and WTD. Align power monitoring systems and collaborate on the development of protocols for sharing power monitoring data.</p> <p>Completing these actions would support the rapid identification, investigation, and resolution of future power quality issues.</p>	None	SCL and WTD
4	Study Electrically Driven RSP Vulnerabilities	<p>Assess the risk of voltage sags to electrically driven RSPs currently being considered as part of the ongoing West Point RSP project. Incorporate the findings and applicable recommendations of this study into the design of new RSP electric motors, drives, and controls.</p> <p>Replacing engine-driven RSPs with electrically driven RSPs could make West Point more vulnerable to power quality issues if existing power quality parameters are not understood and incorporated into the project's assumptions, objectives, and design.</p>	Action 2	WTD
5	Study New Voltage Regulation Equipment	<p>Investigate the viability, space availability, and cost for adding voltage regulation equipment on the West Point power feeds to enable momentary ride-through capacity for voltage sags and brief outages. Potential voltage regulation technologies to consider include distribution static compensator equipment, synchronous condenser, and battery energy storage system.</p> <p>If viable, adding voltage regulation equipment could significantly reduce the number of voltage sags (and brief outages) observed by West Point equipment.</p>	Action 8	WTD and SCL

Corrective Action 3

Corrective Action 1

Corrective Action 3