ATTACHMENT A

ERTS Reports

ERTS # 670591

Initial Report

External Reference #

Caller Information

	First	Last
Name	CHARLES	WENIG
Busines Name	KING COUNTY WEST POINT WWTP	
Street Address	1400 DISCOVERY PARK BLVD	
Other Address		
City	SEATTLE	State WA Zip 98199
E-mail		Confidential_FL ☐

Phone	Ext	Type
(206) 263-3801		Business

Where did it happen

Berth		Anchorage
Location Name	KING COUNTY WEST POINT WWTP	
Street Address	1400 DISCOVERY PARK BLVD	
Other Address		
City/Place	SEATTLE	State WA Zip 98199
County - Region	KING	NWRO FS ID
WIRA #		
Waterway		Type
Latitude		Longitude
Topo Quad 1:24:000	SEATTLE	

Direction/Landmark (mile post, cross roads, township/range)

What happened

Spills Program Oil Spill? N

Incident Date	2/9/2017	Received Date	2/9/2017 3:38
Medium	SURFACE WATER-MARINE		
Material	WASTE WATER		
Quantity	300000	Unit	GALLON/MIN
Source	WASTEWATER TREATMENT PLANT		
Cause	EQUIPMENT FAILURE		
Activity	ROUTINE/NORMAL OPERATIONS		
Impact	WATER POLLUTION		
Vessel Name			
Hull Number			

Primary Potentially Responsible Party Information

	First	Last
Name		
Business Name	**KING COUNTY WEST POINT WWTP**	
Street Address	1400 DISCOVERY PARK BLVD	
Other Address		
City	SEATTLE	State Zip 98199
Phone	(206) 263-3801	Ext Type Business
E-mail		

Additional Contact Information

Name	Phone	Ext	Type

More Information

AHR
Charles Wenig (King County West Point WWTP) reported a complete shutdown of the WWTP due to heavy imput from the rain and electrical equipment failures.

Entry Person Kicken, Yvonne

Entry Date 2/9/2017

ERTS # 670591

Referral

Referral # 219956

Referral Method
- ○ E-mail ERTS number
- ○ E-mail attachment
- ○ Print
- ◉ Telephone

Person Referred to: SMITH AHR, BUCK — Primary ☐
Phone: (425) 649-7147 Fax:
E-mail: JSMI461@ECY.WA.GOV;4259417725@OnPage.co
Program/Organization: SPILLS, PREVENTION, PREPAREDNESS AND RESPONSE
Address: 3190 160TH AVE SE
City: BELLEVUE WA 98008-
Region/Location: NWRO
Referral Date: 2/9/2017

Referral # 219957

Referral Method
- ○ E-mail ERTS number
- ◉ E-mail attachment
- ○ Print
- ○ Telephone

Person Referred to: Larson, Sonja — Primary ☐
Phone: (360) 407-6682 Fax:
E-mail: SLAR461@ecy.wa.gov
Program/Organization: SPILLS, PREVENTION, PREPAREDNESS AND RESPONSE
Address: 300 Desmond Drive
City: Lacey WA 98504-7600
Region/Location: HQ
Referral Date: 2/9/2017

Referral # 219958

Referral Method
- ○ E-mail ERTS number
- ◉ E-mail attachment
- ○ Print
- ○ Telephone

Person Referred to: HENLEY, MARK — Primary ☐
Phone: (425) 649-7103 Fax:
E-mail: MAHE461@ECY.WA.GOV
Program/Organization: WATER QUALITY
Address: 3190 160TH AVE SE
City: BELLEVUE WA
Region/Location: NWRO
Referral Date: 2/9/2017

Referral # 219959

Referral Method
- ○ E-mail ERTS number
- ◉ E-mail attachment
- ○ Print
- ○ Telephone

Person Referred to: KING CO HEALTH (SEWER ISSUES), Lynn Schneider — Primary ☐
Phone: (206) 477-2124 Fax:
E-mail: lynn.schneider@kingcounty.gov
Program/Organization: KING COUNTY HEALTH (SEWER ISSUES)
Address: EASTGATE
City: WA
Region/Location: NWRO
Referral Date: 2/9/2017

*** The Initial report contains only information provided to Ecology from the complainant.

ERTS # 670591

Referral # 219960

Referral Method
- ○ E-mail ERTS number
- ◉ E-mail attachment
- ○ Print
- ○ Telephone

Person Referred to department of health- SHELLFISH, Primary ☐
Phone Fax
E-mail SF.growingarea@doh.wa.gov
Program/Organization STATE HEALTH DEPARTMENT-SHELLFISH
Address
City WA
Region/Location SWRO, NWRO
Referral Date 2/9/2017

Referral # 219963

Referral Method
- ○ E-mail ERTS number
- ◉ E-mail attachment
- ○ Print
- ○ Telephone

Person Referred to McKone, Shawn Primary ☐
Phone (425) 649-7037 Fax
E-mail Email WQ CSO
Program/Organization WATER QUALITY
Address 3190 160th Ave. SE
City Bellevue WA 98008-5452
Region/Location NWRO
Referral Date 2/9/2017

Referral # 219964

Referral Method
- ○ E-mail ERTS number
- ◉ E-mail attachment
- ○ Print
- ○ Telephone

Person Referred to King, Corey Primary ☐
Phone (425) 649-7092 Fax
E-mail CKIN461@ecy.wa.gov ; 4254954390@onpage.com
Program/Organization SPILLS, PREVENTION, PREPAREDNESS AND RESPONSE
Address
City Bellevue WA
Region/Location NWRO
Referral Date 2/9/2017

ERTS # 670591

Followup

Inspector Information

Referral # 219956
☑ Lead Inspector SMITH AHR, BUCK
Program/Organization SPILLS, PREVENTION, PREPAREDNESS AND RESPONSE
* Region/Location NWRO
# of Ecology Staff Overtime ☐

Action

Action	Start Date	End Date
TELEPHONE	2/9/2017	

What happened

Spills Program Oil Spill? N

Incident Date 2/9/2017

Medium
SURFACE WATER-MARINE

Material
WASTE WATER

Quantity	Unit	Est
300000	GALLON/MIN	☐

Source Regulated? ☐
WASTEWATER TREATMENT PLANT

Cause
EQUIPMENT FAILURE

Activity
ROUTINE/NORMAL OPERATIONS

Impact
WATER POLLUTION

Vessel

Where did it happen

Followup #1

Berth Anchorage
Location Name KING COUNTY WEST POINT WWTP
Street Address 1400 DISCOVERY PARK BLVD
Other Address
City/Place SEATTLE State WA Zip 98199-
County KING Region NWRO FS ID
Waterway PUGET SOUND Type MARINE
WRIA #
Latitude 47.661936 Longitude 122.431188
Topo Quad 1:24,000 SEATTLE
Direction/Landmark (mile post, cross roads, township/range)

Potentially Responsible Party Information

Check if the primary PRP provided notice to Ecology ☐

Primary ☑ First Last
Name
Business Name KING COUNTY WEST POINT WWTP
Street Address 1400 DISCOVERY PARK BLVD
Other Address
City SEATTLE State Zip 98199-
Phone (206) 263-3801 Ext Type Business
E-mail

Narrative

AHR
Smith spoke with Charles Wenig (King County West Point WWTP) at 3:44. He reported a complete shutdown of the WWTP due to a loss of the effluent pump station, likely caused by the heavy imput from rain (combined sewer system) and electrical equipment failures. Untreated wastewater is currently flowing directly into Puget Sound. The plant went down at approximately 3:00. Restart time is unknown. The flow rate is 450 MGD (300,000+ gpm). Charles said he will contact DOH next.
The following Ecology staff have been notified:
• Corey King (Spills Program)
• Rob Walls (Spills Program)
• Sonja Larson (Spills Program, Preparation Section) – She also will notify the DOH Shellfish Program.
• Tom Buroker (NWRO Regional Director)
• Heather Bartlett (WQP Manager)
• Mark Henley (WQP NWRO Section Manager) – Smith left a message on his office phone.
Josh Baldi (King Co.) has also been notified.
Smith called the WWTP at 7:24. It is still offline. Their restart time is unknown.

Vessel Emergency ☐ Entry Person: Kicken, Yvonne Entry Date 2/9/2017

Inspector Information

Where did it happen

Followup #2

ERTS # 670591

Referral # 219957
☐ Lead Inspector Larson, Sonja
Program/Organization SPILLS, PREVENTION, PREPAREDNESS AND RESPONSE
* Region/Location HQ
# of Ecology Staff Overtime ☐

Action

	Start Date	End Date
TELEPHONE	2/9/2017	

Berth Anchorage
Location Name KING COUNTY WEST POINT WWTP
Street Address 1400 DISCOVERY PARK BLVD
Other Address
City/Place SEATTLE State WA Zip 98199-
County KING Region NWRO FS ID
Waterway PUGET SOUND Type MARINE
WRIA #
Latitude 47.661936 Longitude 122.431188
Topo Quad 1:24,000 SEATTLE
Direction/Landmark (mile post, cross roads, township/range)

What happened

Spills Program Oil Spill? N
Incident Date 2/9/2017
Medium
SURFACE WATER-MARINE
Material
WASTE WATER

Quantity	Unit	Est
300000	GALLON/MIN	☐

Source Regulated? ☐
WASTEWATER TREATMENT PLANT
Cause
EQUIPMENT FAILURE
Activity
ROUTINE/NORMAL OPERATIONS
Impact
WATER POLLUTION
Vessel

Potentially Responsible Party Information

Check if the primary PRP provided notice to Ecology ☐
Primary ☑ First Last Name
Business Name KING COUNTY WEST POINT WWTP
Street Address 1400 DISCOVERY PARK BLVD
Other Address
City SEATTLE State Zip 98199-
Phone (206) 263-3801 Ext Type Business
E-mail

Narrative

From: Larson, Sonja (ECY)
Sent: Thursday, February 09, 2017 5:17 AM
To: Smith, Buck (ECY) <JSMI461@ECY.WA.GOV>
Cc: King, Corey (ECY) <CKIN461@ECY.WA.GOV>; Walls, Robert (ECY) <rowa461@ECY.WA.GOV>; Buroker, Thomas (ECY) <THBU461@ECY.WA.GOV>; Bartlett, Heather (ECY) <heba461@ECY.WA.GOV>; Henley, Mark (ECY) <MAHE461@ECY.WA.GOV>; Altose, Larry (ECY) <LALT461@ECY.WA.GOV>; Terpening, Dustin (ECY) <DTER461@ECY.WA.GOV>; ECY DL NWRO ERTS <NWROERTS@ECY.WA.GOV>
Subject: Re: King County West Point WWTP

FYI, I notified DOH contact for threat to shellfish growing areas.

Spills from this West Point WWTP don't usually shut down shellfish areas but due to the large volume being discharged they are reviewing potential for impacts now. I have no word on any decisions about closures at this time.

Vessel Emergency ☐
Entry Person: Kicken, Yvonne Entry Date 2/9/2017

Inspector Information

Referral # 219963
☐ Lead Inspector McKone, Shawn
Program/Organization WATER QUALITY
* Region/Location NWRO
# of Ecology Staff 1 Overtime ☐

Action

	Start Date	End Date
TELEPHONE	2/9/2017	

Where did it happen **Followup #3**

Berth Anchorage
Location Name KING COUNTY WEST POINT WWTP
Street Address 1400 DISCOVERY PARK BLVD
Other Address
City/Place SEATTLE State WA Zip 98199-
County KING Region NWRO FS ID
Waterway PUGET SOUND Type MARINE
WRIA #

ERTS # 670591

What happened Spills Program Oil Spill? N

Latitude 47.661936 Longitude 122.431188

Incident Date 2/9/2017

Topo Quad 1:24,000 SEATTLE

Medium
SURFACE WATER-MARINE

Direction/Landmark (mile post, cross roads, township/range)

Material
WASTE WATER

Quantity	Unit	Est
300000	GALLON/MIN	☐

Source Regulated? ☐
WASTEWATER TREATMENT PLANT

Cause
EQUIPMENT FAILURE

Activity
ROUTINE/NORMAL OPERATIONS

Impact
WATER POLLUTION

Vessel

Potentially Responsible Party Information

Check if the primary PRP provided notice to Ecology ☐

Primary ☑ First Last
Name
Business Name KING COUNTY WEST POINT WWTP
Street Address 1400 DISCOVERY PARK BLVD
Other Address
City SEATTLE State Zip 98199-
Phone (206) 263-3801 Ext Type Business
E-mail

Narrative

Contacted Eugene Sugita at about 8:30 am and again at 9:45 am for additional information. He stated that the effluent pump station at the West Point treatment plant had lost electrical power for an unknown reason sometime around 2:15 am. This caused flow to back up in the plant to the point where the emergency bypass gate at the plant's influent control structure automatically opened to divert flow to the emergency outfall. Operators attempted to reduce flow to the plant and force more flow to the CSO treatment facilities and CSO outfall. The plant also was able to sustain about 100 MGD of gravity flow to the outfall during this time. However by 3 am the plant was overwhelmed and the emergency bypass started. There has been some flooding at the plant and their digesters have overflowed.

As of 9:45 am the plant was still operating in emergency bypass and the County did not have an estimated time for returning to normal operation. Operators have checked out pumps in the effluent pump station and in the intermediate pump station, but have not yet checked pumps in the influent pump station. The county has brought in extra staff from the South Treatment Plant in Renton to assist West Point staff return the plant to normal operations. They are in the process of pumping out flooded areas and assessing plant damage. They have also collected water quality samples near the beach at West Point and have attempted to collect representative samples of influent flow.

12:45 pm update via voicemail:

Mr. Sugita stated that plant still in bypass mode and no estimate for restart. He said that several power conduits had water in them and those needed to be cleared before equipment could restart.

2:10 update:

Mr. Sugita called to ask about reducing fecal coliform sample frequency from every 2 hours as the lab was running out of space to manage the samples. We agreed on a 6-hour sample frequency.

During the call Mr. Sugita also verified that the County was diverting flow away from West Point as much as possible. Flow is being diverted at the Lake Ballinger pump station to the City of Edmonds' WWTP. The County was also sending flow from the North Lake Washington area to Brightwater and South Plant via the York pump station. They are also trying to maximize flow through the four CSO treatment plant. As an interim measure, West Point staff are using chlorine from the influent odor control system to provide some disinfection of the bypass flow.

Plant restart time is still unknown. Mr. Sugita noted that some equipment galleries had up to 10 feet of water in them and that equipment needed to be inspected before restart.

4:10 pm update:

Additional follow up from Eugene Sugita; final follow up for 2/9/17. Operators are still pumping water from flooded equipment galleries. Some galleries had 10-12 feet of water from initial flooding; they are now down to about 4 feet. Equipment in these areas cannot be reenergized until the equipment is cleaned and checked and power conduits are cleared.

At this time the County's main goal is to close the emergency bypass gate and cease flow to the near shore emergency outfall as soon as possible. They believe they can do that `sometime early this evening`. The interim plan is to get one influent pump operational to reestablish flow through the plant. This pump will send raw sewage through the screening equipment and then to the primary clarifiers. The primary sludge pumps and motors operating the flights in the clarifiers are offline due to the flooding. Because of this, the County cannot remove solids from the clarifiers. They plan to use only one train of the clarifiers in this temporary mode while cleaning the equipment in the other train. After the primary clarifiers the flow will bypass the secondary system and flow directly to the chlorine contact chamber for disinfection prior to discharge through the deep outfall. They anticipate being able to process 120 MGD through this configuration, which should be enough to close the bypass gate.

Plant staff will collect raw sewage grab samples every 6 hours and will use the effluent composite sampler as normal.

The County will reassess the situation in the morning and provide additional updates to Ecology on 2/10/17.

Update 02/10/2017, 11 am: Phone call to Eugene Sugita.

The county was able to reestablish flow through the plant at about 9pm last night. As mentioned in my previous update, this is not full treatment. Flow is going through the screens, primary sedimentation tanks, disinfection, and dechlorination before discharging through the deep water outfall. There is still no estimate for returning to full secondary treatment due to the extent of damage. The best "guess" at this point is that it could be a week before they may be able to restart the secondary system. Media reports are claiming that the incident bypassed about 200 million gallons of untreated sewage. We can't verify that volume at this time. The county is still working on a strategy for calculating an estimate and will provide a number early next week.

The extent of plant damage is extensive. The primary treatment equipment gallery had about 10-12 feet of water in it, submerging not only the process equipment (pumps and motors) but also the ventilation equipment. They have pumped most of the water out at this point, but still have some pockets of standing water. The gallery needs to be decontaminated and all equipment needs to be inspected and cleaned before they can begin removing primary solids from the process. Before they can work on the process equipment they must first work on the ventilation equipment to reestablish air flow needed for workers to safely enter the area. At this point staff can only enter the area with protective gear. Crews are currently working on restoring unrestricted access to the gallery. This is their main focus of work for the weekend.

Once they have restored access to the gallery, they will work on getting the primary process equipment cleaned and operational. One option they are currently considering is purchasing new motors to replace half of the motors that were submerged in the gallery. Once one half is restored they will clean the other half.

Another issue is that their solids digesters are offline due to the flooding. The boilers used to heat the digesters were submerged and need to be cleaned before that system can restart. Even after the boilers are restarted it will take time for the digesters to get back up to operating temperature. Because of this they currently have no way of handling solids removed from the treatment process. They are attempting to at least get the sludge thickeners operating as soon as possible so they can dewater and haul some sludge to the South Plant for processing.

One possible silver lining is the situation is that they believe the biota in the secondary treatment process is still viable. They are still able to supply air to the aeration basins to keep the biology alive. So they likely won't need to haul seed into the plant to restart the secondary process. Although the secondary treatment process is currently active and viable, they don't believe it is practical for them to use the system for treatment since the digesters are offline. The system would still accumulate solids that they cannot remove from the treatment system. It would only be a matter of days before solids begin passing through to the disinfection process.

02/10/2017 email update from Eugene Sugita:

From: Sugita, Eugene [mailto:Eugene.Sugita@kingcounty.gov]
Sent: Friday, February 10, 2017 4:35 PM
To: McKone, Shawn (ECY) <SHMC461@ECY.WA.GOV>
Subject: West Point bypass & recovery status

Hi Shawn,

Here is the current status and our plans for the next few days.
We were able to close the Emergency Bypass gate around 9 pm yesterday evening.
This means that all flow to the plant is now being screened, going through primary treatment, receiving disinfection and dechlorination, and being discharged out the deep outfall.

We are continuing to drain the plant's lower levels, and plant staff have been going through and cleaning areas while exercising the necessary safety precautions to keep people safe.
This activity has to be done with staff donning the necessary protective gear, under very difficult working conditions with limited ventilation and lighting, since the electricity has to be turned off, and staff have to be aware of hidden dangers such as loose grating and trip hazards.

The draining and cleaning will continue throughout the weekend. Once the draining and cleaning has been done in key identified areas, electricians have to do an inspection of those areas to verify there is no energy present.
This verification has to be done before Monday, when a cleaning contractor will be on-site to do a more thorough bio-cleaning including the air handling units and the boilers.

ERTS # 670591

Later in the week, a boiler inspector will be onsite to inspect the boilers, and to start their repairs.
For the plant processes, the focus will first be to get the equipment for preliminary and primary treatment online as soon as possible after those areas have been drained and cleaned.

02/14/2017 phone and email update from Phuong Truong

King County is making progress on returning the West Point treatment plant to operational status. At present the plant is still operating in a very limited capacity. All flow reaching the plant is going through preliminary screening, partial primary sedimentation and disinfection prior to discharge. "Partial primary sedimentation" means that, although flow is going through the east half of the primary treatment tanks at the plant, the County cannot remove the solids that are settling in those tanks. So there is little capacity for those tanks to provide much, if any, primary treatment. Effluent quality is probably marginally better than wastewater that has been screened and disinfected.

The email bellow from Phuong Truong provides a quick status update on the County's restoration efforts. My understanding from an earlier conversation with her is that they have given their cleaning contractor (NRC) three days to complete their work in the equipment galleries. As noted below, the County has purchased new motors to replace motors connected to pumps and other equipment in the west half of the primary plant. This is their main work priority at this stage. Once the west side is back online, they will begin cleaning the other motors to return the east side to normal primary operation. They are also working on getting at least four of their 10 feed pumps to the sludge thickeners cleaned and ready for use so they can begin hauling thickened sludge to their South Plant. There is currently no time estimate from them on when the first step of restoring the primary treatment and sludge thickening will wrap up. Optimistically this could happen by this weekend (my guess).

The County is continuing to divert flow to their Brightwater and South treatment plants where they can. We (Stephanie Allen and I) spoke to the plant manager at the Edmonds WWTP earlier today about their ability to accept some flow that would normally go to the West Point plant. The City of Edmonds is understandably reluctant to accept flow that could put their plant in jeopardy of violating their permit or worse. However the plant manager said that she would talk to the mayor and public works director about increasing the amount of flow they are taking.

We have received some early ambient test results from the County, taken the 9th through the 11th (see attached...dates should be Feb. instead of Jan). Ecology has also received some "effluent" data via Scott Berebells at DOH, but have not yet received data from the County (Scott's email also attached). The County plans to include sample data in their 5-day follow up letter to Ecology, which we should receive soon.

From: Truong, Phuong [mailto:Phuong.Truong@kingcounty.gov]
Sent: Tuesday, February 14, 2017 4:05 PM
To: McKone, Shawn (ECY) <SHMC461@ECY.WA.GOV>
Cc: Waddle, Robert <Robert.Waddle@kingcounty.gov>; Williamson, Al <Al.Williamson@kingcounty.gov>; Sugita, Eugene <Eugene.Sugita@kingcounty.gov>
Subject: West Point recovery status

Hi Shawn,

An update on the recovery status at West Point:

•NRC is progressing with around the clock cleaning of the galleries
•I&E group and a contract company are working on power distribution restoration
•Motors are purchased and once the clean-up effort is complete and MCCs are available, the plan is to proceed with switching flow to the West side, sludge removal will be via trucking of thickened sludge to South Plant until the digesters & secondary process are recovered
•Initial assessment was done today on the boilers but definite answer on restoration will be determined tomorrow afternoon after more in-depth assessment of the boiler. At that time, we will be able to make decision on whether to wait for the restoration or to proceed with renting a trailer-mounted boiler

---

Written follow up letters from King County are available in PARIS:

https://fortress.wa.gov/ecy/wqreports/public/WQPERMITS.document_pkg.download_document?p_document_id=200869
https://fortress.wa.gov/ecy/wqreports/public/WQPERMITS.document_pkg.download_document?p_document_id=200868

Vessel Emergency ☐ Entry Person: McKone, Shawn Entry Date 2/9/2017

ERTS # 670753

Initial Report

External Reference #

Caller Information

	First	Last
Name	RANDY	SMITH
Busines Name	KING COUNTY WASTEWATER TREATMENT	
Street Address	1400 DISCOVERY PARK BLVD	
Other Address		
City	SEATTLE	State WA Zip 98199
E-mail		Confidential_FL ☐

Phone	Ext	Type
(206) 263-3801		Mobile

Where did it happen

Berth		Anchorage	
Location Name	WEST POINT TREATMENT PLANT		
Street Address	1400 DISCOVERY PARK BLVD		
Other Address			
City/Place	SEATTLE	State WA	Zip 98199
County - Region	**KING**	NWRO	FS ID
WIRA #			
Waterway	PUGET SOUND	Type	MARINE
Latitude	47.662	Longitude	122.435
Topo Quad 1:24:000	SEATTLE		

Direction/Landmark (mile post, cross roads, township/range)

What happened

Spills Program Oil Spill? N

Incident Date	2/15/2017	Received Date	2/15/2017 16:19
Medium	SURFACE WATER-MARINE		
Material	SEWAGE/SLUDGE		

Quantity	Unit
15000000	GALLON

Source	SEWAGE RUNOFF
Cause	OVERFLOW
Activity	ROUTINE/NORMAL OPERATIONS
Impact	WATER POLLUTION
Vessel Name	
Hull Number	

Primary Potentially Responsible Party Information

	First	Last
Name		
Business Name	**KING COUNTY**	
Street Address		
Other Address		
City		State WA Zip
Phone	Ext	Type
E-mail		

Additional Contact Information

Name	Phone	Ext	Type

More Information

AHR
15 million gallons of raw sewage release per day due to overcapacity reached from hobbled plant. Also, only partial primary available. (from recent flood and damage done to plant). May have to bypass and release for weeks to months until the plant is repaired. Notified WA State DOH and ECY water quality. Called treatment plant who said the plant is still not fully functional from recent flooding which damaged the plant and that similar releases may be needed for up to months.

Entry Person Smith, Norla Entry Date 2/15/2017

*** The Initial report contains only information provided to Ecology from the complainant.

ERTS # 670753

Referral

Referral # 220275

Referral Method
- ○ E-mail ERTS number
- ○ E-mail attachment
- ○ Print
- ◉ Telephone

Person Referred to ReedAHR, Rob — Primary ☐
Phone (425) 649-7277 Fax
E-mail RREE461@ECY.WA.GOV
Program/Organization SPILLS, PREVENTION, PREPAREDNESS AND RESPONSE
Address
City Bellevue WA
Region/Location NWRO
Referral Date 2/15/2017

Referral # 220276

Referral Method
- ○ E-mail ERTS number
- ◉ E-mail attachment
- ○ Print
- ○ Telephone

Person Referred to McKone, Shawn — Primary ☐
Phone (425) 649-7037 Fax
E-mail Email WQ CSO
Program/Organization WATER QUALITY
Address 3190 160th Ave. SE
City Bellevue WA 98008-5452
Region/Location NWRO
Referral Date 2/15/2017

Referral # 220277

Referral Method
- ○ E-mail ERTS number
- ◉ E-mail attachment
- ○ Print
- ○ Telephone

Person Referred to KING CO HEALTH (SEWER ISSUES), Lynn Schneider — Primary ☐
Phone (206) 477-2124 Fax
E-mail lynn.schneider@kingcounty.gov
Program/Organization KING COUNTY HEALTH (SEWER ISSUES)
Address EASTGATE
City WA
Region/Location NWRO
Referral Date 2/15/2017

Referral # 220278

Referral Method
- ○ E-mail ERTS number
- ◉ E-mail attachment
- ○ Print
- ○ Telephone

Person Referred to SEATTLE PUBLIC UTIL WQ, ERIC AUTRY — Primary ☐
Phone (206) 684-7988 Fax
E-mail Email Seattle WQ
Program/Organization SEATTLE
Address 700 5th Avenue, Suite 4900
City Seattle WA 98124-
Region/Location PUBLIC UTILITIES
Referral Date 2/15/2017

ERTS # 670753

Followup

Inspector Information

Referral # 220276
☑ Lead Inspector McKone, Shawn
Program/Organization WATER QUALITY

* Region/Location NWRO
# of Ecology Staff 1 Overtime ☐

Action

Action	Start Date	End Date
TELEPHONE	2/15/2017	

What happened

Spills Program Oil Spill? N

Incident Date 2/15/2017

Medium
SURFACE WATER-MARINE

Material
SEWAGE/SLUDGE

Quantity	Unit	Est
42000	GALLON/MIN	☐

Source Regulated? ☐
SEWAGE RUNOFF

Cause
OVERFLOW

Activity
ROUTINE/NORMAL OPERATIONS

Impact
WATER POLLUTION

Vessel

Where did it happen

Followup #1

Berth Anchorage
Location Name WEST POINT TREATMENT PLANT
Street Address 1400 DISCOVERY PARK BLVD
Other Address
City/Place SEATTLE State WA Zip 98199-
County KING Region NWRO FS ID
Waterway PUGET SOUND Type MARINE
WRIA #
Latitude 47.662 Longitude 122.435
Topo Quad 1:24,000 SEATTLE
Direction/Landmark (mile post, cross roads, township/range)

Potentially Responsible Party Information

Check if the primary PRP provided notice to Ecology ☐

Primary ☑ First Last
Name
Business Name KING COUNTY
Street Address
Other Address
City State WA Zip
Phone Ext Type
E-mail

Narrative

This report in related to ERTS 670591 from 02/09/2017. Although this is a separate plant bypass, the incident is related to damage at the plant sustained on 02/09/2017.

Follow up phone call with Phuong Truong at 8:30 am on 02/15/2017. The County opened the emergency bypass gate at about 3:50 am this morning due to high flows to the plant. The level in their influent wet well was 109.6 ft when they opened the bypass gate. The maximum control elevation for the wet well is 109.5 ft and typical operating elevation is 105 ft. The bypass gate is currently 47% open and it has ranged between 27% and 60% open since they started the bypass.

There has been no new flooding or other damage to the plant. The influent pumps are pumping at about 245 MGD with part of that flow bypassing the plant. They initially estimated a bypass flow of 15 MGD when they talked to the afterhours responder, however that likely was at a time when the gate was only 5% open. Bypass flows have increased significantly since that time. They are hoping to get the gate closed sometime this morning, but that will depend on rainfall.

All of the CSO treatment plants are operating at capacity and storage facilities in the system are full. They are collecting samples of sewage at the diversion channel to represent the quality of the bypass flow. A crew is also on their way out to collect ambient samples. The attached email has results from ambient testing done through the 12th.

Email follow up from Phuong Truong at 12:16 pm on 02/15/2017:

From: Truong, Phuong [mailto:Phuong.Truong@kingcounty.gov]
Sent: Wednesday, February 15, 2017 12:16 PM
To: McKone, Shawn (ECY) <SHMC461@ECY.WA.GOV>
Cc: Waddle, Robert <Robert.Waddle@kingcounty.gov>; Williamson, Al <Al.Williamson@kingcounty.gov>; Sugita, Eugene <Eugene.Sugita@kingcounty.gov>; Zimmer, Karl <Karl.Zimmer@kingcounty.gov>
Subject: RE: Bypass Feb 15, 2017

ERTS # 670753

Shawn,

Update: flows to WP slowed down starting 1030 this morning, the bypass gate is completely closed at 1127.

Regarding you prechlor question: yes, we have been adding 50gal/hr, started on 2/9/17 1011.

Phuong

Vessel Emergency ☐ Entry Person: McKone, Shawn Entry Date 2/15/2017

ATTACHMENT B

Ecology's Investigation Report: Analysis of February 9, 2017 West Point flooding, emergency discharge, and failure to provide secondary treatment

Attachment B

Investigation Report: Analysis of February 9, 2017 West Point flooding, emergency discharge, and failure to provide secondary treatment

In the early morning of February 9, 2017, a power disruption at the West Point Treatment Plant (WPTP) led to catastrophic internal flooding of the facility and discharge of untreated combined sewage to Puget Sound for 18 hours. In the aftermath, the damaged WPTP operated at diminished hydraulic capacity and reduced treatment efficiency for approximately three months. The following document provides the Department of Ecology's (Ecology) analysis of the event.

Ecology received the initial notification of the incident at approximately 3:38 am on February 9, 2017 (ERTS # 670591). The supervising operator on duty, Charles Wenig, made the initial notification. Ecology's NPDES permit manager, Shawn McKone, communicated with the WPTP's process control supervisor, Eugene Sugita, throughout the day as plant staff worked to assess damage. Ecology and WPTP staff maintained routine communication over the following months as the County assessed the extent of damage, developed a recovery plan, and restored the facility. Mr. McKone, Ecology's Municipal Permit Compliance Specialist, Amy Jankowiak, and Municipal Unit Supervisor, Laura Fricke, made site visits to the plant on February 21, 2017 and June 27, 2017, as part of Ecology's investigation into the flooding, untreated discharge, and extended bypassing of the secondary treatment system. Ecology also requested numerous documents throughout the investigation which were provided.

Initial chain of events

Shortly after 2:00 am on February 9, 2017, a power disruption set off a chain of events that resulted in internal flooding of the WPTP and discharge of untreated combined sewage to Puget Sound. The WPTP receives power from two separate Seattle City Light (SCL) 26.4 kilovolt (kV) feeds. The Canal substation provides the primary feed to the treatment plant and the Broad Street substation serves as a backup feed. An automatic transfer switch in the plant's main switchgear station handles power transfers during power outages and is the first point in the plant's power distribution system. The incoming 26.4 kV power is distributed to three separate areas: a transformer dedicated to the oxygen generation system, a transformer dedicated to the sludge drying facility, and the plant's 15 kV main electrical substation. Two city-owned transformers (A-side transformer XFMR-TA and B-side transformer XFMR-TB) step-down the incoming power feed to the main substation from 26.4 kV to 13.8 kV. Breakers in the 15 kV substation balance power distribution to various unit substations and switchgears throughout the plant by maintaining separate "A-side" and "B-side" circuits. A bus tie breaker (ID tag 52-9) in the substation allows for the manual transfer of power between A-side and B-side feeds. The plant's onsite cogeneration system also provides power through the main 15 kV substation and an emergency generator provides limited power to key facilities if all SCL power fails.

Two breakers (A-side: 52-3 and B-side: 52-15) at the main electrical substation connect power to the effluent pump station (EPS) power distribution system through the effluent building switchgear (ID tag 707-MSG01). This system provides power to the EPS, chlorine building, maintenance building, and secondary sedimentation area. The switchgear distributes A-side power to effluent pumps 1 and 2 and to a 480 volt (V) secondary power distribution transformer (ID tag 707-XFMR01A). The A-side transformer supplies power to motor control centers in the effluent building (ID tag 707-MCC01), maintenance building (ID tag 702-MCC01), and chlorine building (ID tag 713-MCC01). The B-side power feed routes to effluent pumps 3 and 4 and to 480 V transformer (ID tag 707-XFMR01B) that supplies motor control centers (ID tags 707-MCC02, 702-MCC02, and 713-MCC02) in the effluent,

maintenance, and chlorine buildings. A Kirk Key interlock in the effluent pump station 480 V power distribution system allows for manual transfer of the power feeds to the motor control centers between the A-side and B-side circuits.

At approximately 2:12 am on February 9, 2017 an electrical fault caused the A-side breaker in the main 15 kV substation (breaker 52-3) to trip and disconnect power to the A-side of the EPS power distribution system. Systems impacted by the failure included effluent pump 2, effluent pump 1 (in standby as a redundant pump at the time), and all equipment powered through motor control center 707-MCC01. Based on the plant's original electrical design, the effluent pressure control valve (Pratt Valve) hydraulic control unit receives power exclusively through this motor control center. The resulting power loss for the Pratt valve hydraulic control unit led to the failure of all of the effluent pressure control valves, which fail in the closed position. At approximately 2:14 am, with all of the Pratt valves closed, effluent pumps 3 and 4 which were pumping at that time, failed due to excessive vibration.

Prior to the power disruption the flow rate from the EPS was approximately 455 MGD with three effluent pumps running between 93% and 99%. The water elevation in the EPS wet well was more than 106 feet and rising. The east and west primary effluent gates were open approximately 71% and 74%, respectively, to regulate the operating water level in the primary clarifiers near the set point of 119.01 feet. Four raw sewage (influent) pumps were operating at or near full capacity to keep the raw sewage wet well water elevation at approximately 104.25 feet and to maintain the water elevation in the Influent Control Structure (ICS) at approximately 105.6 feet.

Immediately following the power disruption and failure of effluent pump 2 and the Pratt valve hydraulic unit, effluent flow rapidly decreased. Flow dropped from 457 MGD at 2:12 am to 381.5 MGD at 2:13 am and to 159.3 MGD at 2:14 am. At the same time the water level in the EPS rapidly increased, reaching 115.4 feet by 2:15 am. A water level of 115.0 feet in the EPS wet well triggers a high-high alarm that automatically closes the primary effluent (PE) gates to prevent flooding of the intermediate pump station and secondary treatment systems. According to the plant's SCADA system, the EPS wet well high-high alarm registered at 2:14:49 am and within 10 seconds both the east and west primary effluent gates registered as closed (reported in SCADA as "DEVN" or deviation).

At approximately 2:15 am Mr. Wenig started reducing flow from the raw sewage pumps, slowing the rate in 10% increments from 95% at 2:15 am to 50% by 2:21 am. At about the same time, according to a written statement made on February 16, 2017, Mr. Wenig dispatched "the Secondary operator" [Eric Hart] and Joe Rheaume to the EPS to restart the effluent pumps. He also dispatched operators Dave Nelson, Tammera Stephens, and Emily Carlson to the primary basins to reopen the PE gates.

The design of the primary sedimentation basins includes less than 2.4 feet of freeboard above the normal operating water surface elevation of 119.01 feet. Three separate alarms in the primary sedimentation and pre-aeration basins should alert operators prior to the water level reaching the overflow elevation of 121.4 feet. A primary sedimentation high-high advisory alarm registers when the water elevation in the basins reach 119.5 feet and a pre-aeration high alarm registers at 119.6 feet. Finally, float switches in the pre-aeration basins are designed to register a high-high level alarm at 120.5 feet that automatically shuts down the raw sewage pumps.

The County provided Ecology with trend data for primary sedimentation tank levels measured by multiple sensors at the West Point treatment plant. Data includes measurements from bubbler level sensors located in primary sedimentation tanks 3, 4, 9, and 10, as well as extended range radar level sensors located in tanks 4 and 10. The control system uses the bubblers to control the primary sedimentation tank levels by altering the primary effluent gate positions while the radar level sensors provide information to operators

on tank levels over a broader range. Although levels very between the types of sensors, the values at a given time differ by about an inch. Trend data for the extended range sensors show that the water elevation in the primary basins was near the operating set point of 119.01 feet when the primary effluent gates closed at approximately 2:15 am. Three minutes later the level in the tanks exceeded 119.6 feet. By this time Mr. Wenig had slowed the raw sewage pumps to 70%. By 2:22 am the water level exceeded 120.6 feet and the raw sewage pumps were at 50%. The water elevation exceeded 121.4 feet by 2:25 am. The SCADA system registered high-high level alarms in the primary sedimentation tanks at about 2:15:45 am, but registered no other level alarms in the primary basins.

Based on the plant's operations and maintenance manual (critical hydraulic facilities section), the primary sedimentation tanks may provide approximately 3-4 minutes of storage capacity with the primary effluent gates closed during high flows (approximately 400 MGD). As discussed above, the trend data shows that approximately seven minutes elapsed between the closure of the primary effluent gates and primary sedimentation tank level reaching the pre-aeration high-high level of 120.6 feet. A total of approximately 10 minutes elapsed before the levels reached the overflow level of 121.4 feet.

The trend data indicates that the primary sedimentation tanks began overflowing at approximately 2:25 am with the raw sewage pumps operating at 50%. Seven minutes later, Mr. Wenig reduced the raw sewage pump rate to 45%, which did not alter the primary sedimentation tank level. The primary sedimentation tank levels remained above the overflow level for more than 30 minutes before Mr. Wenig ordered a shutdown of the raw sewage pumps. At approximately 3:00 am Mr. Wenig took initial steps to shut down the pumps by decreasing the raw sewage pump rate to 10%. He also ordered the operators in the plant to shut down the pumps manually. By 3:03 am the raw sewage pumps were off and by 3:11 am the primary sedimentation tank level fell to below the overflow level.

The plant's control system automatically opens an emergency bypass gate that diverts raw sewage from the treatment plant at the ICS when water levels at the ICS reaches 112.0 feet. As Mr. Wenig reduced the raw sewage pumping rate following the power disruption and PE gate closure, the ICS water level slowly increased. At 2:25 am, when the primary sedimentation tank level reached the overflow level, the ICS water level was approximately 107.7 feet. During the 35 minute period in which the primary sedimentation tanks were overflowing and the raw sewage pumps were operating at between 45%-50%, the ICS level rose two feet to 109.8 feet. At 3:04 am, a minute after the raw sewage pumps were manually shut down, the ICS level reached approximately 112.3 feet, which triggered the emergency bypass gate to open. At 3:16 am the emergency outfall gate was opened to allow the diverted influent to discharge to Puget Sound through the Emergency Outfall.

Flooding impacts to facility

The overflowing primary sedimentation tanks led to extensive flooding of the WPTP on February 9th. Water flowed from the tanks into equipment galleries below the primary tanks and corridors connecting to the solids processing facilities. Flooding also impacted the lower levels of the raw sewage pumping facility. Plant staff initially estimated that flooding filled some below-grade galleries with 10-12 feet of water, damaging critical plant equipment ranging from motors, boilers, pumps and electrical control centers to lights, doors, and HVAC. Table 1 summarizes the extent of equipment damage based on asset tracking spreadsheets prepared by plant staff.

The flooding damage significantly impacted the WPTP's ability to fully treat wastewater. Although equipment and basins dedicated to secondary treatment were not physically impacted by the flooding, the damage to the solids handling systems disrupted the secondary treatment process. Equipment necessary

to transport and treat residual solids generated in the primary and secondary treatment processes suffered significant damage. Treatment system impacts included:

- Longitudinal flights that move primary waste sludge to the sludge hoppers at the bottom of each primary sedimentation tank were damaged by the high flows when flooding was occurring.
- Pumps and motors used to remove grit from the pre-aeration basins, primary waste sludge from the primary sedimentation tanks and scum from the primary scum sump were submerged and damaged.
- Boilers used to heat the anaerobic digesters were submerged and rendered inoperable. As a result, the anaerobic digesters cooled and the biological activity in the digesters degraded.
- Pumps and motors used to move primary and secondary waste sludge through the solids treatment processes were submerged.
- The anaerobic digesters lost power to their mixing and gas recovery systems, but the sludge feed pumps to digester #1 continued to operate despite being submerged. The lack of mixing and gas recovery caused gas and foam to build up to a point where they lifted the digester lids and allowed liquid to erupt from the digesters.

In addition to damage to the process equipment, the flooding impacted the supporting infrastructure at the plant:

- All of the electrical components, including lights, power panels, equipment control panels, and sensors located in the flooded galleries were damaged by water exposure and needed to be replaced.
- All surfaces in the galleries were exposed to sewage and needed to be decontaminated by steam cleaning.
- Ventilation equipment necessary to exchange air and create habitable work spaces were damaged and had to be repaired, decontaminated, and/or replaced before workers could enter without protective equipment.
- Pipe supports, equipment mounting pads and other structures vulnerable to damage by the flood water needed to be inspected and repaired.

Table 1 Summary of facility damage

Equipment to be Replaced	Quantity	Comments
Transformers	14	Eight other transformers were tested satisfactorily.
Motor control centers	8	Total of 120 buckets.
Electric panels	54	Includes breaker panels, field panels, UPSs, environmental control panels, lighting contactors; does not include junction boxes or pull boxes.
Electric motors	101	Additional 70 motors refurbished.
Variable-speed drives	11	
Instrumentation	135	Includes solenoids and Ovation control cabinets.
Mechanical equipment	29	Includes blowers, pumps, water heaters, and mechanical roll-up doors.
Boilers	3	Plant heat and digestion operating systems.
HVAC	22	
Light fixtures	450	Approximate—does not include locker room area, etc.

HVAC = heating, ventilation, and air conditioning; UPS = uninterruptible power supply

Source: West Point Treatment Plant Independent Assessment, Final Report; (AECOM 2017)

The flood damage had the immediate effect of preventing the plant from managing its residual solids. Although the plant could still dispose of solids removed by the influent screens, it could not process the grit removed in the pre-aeration basins, primary waste sludge and scum from the primary sedimentation tanks, or waste activated sludge (WAS) from the secondary clarifiers. As plant staff began pumping water from flooded areas early on February 9th, electricians and maintenance staff worked to restore power to all of the effluent pumps by rerouting "B-Side" power to "A-Side" components. Staff also determined that the primary sedimentation tanks could accommodate limited flow.

In the late evening of February 9th, plant management made the decision to restart one raw sewage pump and begin sending flow back through the treatment plant. Under the initial restart plan, operators would limit flow through the plant to approximately 120 MGD and would bypass the secondary treatment processes entirely. All flow to the plant would receive preliminary screening prior to pumping to a single train of primary sedimentation tanks. Wastewater flowing through the primary sedimentation tanks was expected to receive minimal solids removal since the equipment necessary to removed settled solids from the tanks were damaged by the flooding. After passing through the primary tanks, all flow was routed to the chlorine contact chamber for disinfection and dechlorination prior to discharge out of the plant's main outfall. By approximately 9:00 pm on the 9th, the plant operators restarted flow through the plant and closed the emergency bypass gate to cease discharges through the emergency outfall. The WPTP remained at a diminished hydraulic capacity for 77 days, until April 27, 2017 and did not return to routine treatment operations until May 9, 2017, 89 days after the initial flooding event.

Impacts of discharge from emergency outfall and decreased treatment

As stated earlier, the WPTP began discharging untreated combined sewage to Puget Sound through its emergency outfall at approximately 3:16 am on February 9th. According to design drawings and other information provided by plant staff, the emergency outfall is located approximately 550 feet offshore in Puget Sound north of the facility. The 12-ft x 12-ft square pipe discharges at a depth of approximately 33.5 feet (mean lower low water) at the approximate coordinates: 47.664294, -122.431550. The NPDES permit for the West Point plant does not list this outfall as an authorized discharge location.

The emergency outfall discharge continued throughout the day of February 9th as plant staff worked to assess the damage from flooding and to restore at least partial treatment through the plant. At 10:09 am plant staff started adding 12% sodium hypochlorite at a rate of 50 gallons per day to flow entering the plant through the "Old Fort Lawton Tunnel" in an attempt to provide some disinfection to the untreated flow.

In an attempt to minimize flow discharged through the emergency outfall at the West Point plant, County staff diverted some flow away from the plant by shutting off the Kenmore Pump Station to force flow from the north Lake Washington area to the Brightwater treatment plant. Staff also diverted flow from the Norfolk Pump Station to the Renton South Plant and limited flow at the Interbay Pump Station, which forced more flow to the County's CSO treatment facilities and to the County's and City of Seattle's untreated CSO outfalls.

At approximately 5:00 am on February 9th, plant staff began collecting samples to evaluate fecal coliform levels of the emergency outfall discharge. Staff collected samples at a frequency of between 1 and 3 hours until 12:45 pm. The final sample of the day was collected nearly six hours later at 7:00 pm. The plant does not have appropriate infrastructure in place to allow for safe collection of samples from the influent control structure. Given the safety concerns with sampling at the influent control structure, staff collected samples at the Division Channel, located downstream of the raw sewage pumps. Since the raw sewage pumps were off during the emergency discharge, samples taken at the Division Channel did not

represent the flow through the emergency outfall. Although chlorine was added to the emergency outfall flow, staff did not collect samples to test for residual chlorine and the dose concentration and contact time was unknown.

Plant staff set up a temporary composite sampler at the division channel on February 9th and reported results for influent BOD_5, $CBOD_5$, and TSS for that day. However it is questionable whether the reported values were representative of the actual discharged flow. As noted above, the Division Channel did not receive active flow during the 9th since the raw sewage pumps were offline. In addition, the plant's process control supervisor, Eugene Sugita, noted in an email to Ecology on July 25, 2017, that the raw sewage values reported for February 9th "were the average of the 2 previous days". He also noted in the email that the "day's sample was non-representative (the sampler's lid was open so it collected mostly rainwater)".

Due to the discharge of untreated combined sewage through the emergency bypass outfall, Public Health of Seattle-King County advised King County's Department of Natural Resources and Parks (DNRP) to close beaches at Discovery Park adjacent to the WPTP. The closure advisory also included beaches north to Golden Gardens and south to Alki. Kitsap Public Health District, in cooperation with the State Department of Health, issued a no-contact advisory and shellfish harvesting closure for the eastern shoreline of Bainbridge Island and the shoreline between Jefferson Point and Restoration Point. To monitor impacts to King County beaches, staff from DNRP collected ambient water samples for fecal coliform and enterococci testing at multiple beaches starting the morning of February 9th. Monitoring occurred at the beaches around Discovery Park (3 north beach and 3 south beach locations), at Golden Gardens (3 locations), and at Carkeek Park (3 locations). Ambient monitoring indicated that the water quality standard for fecal coliform bacteria of 43 cfu/100mL (single sample maximum) was exceeded at various locations for 3 consecutive days, starting on February 9, 2017. Monitoring continued until February 12th when sample results showed normal bacteria levels.

Heavy rains on February 15th through 16th forced WPTP staff to partially reopen the emergency bypass gate to avoid additional flooding at the plant. WPTP's Chief Process Analyst, Phong Troung, initially reported the second emergency discharge via voicemail to Mr. McKone at approximately 6:45 am on February 15, 2017. Supervising operator on duty that day, Randy Smith, reported the discharge through Ecology's ERTS system later in the day (ERTS# 670753). The second emergency discharge event prompted an extension of the health advisories until additional testing showed that ambient bacteria levels had returned to normal. Health authorities from King and Kitsap counties lifted the closure advisories on February 21st. Results for bacteria testing conducted between February 9th and February 20th at the 12 beach locations noted above are included at the end of this report. Ambient monitoring indicated that the water quality standard for fecal coliform bacteria of 43 cfu/100mL (single sample maximum) was exceeded at various locations for 5 consecutive days, starting on February 15, 2017.

Restoration and recovery period

Restoration efforts began early on February 9th with the initial pumping of the flooded galleries and preliminary damage assessment. The County brought in a variety of contractors to work on cleaning, decontamination, and restoration of damaged equipment and facilities. Immediate priorities included thoroughly steam cleaning and decontaminating all surfaces of the flooded galleries, removal and replacement of damaged equipment, and restoration of all electrical and instrumentation systems.

In the days immediately following the flooding, the County established the general goals of thoroughly cleaning all flooded areas, repairing and replacing damaged equipment in the primary treatment process area, establishing temporary power to the primary treatment system components, and beginning

restoration of the solids treatment systems. WPTP staff and management, working with consultants CH2M, established a restoration schedule in early March that set a goal of returning the plant's primary and secondary treatment systems to normal operation by the end of April 2017. Plant staff and contractors restored operation of the primary basins by the beginning of April and operators restored full flow through the primary and secondary systems by April 27, 2017. All plant systems returned to normal operation by May 9, 2017. Table 2 summarizes key milestones in the plant recovery and restoration efforts.

Table 2 Restoration milestones

Milestone	Date	Duration
Failure and flooding at West Point Treatment Plant	February 9, 2017	0 days
Primary sedimentation basins and chlorine disinfection system partially online	February 9, 2017	18 hours
Pump-out of galleries	February 13, 2017	4 days
Temporary minimum light and ventilation to galleries	February 15, 2017	6 days
Temporary MCCs delivered/installed/online	February 27, 2017	18 days
Hot water boiler online, heat loop running	March 8, 2017	27 days
Dewatering and thickening processes online	March 28, 2017	47 days
Primary preaeration tanks online	April 3, 2017	53 days
All six digesters operational	April 24, 2017	74 days
MLSS recovery	April 25, 2017	75 days
Secondary treatment online—restart to 300 mgd	April 27, 2017	77 days
Primary clarifiers available for high flows	April 28, 2017	78 days
Plant returned to normal operation[1]	May 9, 2017	89 days
[1]The AECOM report listed the final milestone as "NPDES permit compliance achieved". Ecology edited this milestone description to one it considers is more appropriate		

Source: West Point Treatment Plant Independent Assessment, Final Report; (AECOM 2017)

During the plant restoration period the County held daily restoration meetings beginning on February 14, 2017 to coordinate contractor activities. WPTP staff maintained routine contact with Ecology throughout the restoration process to provide status updates and to seek feedback on certain restoration topics. In early March WPTP staff consulted with Ecology on interim guidance for using the CSO treatment plants to limit flow to the WPTP during the restoration period. The guidance also documented strategies for opening the emergency bypass gate to protect the plant while the hydraulic capacity was decreased.

Plant management developed interim flow management protocols to provide operator guidance on reducing flows to the treatment plant and initiating emergency outfall discharges during the plant recovery period. Ecology received a preliminary draft of this guidance on February 22nd and received a final draft on March 1st. The guidance limited the WPTP's flow capacity to 230 MGD with only the east primary sedimentation tanks available for operation. Under the interim flow management guidelines, the County would divert up to 3.5 MGD of flow from the Lake Ballinger pump station to the City of Edmonds' wastewater treatment plant and would continue to divert flow at the Kenmore pump station to the Brightwater treatment plant.

The guidelines also directed operators to begin limiting flow from the Interbay pump station when flows to West Point exceeded 150 MGD during a storm and further directed a shutdown of flows from the West Seattle, Interbay and Carkeek pump stations when West Point flows exceeded 180 MGD. The intent of this strategy was to divert flow to the Alki, Elliot West, and Carkeek CSO treatment plants and, as necessary, to untreated CSO outfalls in the collection system. In addition to managing offsite flow, the guidance established conditions for initiating an emergency outfall discharge. Operators were directed to manually control the raw sewage pumps during storm events so that they did not exceed 230 MGD. The control system was also set to automatically open the emergency bypass gate with the water level in the ICS reached 110 feet and the gate was set to modulate to maintain a level of 109 feet.

On February 15th operators used the general protocols that were later formalized as guidance to manage flows to the West Point plant during a storm event. At approximately 3:50 am on the 15th the Main Control operator on duty, Randy Smith, opened the emergency bypass gate when the ICS level reached 109.6 feet with flows above 250 MGD. The gate modulated between approximately 25% and 60% open to maintain the ICS level at about 106 feet. Less than seven hours later the ICS level lowered to approximately 103.5 feet with flows at about 220 MGD. At 10:37 am the operators closed the emergency bypass gate. The gate remained closed until approximately 4:00 pm when the ICS level rose again to above 109 feet with flows above 250 MGD. The gate was reopened at 4:01 pm and remained approximately 15% open throughout the night. It was closed again at 6:05 am on February 16th. Operators did not need to reopen the gate and the plant did not experience further emergency bypass discharges after the 16th.

Biological restart

The February 9th flooding impacted systems necessary to support the biological processes of the secondary treatment and anaerobic digestion systems. While plant operators were able to sustain the biomass in the secondary basins by routing minimal amounts for primary effluent to the basins to provide food, the anaerobic digestion system required more extensive rehabilitation to restart the biological processes. The digesters cooled for about one month due to the damaged boilers and the biomass activity significantly decreased due to the lack of food from the primary and secondary processes. In addition, the digesters had experienced gas entrainment and foaming issues for almost one year prior. To facilitate a stable restart of the digesters, the team responsible for developing the biological restart strategy decided that a slow restart with only primary sludge would minimize the potential for gas entrainment and foaming. The team's approach called for adding WAS to the digesters only after they achieved stable operation.

In late March WPTP staff and consultants from CH2M briefed Ecology on options for restarting the secondary treatment process. The options centered on slowly restarting the digesters, as recommended by the restart team. Staff presented the following two alternatives.

1. Conservative Restart – This option involved limiting (delaying) the secondary restart based on the ability of the digesters to accept all primary sludge and WAS produced during the ramp up of the secondary system. The timing of the secondary restart would be adjusted to align the restart with the digester restart so that all primary and secondary sludge produced at the plant could be processed by the digesters. This strategy would delay the secondary restart by about 20-30 days.
2. Enhanced Restart – This option involved starting the secondary treatment system as fast and efficiently as possible – approximately 20-30 days sooner than the conservative option – by feeding the secondary system at the maximum incremental food-to-microorganism ratio. This option would begin before the digesters could accept the WAS generated by the secondary system

and the team predicted that WAS production would exceed the capacity for the County to manage by trucking to the Renton South Plant. The alternative proposed discharging the excess WAS to the chlorine contact channel for disinfection and discharge to Puget Sound.

The biological restart plan used process modeling to examine the impacts of each restart option. The modeling predicted that the enhanced restart option would potentially result in a 0.9 million pound reduction in BOD discharge to Puget Sound during the restart period compared to the conservative option. The plan presented the enhanced alternative as the preferred option. Ecology reviewed the County's plan, and provided feedback on the options. Ecology advised that, while the conservative plan would extend the time the plant bypassed secondary treatment and remained in non-compliance, the enhanced plan would introduce a new permit violation of General Condition G9 by discharging WAS to Puget Sound. Ecology encouraged the County to select the strategy it believed would result in the greatest level of mitigation of the ongoing non-compliance and to maximize the use of sludge storage and transportation to other facilities to the extent practical. Ecology noted that both options would result in violations.

The County elected to use the enhanced biological restart option. On March 27th County staff initiated the restart of the secondary treatment system by sending intermittent flows of 15-30 MGD to the secondary system from the intermediate pump station. Operators began sending continuous flows of 30 MGD to the secondary system on March 29th. By April 4th, the secondary biological system had recovered to the point where operators needed to start discharging WAS. On April 18th operators began sending a portion of the WAS to the sludge blending tanks to reduce the amount discharged to Puget Sound. In response to decreasing microbial concentrations in the secondary system, the operators ceased all sludge wasting on April 22nd to allow the biomass to increase. By April 26th the microbial concentration returned to normal levels and operators began wasting solids again. As the digesters recovered, operators progressively reduced the ratio of WAS discharged to Puget Sound until the County could manage all of the WAS with the available digesters or by trucking to the Renton South Plant. Operators ceased all discharges of WAS to Puget Sound on May 9th.

Effluent quality impact

The effluent quality for the WPTP degraded with the secondary treatment systems offline and with the primary systems operating with minimal efficiency. Discharge monitoring reports (DMRs) for the months of February, March, and April reported violations of effluent limits on $CBOD_5$, TSS, and total residual chlorine. Violations included exceedances of maximum monthly and weekly average limits on the concentration and total mass of $CBOD_5$ and TSS discharged. The WPTP also failed to meet minimum treatment efficiency (85% removal) for $CBOD_5$ and TSS. Finally, it exceeded daily maximum limits on total residual chlorine on two days in April and exceeded the monthly average total residual chlorine limits in April.

Effluent quality significantly improved in late April as WPTP staff returned the primary and secondary treatment systems to full operation. Concentrations of $CBOD_5$ averaged approximately 67 mg/L for most of April, but reduced to an average of about 19 mg/L after April 25th. Removal efficiencies for $CBOD_5$ improved from an average of about 47% removal prior to the 25th to greater than 85% removal after the 25th. TSS concentration and treatment efficiency data showed similar improvements over the same time period. After WPTP staff ceased discharge of WAS to Puget Sound on May 9th, the effluent quality returned to typical levels for the facility. Concentrations of $CBOD_5$ and TSS returned to averages of less than 10 mg/L and treatment efficiencies returned to greater than 95% removal.

In addition to beach monitoring immediately following the emergency bypasses, DNRP conducted expanded ambient water quality monitoring near the treatment plant's outfall and at other locations in

central Puget Sound. Expanded ambient monitoring included weekly testing for bacteria (fecal coliform and enterococci), nutrients (nitrogen and phosphorous compounds), and dissolved oxygen along with other physical characteristics. The WPTP also tested plant effluent for priority pollutant concentrations (metals and organics) and whole effluent toxicity during the period the plant was operating with diminished treatment capability. Data from DNRP's ambient monitoring is available from King County's website at the following location: http://www.kingcounty.gov/depts/dnrp/wtd/system/west/west-point-restoration/marine-monitoring.aspx. Results from priority pollutant testing and whole effluent toxicity testing are available through Ecology's PARIS database: https://fortress.wa.gov/ecy/wqreports/public/f?p=110:1000:843480670770061::NO:RP:P1000_FACILITY_ID,P1000_FACILITY_NAME:24954381,King%20County%20West%20Point%20WWTP.

Operations, maintenance, and training

The WPTP had nine operators on duty during the overnight shift starting 2/8/2017 and ending 2/9/2017. The typical night shift staffing level is 6-9 operators on duty with a minimum of five during summer months and a minimum of seven during winter months. Plant operators are organized into four shifts that rotate between day and night operations. In addition to certified operators, the plant staff includes mechanics and electricians that work strictly during daytime hours Monday-Friday. Mechanics and electricians rotate through an on-call, standby status on weekends and during night hours. Table 3 identifies the certified operators on-duty, their assigned areas, and summarizes their action immediately following the power disruption. Action summaries area based on written statements from the operators that the County collected as part of their internal after-action assessment.

Ecology interviewed operators on duty during the February 9, 2017 event as part of its investigation. Mr. Wenig was interviewed on February 21, 2017 during Ecology's initial post-incident site visit along with the Waste Treatment Division's West Section Manager, Robert Waddle, and WPTP's Chief Process Analyst, Phong Troung. During a second site visit on June 27, 2017, Ecology interviewed Mr. Wenig, Mr. Edenshaw, and Ms. Stephens. The staff interviews focused on the following topics:

- verifying facts from written statements and other reports about operator actions and observations during the flooding event;
- the operators' understanding of SOPs for key systems involved in the February 9, 2017 incident and their understanding of critical hydraulic constraints;
- operator training for emergency and routine operations.

Table 3 On-duty operator summary

Operator (Certification Level, Position)	Assigned area	Summary of actions during initial event
Charles Wenig (Group IV, Shift Supervisor)	Main Control	Responsible for monitoring plant operations. Directed operator responses to loss of effluent pumps and closure of primary effluent gates. Controlled raw sewage pumping rate prior to ordering full shutdown of raw sewage pumps. Controlled off-site (collection system) pumps to reduce flow coming to the plant.
Dan Edenshaw (Group III, Senior Operator)	Main Control	In training on Main Control operations. Attempted to call in staff electricians and mechanics from the stand-by list to assist with response. Coordinated with off-site staff at CSO facilities.
David Nelson (Group IV, Senior Operator)	ACC 1	Responded to primary basins with Ms. Stephens and Ms. Carlson to try to reopen the primary effluent gates; worked on the east gates. Manually shut down the raw sewage pumps after shutdown order given by Mr. Wenig. Responded to the emergency marine outfall

Operator (Certification Level, Position)	Assigned area	Summary of actions during initial event
		gate to get it to open after emergency bypass gate had opened.
Tamera Stephens (Group II, Operator)	ACC1	Responded to primary basins with Mr. Nelson and Ms. Carlson to try to reopen the primary effluent gates; worked on the west gates. Provided initial first aid assessment of Ms. Carlson after she was injured evacuating the primary area. Manually shut down the raw sewage pumps after shutdown order given by Mr. Wenig. Responded to the emergency marine outfall gate to get it to open after emergency bypass gate had opened.
Emily Carlson (Operator-in-Training)	ACC 1	Working with Ms. Stephens and Mr. Nelson as a trainee. Responded with Ms. Stephens to try to open the west primary effluent gates. While evacuating the primary basin area, fell and was injured when foot went through an opening from a missing gate cover. Was unable to contribute further to response due to injury.
Eric Hart (Group I, Operator)	ACC 3	Responded to Effluent Pump Station to restart pumps, working with Mr. Rehume. Attempted to connect backup hydraulic skid to the Pratt valves before being ordered to evacuate area by Mr. Wenig. Worked to secure flooded area between the Effluent Pump Station and Solids Handling.
Joe Rheaume (Group III, Operator)	ACC 2	Responded to Effluent Pump Station to restart pumps. Worked first on resetting VFDs (2-3 attempts) before realizing that there was no power to the Pratt valve hydraulic skid. Attempted to connect backup hydraulic skid before ordered to evacuate by Mr. Wenig. After reporting in at Main Control, assisted a city firefighter responding to an alarm in the solids building.
Perry Nazaretiz (Group II, Senior Operator)	ACC 2	In response to "power bump", checked the GBT feed pumps and the sumps in the dewatering feed room. Noticed water coming up through sump covers and sump pumps were off. Went to locker room to put on rubber boots then thigh-high waders due to rising water level in basement. Intended to try to restart sump pumps. Aborted the effort when water level in basement reached about 2.5 feet; evacuated area and reported in at Main Control. Help provide first aid to Ms. Carlson.
James Glen (Group II, Operator)	ACC 2	At the time of the power disruption, Mr. Glen was working on draining Digester #5 for planned maintenance work. When digester approached the target level of 2.0 feet, he paused and secured the dewatering pumps. Written statement notes that he "noticed the Sed Area level was getting out of range and it was in the red on the level indicators in Ovation". Mr. Glen "got curious and started going to the Sed Area...noticed water going over into Reuse Area". He went to the east primary gate to assist Mr. Nelson in opening the gate. He then went to the effluent pump station to assist Mr. Hart and Mr. Rheaume. After evacuating the effluent pump station, Mr. Glen reported in at Main Control.

Area Control Center (ACC) locations and responsibilities

Main Control Center: Located in the Administration Building. Coordinates major plant wide and offsite operations.

ACC1: Located in Raw Sewage Pump Building. Manages plant hydraulic level; monitors and controls preliminary and primary treatment.

ACC2: Located in Solids Handling Building. Manages solids processing operations.

ACC3: Located in Facility Services Building. Manages secondary treatment and disinfection processes.

Operator actions during the initial power failure and flooding

Immediately following the failure of the effluent pumps, Mr. Wenig dispatched Mr. Hart and Mr. Rheaume to the effluent pump station to restart the pumps. Mr. Rheaume was the first to arrive. Based on his written statement, he reported directly to the VFD room because he knew the VFDs needed to be reset based on the alarms. Mr. Rheaume stated that pumps #1 and #2 would not reset. He also stated that he needed to attempt the reset sequence two or three times on the other pumps. According to Mr. Wenig's statement, each time Mr. Rheaume restarted the pumps they would fail. When Mr. Hart arrived at the effluent pump station he found Mr. Rheaume in the VFD room. From his statement he also observed that "it was so loud down below, you could hear #3 and #4 pushing water hard". Based on both operators' statements, they did not check the status of the Pratt valve hydraulic control unit until after making two or three failed attempts to restart pumps #3 and #4.

As is noted in King County's independent assessment of the incident (AECOM 2017), the SOP for restarting the effluent pump station listed checking the Pratt valve hydraulic control unit as a required step. Despite having knowledge that a "power bump" occurred at the plant prior to the effluent pumps shutting down, the responding operators did not verify whether all components at the effluent pump station had power available. Based on their written statements and interviews with Mr. Wenig, the responding operators immediately went to the VFD room to reset the drives. According to the self-assessment report, they did not expect power to the hydraulic control unit to be an issue since past problems with the effluent pumps had been related to vibrations. They did not discover that the hydraulic control unit did not have power for approximately 30 minutes, after the primary sedimentation tanks had started to overflow.

Once Mr. Rheaume and Mr. Hart discovered that the hydraulic control unit did not have power, they took steps to connect the back-up hydraulic power unit. A portable hydraulic power unit is staged on the motor level of the effluent pump building, one floor above the normal hydraulic control unit. According to Mr. Wenig, operators can use the portable unit at the influent control structure if the hydraulic control unit at that location goes offline. However, the unit is typically kept at the effluent pump building. Transferring to the back-up unit requires operators to drag hoses from the motor level down to the pump level to connect to the main hydraulic system. Mr. Wenig stated that connecting the portable unit can take 10-20 minutes. Written statements by Mr. Rheaume and Mr. Hart noted that connecting the hose to the main hydraulic system was difficult due to pressure stored in the system. In his written statement, Mr. Rheaume noted "this [difficulty to connect] happened to me before when we did a practice scenario on A crew, about 6 years ago". When asked about operator training on the use of the back-up system, Mr. Wenig responded that there had been training on using the system at the effluent pump station, but "it had been a while".

During her interview, Ms. Stephens commented that she thought she had a good understanding of what could happen at the plant during high flows. Mr. Edenshaw generally shared Ms. Stephens' opinion, but conceded that "anyone can be an expert on paper". Ecology interpreted this comment as meaning that just understanding what is written in the operations and maintenance (O&M) manual does not guarantee that operators will know how to react in different situations.

Immediately following the effluent pump shutdown and triggering of the effluent pump station high-high alarm, Mr. Wenig directed Ms. Stephens along with Mr. Nelson and Ms. Carlson to reopen the PE gates. Mr. Wenig stated in his interview on 6/27/2017 that he "was trying to but time to restart the effluent pump station" by having the field crew reopen the primary effluent gates. During the same interview, Mr.

Wenig also acknowledged that, as long as the effluent pump station, was in a high-high alarm condition, the interlock would prevent the operators from lowering the primary effluent gates.

Based on the operators' written statements, it is unclear whether they knew at the time that the primary effluent gates had closed due to the effluent pump station interlock. In Ms. Stephens' statement she noted that the "PE (Primary Effluent) gates fails". She later clarified in her interview on 6/27/2017 that she was referring to the gates closing due to the interlock. Although written statement by Mr. Nelson and Mr. Wenig do not indicate that there was clear communication among the operators about the reason why the primary effluent gates had closed, all of the operators on duty knew that the effluent pumps were offline. It would have been reasonable for the operators to assume, based on the high plant flows and no effluent pumping, that the primary effluent gates closed due to the interlock.

The WPTP O&M manual describes how critical interlocks at the plant operate in response to high flows. According to the Plant Hydraulic Manual (Section 2, Critical Hydraulic Facilities), an automated interlock closes the primary effluent gates when the water level in the effluent pump station reaches the high-high alarm elevation of 115.0 feet. The manual also states that the "gates must be reset (ACC-1 control room) after the wet well level drops below 115.0". Although the manual clearly described how the interlock worked and the steps operators needed to take to reset the gate controllers, their actions did not follow the established SOPs. The operators went directly to the primary effluent gates shortly after being dispatched by Mr. Wenig. Based on Ms. Carlson's statement, they worked on opening the gates for "about 10 minutes" before abandoning the attempt to reopen the gates. Mr. Nelson noted in his statement that, after attempting to lower the east gate, he heard over the radio "they may need to be reset in ACC-1" and that he "thought that too".

In their written statements, Ms. Stephens, Mr. Nelson, Ms. Carlson, and Mr. Glen all commented that they had seen water overflowing from the primary basins during the time Mr. Rheaume and Mr. Hart were attempting to restart the effluent pumps. In addition, Ms. Carlson was injured while evacuating the primary basin area when her foot went through an opening in the primary deck caused when the overflowing water lifted a gate access cover. However the operators did not report the overflowing basins or the injury to Main Control. When asked why she did not inform Main Control of the overflowing basins and injury, Ms. Stephens responded that she wanted to keep the radio line clear so Mr. Wenig could communicate with operators at the effluent pump station.

Operator training

Operators on duty February 9th generally identified in their written statements that they would have benefitted from improved training, specifically with respect to handling emergency situations and in connecting the back-up hydraulic control unit. In the course of developing its independent assessment report, AECOM review training records for the "C Shift" operators. They found that, although the crew on duty had completed a combined total of 503 courses relating to the plant and off-site systems and effectively and safely operating WTD facilities under normal or emergency conditions, many of the courses had not been completed in the past 3 years. They also noted that there were no SOPs in place to aid the operators in deciding when to initiate an emergency outfall bypass and the operators were not comfortable in making that decision (AECOM 2017).

When interviewed on June 27, 2017, Mr. Waddle stated that the plant's previous technical trainer had developed a robust training plan, but did not have direct authority to the plan. Each shift supervisor was responsible for their crew's training. He also noted that there was not a consistent application of SOPs among the shift supervisors.

When asked to describe the training process for operators, Mr. Wenig explained that most training was "theoretical", consisting of verbal discussions of scenarios. He also noted that WPTP did not have a formal, written training plan for operations and relied primarily on informal one-on-one instructions, mentoring, and on-the-job training. The County does, however, have written mandatory safety training for operators. It also has written training materials in a job progression manual for various equipment and systems broken down by process area for operators to work through at their own pace. Ms. Stephens stated that she had completed "all books" of the training materials.

On January 4, 2000, problems at the WPTP's effluent pump station led to an emergency bypass discharge of approximately 20 MG to Puget Sound. Ecology issued a Notice of Violation (DE 00WQ-NR270) for this incident and issued follow-up administrative orders in October 2007 (DE 00WQ-NR1662) and in June 2001 (DE 00-WQNR1662A-01). In cooperation with Ecology's investigation into this incident, King County WTD submitted an investigation report authored by CH2M Hill that reviewed the factors involved in the emergency discharge. That report recommended the development of an operator training tool that incorporated simulator technology based on hydraulic models of plant operations under both normal and abnormal conditions. The County committed to reviewing the recommendation, but ultimately did not develop the simulator-based training due to high cost (WTD 2017).

Mercoid float switch history and maintenance

Based on his written statement and responses to interview questions, Mr. Wenig relied on the proper operation of the Mercoid 301 float switches installed in the pre-aeration basins to automatically shut off the raw sewage pumps and initiate an emergency bypass discharge before the primary basins overflowed. When interviewed on June 27th, he stated that his main focus was on restarting the effluent pumps and controlling the raw sewage pumps to "buy time" for that restart. Although he knew about some past problems with the switches, he stated that he was not aware of the full history of problems.

The County installed the Mercoid switches in the mid-1990s as part of the plant's expansion to secondary treatment. The switches use a hollow metal sphere attached to a thin metal rod to activate relays when the water level reaches a specific height. The assembly is mounted in an armature tube to protect it from floating debris. The WPTP used eight of the switch assemblies in the pre-aeration basins; two in each of the four basins. One switch in each basin was used to register a high level alarm when the water level reached 119.6 feet and the other switch registered a high-high alarm at 120.5 feet. The plant's control system logic was set to automatically shut down the raw sewage pumps when two of the high-high alarms registered that critical elevation. The alarm data for February 9th showed that the pre-aeration tank alarms failed to register their respective high and high-high conditions as the water level rose in the primary system.

In its response to the Notice of Violation for the January 2000 plant emergency bypass, King County WTD identified that problems with the Mercoid float switches in the pre-aeration basin contributed to that bypass. The work order history for the WPTP includes six of 18 corrective maintenance request for the Mercoid switches since 1998 to replace bent rods. The most recent requests were from 2008. The preliminary findings report for the February 9th flooding and emergency discharge concluded that mechanical impingement due to bent attachment rods caused the switches to fail (CH2M 2017).

The self-assessment report noted that accumulations of debris and/or fats, oil, and grease meant that operators needed to periodically clean the switches. The operations staff perform this cleaning on a weekly basis, typically on Saturdays. Ms. Stephens commented during her June 27th interview that there were no written SOPs for this maintenance aside from general directions listed on the preventive maintenance work order. In a separate set of written responses to questions about the Merciod switch

maintenance collected by King County WTD, Ms. Stephens stated that the "float was too long for a 5'4" person to lift".

The WPTP's instrumentation maintenance staff performs annual inspections of the Mercoid switches in the plant to verify functionality. This annual testing is designed to ensure that the switches trigger the appropriate hard-wired responses in the plant. Testing is to be done during dry weather and with stop logs installed at the emergency bypass gate to prevent discharges during testing. Although the SOP for this test calls for the operators to manually raise the water level in the tanks to trigger the switches, the self-assessment report notes that the plant staff do not follow the procedure due to multiple tank leaks when the tanks are operating at high levels. Staff instead use a modified procedure that has an instrument maintenance technician open the switch cover and manually activate the mercury switch. The modified procedure does not use the float and float rod to actuate the switch. The self-assessment report noted that "Not testing the floats' ability to activate the mercury switches has resulted in a false sense of security for many years and obscured the risk of failure during high water level events" (WTD 2017a).

According to the plant's O&M manual (Critical Hydraulic Facilities), the primary sedimentation tanks can be used to store excess flows for a short period of time during a high flow emergency. The Mercoid float switches act as a safeguard to prevent the primary basins from overflowing when operators are using them to store flows. The operators relied on the design intent of the switches providing that safeguard as they worked to restart the facility.

When interviewed by Ecology on June 27, 2017, Mr. Wenig, Ms. Stephens, and Mr. Edenshaw stated that they did not consider the primary basins to have any significant storage capacity with the primary effluent gates closed. As discussed in the Initial Chain of Events section of this report, the O&M manual for the WPTP indicates that the primary basins have 3-4 minutes of storage capacity at high flows. The plant trend data for February 9th also show that, as a result of Mr. Wenig's management of the raw sewage pumps, approximately 10 minutes elapsed between the time the primary effluent gates closed and the primary basins reached their overflow level. Ecology does not find fault with the operators using the conservative assumption of no storage capacity. However, despite this assumption, the main control operators did not monitor available information on the primary sedimentation tank levels and relied solely on the Mercoid float switches to prevent flooding. In his interview on June 27th, Mr. Edenshaw conceded that the float switches provided a false sense of security.

The failure of the Merciod switches were exacerbated by the combination of the main control operators not monitoring the primary basin level and the failure of the operators in the field to notify main control when they saw water overflowing from the basins. This resulted in a significant delay in shutting the influent pumps off and opening the emergency bypass gate to allow incoming sewage to flow to the emergency outfall. Had the emergency outfall been utilized once the overtopping occurred or was noticed by the field operators, the plant would not have received the extensive damage that it did.

Changes made at plant since February 9th flooding

King County WTD has taken steps since the February 9th flooding improve redundancy and training at the WPTP. In a May 31, 2017 Manager's Memo titled *West Point Flood Recovery – Resiliency Action Plan* (WTD 2017), Mr. Waddle identified several changes needed at the WPTP. The recommendations are based on the findings in the *After Action Self-Assessment Report* (WTD 2017a) and in consultation in CH2M during the plant recovery. Table 4 includes the recommended changes, as updated on August 8, 2017.

To date, WPTP staff have replaced the Mercoid float switches with tethered float switches and installed an automatic transfer switch to provide redundant power to the Pratt valve hydraulic control unit. Also, consultants are in the process of creating a simulator that uses an existing hydraulic model of the WPTP to use as an operator training tool and design is underway for a second hydraulic control unit for the Pratt valves. To improve operator training and continuity between shifts, WPTP has hired a fifth shift supervisor. This shift supervisor will be in charge of operator training and will have the plant's Technical Trainer as a subordinate.

Table 4 Corrective actions recommended by WPTP management

Device/System to Improve	Corrective Action	Specific Corrective Action Taken	Corrective Action Start Date	Corrective Action Completion Date
1 - Plant Hydraulic Simulator Program	Develop complete model	Ovation user interface hydraulic model	January 2016	August 2017
2 - Tunnel Access Protocols	Administrative controls	Limit tunnel access during high flows	February 2017	Ongoing
3 – Raw Sewage Pump - Primary Sedimentation Level Interlock	Replace existing system	New float design and installation	February 2017	May 2017
4 - Effluent Pump Station (EPS) Power Supply	Redundant power	Automatic control switch (ATS)	February 2017	May 2017
5 - EPS Pratt Valve Operations	Redundant control	Design, construct and install redundant valve hydraulic system	February 2017	March 2018
6 – Influent Control Structure Gate – Wet Well Level Interlock	Replace existing system	New float design and installation	April 2017	June 15, 2017
7 - Operator Training	Formal shift ops training	New Shift Sup-Trainer to enhance • shift sup continuity • ops training	May 2017	June 2017
8 - Life Safety Report and implementation	Review control systems	Contract with CH2M to conduct study	May 2017	January 2018
9 – Safety Management of Change (SMoC)	Develop SMoC specific maintenance and testing procedures	Apply SMoC specific procedures to all identified Life-Safety issues identified in #8	January 2018	Ongoing
10 – SCADA Alarm Management	Prioritize critical alarms	Program Ovation to display critical alarms until acknowledged	June 2017	January 2018

Source: Manager's Memo: West Point Flood Recovery – Resiliency Action Plan; (WTD 2017)

Conclusions

Lack of adequate redundancy in Pratt Valve power led to a catastrophic chain of events.

The Pratt valve hydraulic system was the critical point of failure that set in motion a chain of events that ultimately resulted in internal flooding of the West Point treatment plant and discharge of raw sewage to Puget Sound on three days in February 2017. Flooding damage also led to reduced treatment capabilities at the plant that took 89 days to fully correct. The hydraulic system is a critical auxiliary system necessary for the operation of valves that control the discharge pressure of the effluent pumps. The initial

loss of "A-Side" power for the effluent pump station shut down effluent pump 2; pumps 3 and 4 remained energized through the "B-Side" power supply.

Plant design records lists the pumping capacity of the individual effluent pumps at 102,000 gallons per minute, or approximately 146.9 MGD. The AECOM report cites a firm capacity of 144 MGD for each effluent pump. Effluent pumps 3 and 4 failed as a result of high vibrations from pumping against the closed Pratt valves. Had the Pratt valves remained in operation, effluent pumps 3 and 4 could have sustained pumped effluent flow of approximately 288-294 MGD. Flow records for the time of the period after all four pumps were offline show that some effluent was able to leave the plant under gravity flow at a rate between 100-125 MG. The resulting range of combined gravity and pumped effluent flow that could have potentially discharged from the West Point plant had pumps 3 and 4 remained in operation was 388-419 MGD. Although this would not have been sufficient to discharge the entire 450 MGD flow rate through the plant at the time, it would have significantly decreased the imbalance between influent and effluent flows. This may have provided the operators with more time to react to the emergency and may have eliminated or minimized the plant flooding. Comprehensive flow modeling of the treatment plant is necessary to determine the impact that two operating effluent pumps would have had on the incident.

The AECOM report noted that the "lack of redundancy combined with several interdependencies in the complex system [of the West Point plant] gives operators very little time to react during peak-flow events." That report also identified the lack of backup power for the Pratt valve hydraulic unit as a key critical failure leading to the February 9th flooding event. The County's July 2017 After-Action Self-Assessment Report also concluded that the Pratt valve hydraulic system power supply "may not be fully redundant". Both reports recommended adding redundancy to this system. As part of the County's restoration efforts, it added full power redundancy to the hydraulic system. The County is also in the process of installing a second hydraulic unit that will operate in parallel with the original system. The new system will be powered through the "B-Side" motor control center and operate two valves while the original will remain on the "A-Side" and operate the other two valves. Both units will be tied together through valves that will allow either hydraulic system to operate all four valves during emergency conditions.

Operators not adequately prepared to manage the emergency

During interviews with Ecology, operators on site the morning of February 9, 2017 stated that they had not imagined a scenario like this one. The operators were not aware that the Pratt valve hydraulic system only received power from the A-Side and did not have consistent awareness of past problems with the Mercoid float switches. Operators were not adequately trained on flow emergencies. Although CH2M Hill's technical memorandum on the January 2000 emergency discharge recommended development of a simulator-based operator training tool, the County did not follow through with this recommendation due to high cost. There was also an inconsistent level of training among the various shifts, an inconsistent application of SOPs between shifts, and a lack of SOPs to aid operators in deciding when to initiate an emergency outfall discharge.

The lack of effective emergency response training left the operators unprepared for the February 9th incident. While the operators stated that they conservatively assumed that the primary basins did not have storage capacity during high flows, their actions were not consistent with this assumption. The timeline of operator actions is inconsistent with a sense of urgency required. Approximately 45 minutes elapsed between the time the effluent pumps shut down and the time Mr. Wenig ordered the shutdown of the raw sewage pumps. While he slowed the raw sewage pumping rate to "help buy time", neither he nor Mr.

Edenshaw monitored the water level in the primary basins. They instead relied on the proper operation of float switches that had a history of problems to protect the plant from flooding. In addition, operators in the field who first noticed water overflowing from the primary basins failed to report the situation to main control because they wanted to keep the radio lines clear for main control to communicate with the operators working to restart the effluent pumps. This error resulted in exacerbating the flooding.

While the operators working to restart the effluent pumps may not have followed SOPs and those actions may have delayed that restart, it is questionable whether following the SOPs would have made a significant difference. If they had noticed earlier that the Pratt valve hydraulic control unit did not have power, it would have still taken 10-20 minutes for them to connect the back-up unit. Based on the timeline of events, if no other operator actions changed, the primary basins would have still overflowed before they would have been able to successfully restart two of the effluent pumps. The only likely outcome would have been a reduction in flooding severity.

Operators did not have proper support systems to manage the emergency.

The operators on duty did not have adequate systems in place to aid in decision making during emergency conditions. In addition to the lack of formal emergency training discussed above, the operators lacked support from the Ovation control system. The lack of SOPs to aid operators in deciding when to initiate a emergency discharge and an organizational culture that focused on avoiding using the emergency outfall led to decision making delays that resulted in catastrophic flooding of the plant.

The internal self-assessment report and the independent assessment report both noted that the operators were overwhelmed by a rapid succession of alarms immediately following the initial power disruption. The independent assessment noted "the alarms came in at such a high rate (up to 120 alarms per minute at its peak) that it was difficult for the operator to obtain useful information from the SCADA alarms page" (AECOM 2017). The newly-installed Ovation control system did not have alarms properly prioritized and, as a result, critical alarms were obscured in a flood of status messages and non-critical alarms. The main control room also does not have annunciators or other alarm displays to alert the main control operators to critical conditions. Prominent visual displays alerting the main control operators to the power failure in the effluent pump station or the rising level of the primary basins would have provided vital information they needed to manage the emergency.

The organizational culture at the WPTP and lack of clear directions on the acceptability of initiating an emergency outfall discharge inhibited the operators' decision making. When interviewed on June 27th, Ms. Stephens stated that she thought there was an obvious need to open the emergency bypass gate as soon as the primary effluent gates closed. Mr. Wenig stated, however, that "the old mindset was to keep the flow in the pipes". The independent assessment noted that the operators were trying to prevent flow from being diverted – it was their day-to-day priority to prevent a bypass to the emergency outfall (AECOM 2017). While the plant's NPDES permit prohibits intentional bypasses, federal law recognizes that a bypass may be warranted when necessary to prevent loss of life or property. The law recognizes that it is sometimes reasonable to bypass treatment systems to prevent catastrophic damage. The AECOM report also noted that no SOPs were in place for when to make a bypass decision and operators were not comfortable making this decision without clear instruction. Ecology believes it is likely that the plant flooding would have been minimized or prevented had the management systems been in place to support an operators in a decision to open the emergency bypass gate earlier than they did.

Results of beach sampling following bypass events

Fecal Coliform test results (cfu/100 ml) following 2/9/2017 bypass

	Sample - date and time			
Sample locations	Feb. 9	Feb. 10	Feb. 11	Feb. 12
South Beach, farthest from lighthouse	80	230	170	5
South Beach, middle	140	300	140	10
South Beach, nearest to lighthouse	110	200	100	14
North Beach, nearest to lighthouse	19,000	230	36	14
North Beach, middle	20,000	73	32	5
North Beach, farthest from lighthouse	13,000	190	48	1
Golden Gardens, south end of beach	90	99	29	10
Golden Gardens, middle of beach	120	110	50	5
Golden Gardens, north end of beach	70	71	5	<1
Carkeek Park, south end of beach	1300	42	14	5
Carkeek Park, middle of beach	900	28	14	2
Carkeek Park, north end of beach	3	29	13	4

Enterococcus test results (cfu/100 ml) following 2/9/2017 bypass

	Sample - date and time			
Sample locations	Feb. 9	Feb. 10	Feb. 11	Feb. 12
South Beach, farthest from lighthouse	50	340	140	18
South Beach, middle	300	290	140	21
South Beach, nearest to lighthouse	90	170	130	21
North Beach, nearest to lighthouse	22,000	190	21	3
North Beach, middle	12,000	99	23	11
North Beach, farthest from lighthouse	12,000	120	41	5
Golden Gardens, south end of beach	270	73	44	10
Golden Gardens, middle of beach	180	140	32	1
Golden Gardens, north end of beach	1400	120	18	5
Carkeek Park, south end of beach	7000	90	23	6
Carkeek Park, middle of beach	<900	27	23	3
Carkeek Park, north end of beach	2	27	13	3

Fecal Coliform test results (cfu/100 ml) following 2/15/2017 bypass

	Sample - date and time					
Sample locations	Feb. 15	Feb. 16	Feb. 17	Feb. 18	Feb. 19	Feb 20
South Beach, farthest from lighthouse	60	600	80	80	59	2
South Beach, middle	51	690	190	2	12	1
South Beach, nearest to lighthouse	64	770	140	8	15	3
North Beach, nearest to lighthouse	19	230	19	10	3	2
North Beach, middle	22	110	25	2	2	2
North Beach, farthest from lighthouse	23	72	24	2	5	<1
Golden Gardens, south end of beach	32	44	26	19	42	17
Golden Gardens, middle of beach	32	72	26	13	8	2
Golden Gardens, north end of beach	12	20	17	4	9	1
Carkeek Park, south end of beach	15	100	13	4	25	17
Carkeek Park, middle of beach	5	47	10	<1	12	4
Carkeek Park, north end of beach	14	21	6	<1	10	3

Enterococcus test results (cfu/100 ml) following 2/15/2017 bypass

	Sample - date and time					
Sample locations	Feb. 15	Feb. 16	Feb. 17	Feb. 18	Feb 19	Feb 20
South Beach, farthest from lighthouse	80	400	160	4	13	No Test
South Beach, middle	50	500	110	4	14	No Test
South Beach, nearest to lighthouse	50	580	90	8	14	No Test
North Beach, nearest to lighthouse	50	140	15	21	5	No Test
North Beach, middle	63	130	23	10	4	No Test
North Beach, farthest from lighthouse	200	99	32	8	4	No Test
Golden Gardens, south end of beach	17	70	32	15	16	No Test
Golden Gardens, middle of beach	17	320	19	17	7	No Test
Golden Gardens, north end of beach	19	31	19	4	3	No Test
Carkeek Park, south end of beach	140	500	25	50	14	No Test
Carkeek Park, middle of beach	63	360	22	3	11	No Test
Carkeek Park, north end of beach	28	46	14	5	3	No Test

References

AECOM 2017: *West Point Treatment Plant Independent Assessment – Final Report*, July 18, 2017.

CH2M 2017: *West Point Flooding Investigation – Preliminary Findings Report*, March 10, 2017.

WTD 2017: Manager's Memo: *West Point Flood Recovery – Resiliency Action Plan,* May 31 2017 (revised August 8, 2017)

WTD 2017a: *After Action Self-Assessment Report: February 9, 2017 Emergency Bypass Event at West Point Treatment Plant*, July 2017

ATTACHMENT C

Pertinent Permit Conditions, Discharge Monitoring Reports and Supplemental Data

Issuance Date: December 19, 2014
Effective Date: February 1, 2015
Expiration Date: January 31, 2020

National Pollutant Discharge Elimination System
Waste Discharge Permit No. WA0029181

State of Washington
DEPARTMENT OF ECOLOGY
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008-5452

In compliance with the provisions of
The State of Washington Water Pollution Control Law
Chapter 90.48 Revised Code of Washington
and
The Federal Water Pollution Control Act
(The Clean Water Act)
Title 33 United States Code, Section 1342 et seq.

KING COUNTY WASTEWATER TREATMENT DIVISION – WEST POINT WASTEWATER TREATMENT PLANT & COMBINED SEWER OVERFLOW SYSTEM

King Street Center, KSC-NR-0512
201 South Jackson Street
Seattle, WA 98104-3855

is authorized to discharge in accordance with the Special and General Conditions that follow.

Facility Name	West Point Wastewater Treatment Plant (serves combined sewer area)	Alki Storage and CSO Treatment Plant	Carkeek Storage and CSO Treatment Plant	Denny/Elliott West Storage and CSO Treatment Plant	Henderson/MLK Storage and CSO Treatment Plant
Plant Address	1400 Discovery Park Blvd Seattle, WA 98199	3380 Beach Drive SW Seattle, WA 98116-2616	1201 NW Carkeek Park Rd, Seattle, WA 98177-4640	545 Elliott Ave W Seattle, WA 98119	Outlet Regulator 9829 42nd Ave S Seattle, WA 98118
Receiving Water	Puget Sound	Puget Sound	Puget Sound	Elliott Bay	Duwamish Waterway
Plant Type	Secondary, Activated Sludge, Chlorine Disinfection	Satellite CSO Storage and Treatment Plant	Satellite CSO Storage and Treatment Plant	Satellite CSO Storage and Treatment Plant	Satellite CSO Storage and Treatment Plant
Discharge Location:	Lat: 47.661111° Long: -122.446389°	Lat: 47.57025° Long: -122.4225°	Lat: 47.71264° Long: -122.38789°	Lat: 47.61755° Long: -122.36186°	Lat: 47.51194° Long: -122.29736°

Kevin C. Fitzpatrick
Water Quality Section Manager
Northwest Regional Office
Washington State Department of Ecology

Special Conditions

S1. Discharge limits

All discharges and activities authorized by this permit must comply with the terms and conditions of this permit. The discharge of any of the following pollutants more frequently than, or at a level in excess of, that identified and authorized by this permit violates the terms and conditions of this permit.

S1.A. Effluent limits for Outfall 001 - West Point wastewater treatment plant

Beginning on the effective date of this permit and lasting through the expiration date, the Permittee may discharge treated municipal wastewater at the permitted locations subject to compliance with the following limits:

Effluent Limits: Outfall #001 - West Point WWTP Latitude: 47.661111° Longitude: -122.446389°		
Parameter	**Average Monthly** [a]	**Average Weekly** [b]
Carbonaceous Biochemical Oxygen Demand (5-day)	25 milligrams/liter (mg/L) 44,800 pounds/day (lbs/day) May–Oct: 85% removal of influent $CBOD_5$ Nov–April: 80% removal of influent $CBOD_5$	40 mg/L 71,700 lbs/day
Total Suspended Solids	30 mg/L, 53,800 lbs/day May–Oct: 85% removal of influent TSS Nov–April: 80% removal of influent TSS	45 mg/L 80,700 lbs/day
	Monthly Geometric Mean	**Weekly Geometric Mean**
Fecal Coliform Bacteria [c]	200/100 mL	400/100 mL
	Instantaneous Minimum	**Instantaneous Maximum**
pH [d]	6.0	9.0
	Average Monthly [a]	**Maximum Daily** [e]
Total Residual Chlorine	139 µg/L	364 µg/L

[a] Average monthly effluent limit means the highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.

[b] Average weekly discharge limit means the highest allowable average of daily discharges over a calendar week, calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week.

[c] Ecology provides directions to calculate this value in publication No. 04-10-020, *Information Manual for Treatment Plant Operators,* available at: http://www.ecy.wa.gov/pubs/0410020.pdf.

[d] Report the instantaneous maximum and minimum pH monthly. Do not average pH values.

[e] Maximum daily effluent limit means the highest allowable daily discharge. The daily discharge is the average measurement of the pollutant over the day.

S2. Monitoring requirements

S2.A. Monitoring schedules

The Permittee must monitor in accordance with the schedules in the following tables and the requirements specified in Appendix A or any corresponding *Sampling Analysis Plan/Quality Assurance Project Plan (SAP/QAPP)* documents. Alternative methods from 40 CFR Part 136 are acceptable only for those parameters without limits and if the DL and QL are equivalent to those specified in Appendix A, any corresponding SAP/QAPP documents, or sufficient to produce a measurable quantity.

Table 2. Monitoring Schedule – West Point WWTP (001)

Parameter	Units	Minimum Frequency	Sample Type
(1) Wastewater Influent [a]			
BOD_5	mg/L	1/week	24-hr Composite [b]
	lbs/day [c]	1/week	Calculation
$CBOD_5$	mg/L	1/day	24-hr Composite
	lbs/day [c]	1/day	Calculation
TSS	mg/L	1/day	24-hr Composite
	lbs/day	1/day	Calculation
(2) Final Wastewater Effluent [d]			
Flow	MGD	Continuous [e]	Meter
$CBOD_5$ [f]	mg/L	1/day	24-hr Composite
	lbs/day [c]	1/day	Calculation
	% removal [g]	1/month	Calculation
TSS	mg/L	1/day	24-hr Composite
	lbs/day [c]	1/day	Calculation
	% removal [g]	1/month	Calculation
Chlorine (after dechlorination)	µg/L	Continuous [e]	Meter
Fecal Coliform	# /100 ml	1/day	Grab [h]
pH	Standard Units	Continuous [e]	Meter
(3) Effluent Characterization – Final Wastewater Effluent			
Total Ammonia	mg/L N	1/month	24-hr Composite
	lbs/day	1/month	Calculation
Nitrate + Nitrite Nitrogen	mg/L N	1/month	24-hr Composite
Total Kjeldahl Nitrogen	mg/L N	1/month	24-hr Composite
Total Phosphorus	mg/L P	1/month	24-hr Composite
Soluble Reactive Phosphorus	mg/L P	1/month	24-hr Composite
(4) Whole Effluent Toxicity Testing – Final Wastewater Effluent - As specified in Permit Conditions S8 & S9.			
Acute Toxicity Testing		2/permit cycle	24-hr Composite
Chronic Toxicity Testing		2/permit cycle	24-hr Composite
(5) Pretreatment - As specified in Permit Condition S6.			
(6) CSO Monitoring - As specified in Permit Condition S11.			
(7) Permit Application Requirements – Final Wastewater Effluent [i]			
Dissolved Oxygen	mg/L	1/year in Aug	Grab
Oil and Grease (HEM)	mg/L	1/year in Aug	Grab
Total Dissolved Solids	mg/L	1/year in Aug	24-hr Composite
Total Hardness	mg/L	1/year in Aug	24-hr Composite
Alkalinity	mg/L as CaCO3	1/year in Aug	Grab

Table 2. Monitoring Schedule – West Point WWTP (001)

Parameter	Units	Minimum Frequency	Sample Type
Temperature	°C	1/year in Aug	Grab
Cyanide	µg/L	2/year [i, j]	Grab
Total Phenolic Compounds	µg/L	2/year [i, j]	Grab
Priority Pollutants (PP) – Total Metals	µg/L (ng for mercury)	2/year [i, j]	24-hr Composite; Grab for mercury
PP – Volatile Organic Compounds	µg/L	2/year [i, j]	Grab
PP – Acid-extractable Compounds	µg/L	2/year [i, j]	24-hr Composite
PP – Base-neutral Compounds	µg/L	2/year [i, j]	24-hr Composite
(8) Sediment Study - As specified in Permit Condition S13.A.			

[a] Wastewater Influent means the raw sewage flow from the collection system into the treatment facility. Sample the wastewater entering the headworks of the plant excluding any side-stream returns from inside the plant.

[b] 24-hour composite means a series of individual samples collected over a 24-hour period in a single container and analyzed as one sample.

[c] lbs/day = Concentration (in mg/L) x Flow (in MGD) x Conversion Factor (8.34) = lbs/day. Calculate using the average flow measured during the sample collection period.

[d] Final Wastewater Effluent means wastewater which is exiting, or has exited, the last treatment process or operation.

[e] "Continuous" means uninterrupted except for brief lengths of time for calibration, power failure, or unanticipated equipment repair or maintenance. The Permittee must sample every six hours when continuous monitoring is not possible.

[f] Effluent samples for $CBOD_5$ analysis may be taken before or after the disinfection process. If taken after, dechlorinate and reseed the sample.

[g] % removal = $\frac{\text{Influent monthly average concentration (mg/L)} - \text{Effluent monthly average concentration (mg/L)}}{\text{Influent monthly average concentration (mg/L)}} \times 100$

[h] "Grab" means an individual sample collected over a 15-minute, or less, period.

[i] One of the two annual sampling events must occur when flows are being diverted around the secondary process (i.e. instantaneous effluent flow rate is greater than 300 MGD) or when the average daily precipitation is equal to or greater than 0.25 inches.

[j] The Permittee must record and report the wastewater treatment plant flow discharged on the day it collects the sample for Appendix A pollutant testing with the discharge monitoring report.

See Appendix A or corresponding SAP/QAPP for the required detection (DL) or quantitation (QL) levels.

Report single analytical values below detection as "less than (detection level)" where (detection level) is the numeric value specified in Appendix A.

Report single analytical values between the detection and quantitation levels with qualifier code of 'j' following the value. If unable to obtain the required DL and QL due to matrix effects, the Permittee must submit a matrix specific MDL and a QL with appropriate laboratory documentation.

Untreated CSO Outfalls

The Permittee must monitor all discharges from the CSO outfalls listed in Special Condition S11, not including any CSO treatment plants, using the following monitoring schedule. The Permittee must use automatic flow monitoring equipment to collect the information required below, and must calibrate flow monitoring equipment according to requirements in Condition S2.C. A CSO discharge is defined as any untreated CSO which will exit or has exited the CSO outfall.

Table 4. Monitoring Schedule – Untreated CSO Outfalls

Parameter	Units	Minimum Sampling Frequency	Sample Type
Volume Discharged	MG	Per Event [a]	Meter/Calculation [b]
Discharge Duration	Hours	Per Event	Meter/Calculation
Storm Duration [c]	Hours	Per Event	Meter/Calculation
Precipitation	Inches	Per Event	Meter/Calculation
Sediments – As specified in Permit Condition S13.C.			

[a] "Per Event" means a unique flow event as defined in the *Permit Writer's Manual*, p. V-30. Ecology defines the minimum inter-event period as 24 hours. A CSO event is considered to have ended only after at least 24 hours has elapsed since the last measured occurrence of an overflow.

[b] "Meter/Calculation" means the total volume of the discharge or amount of precipitation event as estimated by direct measurement or indirectly by calculation (i.e. flow weirs, pressure transducers, tipping bucket). Precipitation must be measured by the nearest possible precipitation-measuring device and actively monitored during the period of interest.

[c] Storm duration is the total amount of time precipitation occurred that contributed to a discharge event; it is determined on a case-by-case basis.

S2.B. Sampling and analytical procedures

Samples and measurements taken to meet the requirements of this permit must represent the volume and nature of the monitored parameters. The Permittee must conduct representative sampling of any unusual discharge or discharge condition, including bypasses, upsets, and maintenance-related conditions that may affect effluent quality.

Sampling and analytical methods used to meet the monitoring requirements specified in this permit must conform to the latest revision of the *Guidelines Establishing Test Procedures for the Analysis of Pollutants* contained in 40 CFR Part 136 (or as applicable in 40 CFR subchapters N [Parts 400–471] or O [Parts 501-503]) unless otherwise specified in this permit. Ecology may only specify alternative methods for parameters without permit limits and for those parameters without an EPA approved test method in 40 CFR Part 136.

S2.C. Flow measurement, field measurement, and continuous monitoring devices

The Permittee must:

1. Select and use appropriate flow measurement, field measurement, and continuous monitoring devices and methods consistent with accepted scientific practices.

2. Install and maintain these devices to ensure the accuracy of the measurements is consistent with the accepted industry standard and the manufacturer's recommendation for that type of device.
3. Calibrate continuous monitoring instruments consistent with the manufacturer's recommendation.
4. Maintain calibration records for at least three years.

S2.D. Laboratory accreditation

The Permittee must ensure that all monitoring data required by Ecology for permit specified parameters is prepared by a laboratory registered or accredited under the provisions of chapter 173-50 WAC, *Accreditation of Environmental Laboratories*. Flow, temperature, settleable solids, and internal process control parameters are exempt from this requirement. .

S3. Reporting and recording requirements

The Permittee must monitor and report in accordance with the following conditions. Falsification of information submitted to Ecology is a violation of the terms and conditions of this permit.

S3.A. Reporting

The first monitoring period begins on the effective date of the permit. The Permittee must:

1. Summarize, report, and submit monitoring data obtained during each monitoring period on the electronic Discharge Monitoring Report (DMR) form provided by Ecology within the Water Quality Permitting Portal. Include data for each of the parameters tabulated in Special Condition S2 and as required by the form. Report a value for each day sampling occurred (unless specifically exempted in the permit) and for the summary values (when applicable) included on the electronic form.

   To find out more information and to sign up for the Water Quality Permitting Portal go to: http://www.ecy.wa.gov/programs/wq/permits/paris/webdmr.html.
2. Enter the "no discharge" reporting code for an entire DMR, for a specific monitoring point, or for a specific parameter as appropriate, if the Permittee did not discharge wastewater or a specific pollutant during a given monitoring period.
3. Report single analytical values below detection as "less than the detection level (DL)" by entering < followed by the numeric value of the detection level (e.g. < 2.0) on the DMR. If the method used did not meet the minimum DL and quantitation level (QL) identified in the permit, report the actual QL and DL in the comments or in the location provided.
4. Report the test method used for analysis in the comments if the laboratory used an alternative method not specified in the permit and as allowed in Appendix A.

2. This notice must include an evaluation of the wastewater treatment plant's ability to adequately transport and treat the added flow and/or waste load, the quality and volume of effluent to be discharged to the treatment plant, and the anticipated impact on the Permittee's effluent [40 CFR 122.42(b)].

S4.E. Wasteload assessment

The Permittee must conduct wasteload assessments of the West Point WWTP and each CSO treatment plant and submit a report to Ecology with the next permit application. The Permittee must also submit the report electronically. The report must contain:

1. A description of compliance or non-compliance with the permit effluent limits.
2. A comparison between the existing and design:
   a. Monthly average dry weather and wet weather flows.
   b. Peak flows.
   c. $CBOD_5$ and TSS loadings (West Point only).
   d. 5-year average of annual discharge events and annual discharge volume for the Alki and Carkeek CSO treatment plants.
3. The percent change in the above parameters since the previous report.
4. The present and design population or population equivalent.
5. The projected population growth rate.
6. The estimated date upon which the Permittee expects the wastewater treatment plant to reach design capacity, according to the most restrictive of the parameters above.

S5. Operation and maintenance

The Permittee must at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances), which are installed to achieve compliance with the terms and conditions of this permit. Proper operation and maintenance also includes keeping a daily operation logbook (paper or electronic), adequate laboratory controls, and appropriate quality assurance procedures. This provision of the permit requires the Permittee to operate backup or auxiliary facilities or similar systems only when the operation is necessary to achieve compliance with the conditions of this permit.

S5.A. Certified operator

These permitted facilities must be operated by an operator certified by the state of Washington for at least a Class IV plant. This operator must be in responsible charge of the day-to-day operation of the wastewater treatment facilities. An operator certified for at least a Class III plant must be in charge during all regularly scheduled shifts.

S5.B. Operation and maintenance program

The Permittee must:

1. Maintain the operation and maintenance program for the entire sewage system under the ownership and control of KC.
2. Keep maintenance records on all major electrical and mechanical components of the treatment plant, as well as the sewage system and pumping stations. Such records must clearly specify the frequency and type of maintenance recommended by the manufacturer and must show the frequency and type of maintenance performed.
3. Make maintenance records available for inspection at all times.

S5.C. Short-term reduction

The Permittee must schedule any facility maintenance, which might require interruption of wastewater treatment and degrade effluent quality, during non-critical water quality periods and carry this maintenance out in a manner approved by Ecology.

If a Permittee contemplates a reduction in the level of treatment that would cause a violation of permit discharge limits on a short-term basis for any reason, and such reduction cannot be avoided, the Permittee must:

1. Give written notification to Ecology, if possible, thirty (30) days prior to such activities.
2. Detail the reasons for, length of time of, and the potential effects of the reduced level of treatment.

This notification does not relieve the Permittee of its obligations under this permit.

S5.D. Electrical power failure

The Permittee must ensure that adequate safeguards prevent the discharge of untreated wastes or wastes not treated in accordance with the requirements of this permit during electrical power failure at the treatment plant and/or sewage lift stations. Adequate safeguards include, but are not limited to, alternate power sources, standby generator(s), or retention of inadequately treated wastes.

The Permittee must maintain Reliability Class II (EPA 430-99-74-001) at the wastewater treatment plant. Reliability Class II requires a backup power source sufficient to operate all vital components and critical lighting and ventilation during peak wastewater flow conditions. Vital components used to support the secondary processes (i.e., mechanical aerators or aeration basin air compressors) need not be operable to full levels of treatment, but must be sufficient to maintain the biota.

S5.E. Prevent connection of inflow

The Permittee must strictly enforce its sewer ordinances and not allow the connection of inflow (roof drains, foundation drains, etc.) to the sanitary sewer system where under ownership and control of King County.

S5.F. Bypass procedures

This permit prohibits a bypass, which is the intentional diversion of waste streams from any portion of a treatment facility. Ecology may take enforcement action against a Permittee for a bypass unless one of the following circumstances (1, 2, or 3) applies.

1. Bypass for essential maintenance without the potential to cause violation of permit limits or conditions.

   This permit authorizes a bypass if it allows for essential maintenance and does not have the potential to cause violations of limits or other conditions of this permit, or adversely impact public health as determined by Ecology prior to the bypass. The Permittee must submit prior notice, if possible, at least ten (10) days before the date of the bypass.

2. Bypass which is unavoidable, unanticipated, and results in non-compliance of this permit.

   This permit authorizes such a bypass only if:

   a. Bypass is unavoidable to prevent loss of life, personal injury, or severe property damage. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which would cause them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass.

   b. No feasible alternatives to the bypass exist, such as:

      - The use of auxiliary treatment facilities.
      - Retention of untreated wastes.
      - Maintenance during normal periods of equipment downtime, but not if the Permittee should have installed adequate backup equipment in the exercise of reasonable engineering judgment to prevent a bypass.
      - Transport of untreated wastes to another treatment facility or preventative maintenance.

   c. Ecology is properly notified of the bypass as required in Special Condition S3.E of this permit.

3. If bypass is anticipated and has the potential to result in non-compliance of this permit.

   a. The Permittee must notify Ecology at least thirty (30) days before the planned date of bypass. The notice must contain:

      - A description of the bypass and its cause.
      - An analysis of all known alternatives which would eliminate, reduce, or mitigate the need for bypassing.
      - A cost-effectiveness analysis of alternatives including comparative resource damage assessment.

provides the toxicity test data in electronic format for entry into Ecology's database, then the Permittee must send the data to Ecology along with the test report, bench sheets, and reference toxicant results.

2. The Permittee must collect 24-hour composite effluent samples for toxicity testing. The Permittee must cool the samples to 0 - 6 degrees Celsius during collection and send them to the lab immediately upon completion. The lab must begin the toxicity testing as soon as possible but no later than 36 hours after sampling was completed.
3. The laboratory must conduct water quality measurements on all samples and test solutions for toxicity testing, as specified in the most recent version of Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria.*
4. All toxicity tests must meet quality assurance criteria and test conditions specified in the most recent versions of the EPA methods listed in Section C and the Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria.* If Ecology determines any test results to be invalid or anomalous, the Permittee must repeat the testing with freshly collected effluent.
5. The laboratory must use control water and dilution water meeting the requirements of the EPA methods listed in Subsection C or pristine natural water of sufficient quality for good control performance.
6. The Permittee must collect effluent samples for whole effluent toxicity testing just prior to the chlorination step in the treatment process.
7. The Permittee may choose to conduct a full dilution series test during compliance testing in order to determine dose response. In this case, the series must have a minimum of five effluent concentrations and a control. The series of concentrations must include the CCEC and the ACEC. The CCEC and the ACEC may either substitute for the effluent concentrations that are closest to them in the dilution series or be extra effluent concentrations. The CCEC equals 0.53% effluent. The ACEC equals 3.6% effluent.
8. All whole effluent toxicity tests that involve hypothesis testing must comply with the chronic statistical power standard of 39% as defined in WAC 173-205-020. If the test does not meet the power standard, the Permittee must repeat the test on a fresh sample with an increased number of replicates to increase the power.

S10. Wet weather operation

CSO-related bypass of the secondary treatment portion of the West Point WWTP is authorized when the instantaneous flow rate to the WWTP exceeds 300 MGD as a result of precipitation events. Bypasses that occur when the instantaneous flow rate is less than 300 MGD are not authorized under this condition and are subject to the bypass provisions as stated in S5.F of the permit. In the event of a CSO-related bypass authorized under this condition, the Permittee must minimize the discharge of

pollutants to the environment. At a minimum, CSO-related bypass flows must receive solids and floatables removal, primary clarification, and disinfection. The final discharge must at all times meet the effluent limits of this permit as listed in S1.

The Permittee must maintain records of all CSO-related bypasses at the treatment plant. These records must document the date, duration, and volume of each bypass event, and the magnitude of the precipitation event. The records must also indicate the effluent flow rate at the time when bypassing is initiated. The Permittee must report all occurrences of bypassing on a monthly and annual basis. The monthly report must include the above information and must be included in narrative form with the discharge monitoring report. The annual report must include all of the above information in summary format and should be reported in the annual CSO report per S11.C.

S11. Combined sewer overflows

S11.A. Authorized CSO discharge locations

Beginning on the effective date of this permit, the Permittee may discharge combined wastewater and stormwater from the 38 combined sewer overflow (CSO) outfalls listed in

Table 5. These point source discharges occur intermittently when rain events overload the combined sewer system. The permit prohibits discharges from the CSO outfall sites except as a result of precipitation. This permit does not authorize discharges from CSO outfalls that threaten characteristic uses of the receiving water as identified in the water quality standards, Chapter 173-201A WAC, or that result in an exceedance of the Sediment Management Standards, Chapter 173-204 WAC.

Table 5. Permitted CSO outfalls (38)

Outfall No.	Facility Name	Receiving Water	Latitude	Longitude
003	Ballard Siphon Reg.via Seattle storm drain	Lake Washington Ship Canal	47.663916°	-122.382333°
004	11th Ave NW (AKA East Ballard)	Lake Washington Ship Canal	47.659491°	-122.370774°
006	Magnolia Overflow	Elliott Bay/Puget Sound	47.630184°	-122.399021°
007	Canal Street Overflow	Lake Washington Ship Canal	47.651856°	-122.358113°
008	3rd Ave W and Ewing St.	Lake Washington Ship Canal	47.652084°	-122.360052°
009	Dexter Ave Regulator	Lake Union	47.632273°	-122.339235°
011	E Pine St. PS Emergency Overflow	Lake Washington	47.614926°	-122.280304°
012	Belvoir Pump Station Emergency Overflow	Lake Washington	47.656698°	-122.287589°
013	MLK Trunkline Overflow - via storm drain	Lake Washington	47.523285°	-122.262950°
014	Montlake Overflow	Lake Washington Ship Canal	47.647110°	-122.304861°
015	University Regulator	Lake Washington Ship Canal	47.648929°	-122.311296°
018	Matthews Park PS Emergency Overflows	Lake Washington	47.697458°	-122.272650°
027a	Denny Way Regulator	Elliott Bay	47.618139°	-122.361888°
028	King Street Regulator	Elliott Bay	47.599003°	-122.337425°
029	Kingdome	Elliott Bay	47.592532°	-122.342106°
030	Lander St. Regulator	Elliott Bay	47.581476°	-122.342997°

Outfall No.	Facility Name	Receiving Water	Latitude	Longitude
031a, b, c	Hanford #1 Overflow - Via Diagonal Storm Drain	Duwamish River	47.563108°	-122.345315°
032	Hanford #2 Regulator	Duwamish - East Waterway	47.577223°	-122.34278°
033	Rainier Ave Pump Station	Lake Washington	47.571374°	-122.27553°
034	E. Duwamish Pump Station	Duwamish River	47.562985°	-122.345272°
035	W. Duwamish Pump Station	Duwamish River	47.563224°	-122.348256°
036	Chelan Ave Regulator	Duwamish - West Waterway	47.573667°	-122.357779°
037	Harbor Avenue Regulator	Duwamish to Elliott Bay	47.573706°	-122.361159°
038	Terminal 115 Overflow	Duwamish River	47.54826°	-122.340503°
039	Michigan S. Regulator	Duwamish River	47.54353°	-122.334967°
040	8th Ave South Reg. (W. Marginal Way PS)	Duwamish River	47.533648°	-122.322639°
041	Brandon Street Regulator	Duwamish River	47.554661°	-122.340832°
042	Michigan W. Regulator	Duwamish River	47.541561°	-122.334994°
043	East Marginal Pump Station	Duwamish River	47.537048°	-122.31849°
044a	Norfolk Outfall	Duwamish River	47.511941°	-122.297356°
045	Henderson Pump Station	Lake Washington	47.523285°	-122.26295°
048a,b	North Beach Pump Station: a.) wet well, b) inlet structure	Puget Sound	47.704007° 47.702142°	-122.392337° -122.392564°
049	30th Avenue NE Pump Station	Lake Washington	47.656698°	-122.287589°
052	53rd Avenue SW Pump Station	Puget Sound	47.584799°	-122.402552°
054	63rd Avenue SW Pump Station	Puget Sound	47.570016°	-122.416301°
055	SW Alaska Street Overflow	Puget Sound	47.559442°	-122.406947°
056	Murray Street Pump Station	Puget Sound	47.540275°	-122.400003°
057	Barton Street Pump Station	Puget Sound	47.523886°	-122.396393°

S11.B. Nine minimum controls

In accordance with chapter 173-245 WAC and US EPA CSO control policy (59 FR 18688), the Permittee must implement and document the following nine minimum controls (NMC) for CSOs. The Permittee must document compliance with the NMCs in the annual CSO report as required in Special Condition S11.C.

The NMCs are considered technology-based requirements for CSO systems. In order to comply with these requirements, the Permittee must:

1. Implement proper operation and maintenance programs for the sewer system and all CSO outfalls to reduce the magnitude, frequency, and duration of CSOs. The program must consider regular sewer inspections; sewer, catch basin, and regulator cleaning; equipment and sewer collection system repair or replacement, where necessary; and disconnection of illegal connections.
2. Implement procedures that will maximize use of the collection system for wastewater storage that can be accommodated by the storage capacity of the collection system in order to reduce the magnitude, frequency, and duration of CSOs.

3. Review and modify, as appropriate, its existing pretreatment program to minimize CSO impacts from the discharges from non-domestic users. Starting with its annual Pretreatment Report submitted in 2016, the County must include in the report, for each discharger with a King County discharge authorization (major or minor) or discharge permit, the downstream CSO outfall(s) to which the discharger contributes, where applicable.
4. Operate the wastewater treatment plant at maximum treatable flow during all wet weather flow conditions to reduce the magnitude, frequency, and duration of CSOs. The Permittee must deliver all flows to the treatment plant within the constraints of the treatment capacity of the treatment works.
5. Not discharge overflows from CSO outfalls except as a result of precipitation events; dry weather overflows from CSO outfalls are prohibited. The Permittee must report each dry weather overflow to the permitting authority immediately per Special Condition S3.E. When it detects a dry weather overflow, the Permittee must begin corrective action immediately and inspect the dry weather overflow each subsequent day until it has eliminated the overflow.
6. Implement measures to control solid and floatable materials in CSOs.
7. Implement a pollution prevention program focused on reducing the impact of CSOs on receiving waters. Best management practices (BMPs) to control pollutant sources in stormwater in CSO basins must be an element of the pollution prevention program. Ecology's *Stormwater Management Manual for Western Washington* (2012) contains appropriate BMPs for reference.

   Starting with the Annual CSO Report submitted in 2017, the Permittee must include a detailed description of the pollution prevention program, appropriate BMPs, and the legal authority and administrative procedures that will be used to ensure the program is being implemented. If the legal authority and/or administrative procedures are not in place, the Annual CSO Report must include a detailed description of the steps needed to establish such a program and the timeline for getting the program in place.
8. Continue to implement the public notification process that informs citizens of when and where CSOs occur. The process must continue to include (a) a mechanism to alert citizens of CSO occurrences and (b) a system to determine the nature and duration of conditions that are potentially harmful for users of receiving waters due to CSOs.
9. Monitor CSO outfalls to characterize CSO impacts and the efficacy of CSO controls. This must include collection of data to document existing baseline conditions and to evaluate the efficacy of the technology-based controls. This data must include:

   a. Characteristics of the combined sewer system, including the population served by the combined portion of the system and locations of all CSO outfalls.

G8. Reduced production for compliance

The Permittee, in order to maintain compliance with its permit, must control production and/or all discharges upon reduction, loss, failure, or bypass of the treatment facility until the facility is restored or an alternative method of treatment is provided. This requirement applies in the situation where, among other things, the primary source of power of the treatment facility is reduced, lost, or fails.

G9. Removed substances

Collected screenings, grit, solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters must not be resuspended or reintroduced to the final effluent stream for discharge to state waters.

G10. Duty to provide information

The Permittee must submit to Ecology, within a reasonable time, all information which Ecology may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The Permittee must also submit to Ecology upon request, copies of records required to be kept by this permit.

G11. Other requirements of 40 CFR

All other requirements of 40 CFR 122.41 and 122.42 are incorporated in this permit by reference.

G12. Additional monitoring

Ecology may establish specific monitoring requirements in addition to those contained in this permit by administrative order or permit modification.

G13. Payment of fees

The Permittee must submit payment of fees associated with this permit as assessed by Ecology.

G14. Penalties for violating permit conditions

Any person who is found guilty of willfully violating the terms and conditions of this permit is deemed guilty of a crime, and upon conviction thereof shall be punished by a fine of up to ten thousand dollars ($10,000) and costs of prosecution, or by imprisonment in the discretion of the court. Each day upon which a willful violation occurs may be deemed a separate and additional violation.

Any person who violates the terms and conditions of a waste discharge permit may incur, in addition to any other penalty as provided by law, a civil penalty in the amount of up to ten thousand dollars ($10,000) for every such violation. Each and every such violation is a separate and distinct offense, and in case of a continuing violation, every day's continuance is deemed to be a separate and distinct violation.

RCW 90.48.080

Discharge of polluting matter in waters prohibited.

It shall be unlawful for any person to throw, drain, run, or otherwise discharge into any of the waters of this state, or to cause, permit or suffer to be thrown, run, drained, allowed to seep or otherwise discharged into such waters any organic or inorganic matter that shall cause or tend to cause pollution of such waters according to the determination of the department, as provided for in this chapter.

[**1987 c 109 § 126; 1967 c 13 § 8; 1945 c 216 § 14;** Rem. Supp. 1945 § 10964n.]

NOTES:

Purpose—Short title—Construction—Rules—Severability—Captions—1987 c 109: See notes following RCW **43.21B.001**.

King County
Department of Natural Resources and Parks
Wastewater Treatment Division
West Section
West Point Treatment Plant
1400 Utah Street West
Seattle, WA 98199-1004
206-263-3800 Fax 206-263-3850
TTY Relay: 711

February 15, 2017

Shawn McKone
Permit Manager
Washington Department of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008-5452

Mark Toy
Washington Department of Health
Environmental Public Health Division
Office of Environmental Health and Safety
P.O. Box 47824
Olympia, WA 98504-7824

Teri Barclay
Public Health Seattle-King County
2124 4th Avenue
Seattle, WA 98121

Re: Weather-related Plant Bypass Event, West Point Treatment Plant, February 9, 2017

Dear Mr. McKone, Mr. Toy, and Ms. Barclay:

Starting Wednesday afternoon, on February 8, the region experienced steady and heavy rain. Early Thursday morning, the plant suffered an equipment failure resulting in a plant bypass and collection system overflows. The overflow was reported to the Department of Ecology (Ecology) and assigned ERTS number 670591.

Around 2:15 a.m., the plant was at maximum capacity and processing approximately 450 MGD of flow when the Effluent Pump Station (EPS) suddenly went offline. Staff immediately responded by reducing the incoming flow to the plant while attempting to restart the 2250 hp motors for the EPS pumps. While the EPS pumps were off-line, the plant was still able to pass 120 to 150 MGD through the plant's outfall using gravity-flow.

As staff made multiple restart attempts, the hydraulic levels within the plant continued to rise and caused water levels eventually overflow the primary sedimentation tanks. Staff had to manually intervene to stop the influent pumps, which then caused the upstream level in the Influent Control Structure (ICS) to trigger the Emergency Bypass (EB) gate to automatically open around 3:00 a.m.

For February 9, through 9 p.m., we have estimated the total discharge of stormwater diluted sewage at 250 million gallons (MG). 200 MG were discharged through the plant emergency marine outfall, which is approximately 35 feet below the surface and 490 feet offshore. The remaining 50 MG were discharged within the collection system including marine CSO outfalls upstream of Interbay (including from the Denny/Elliott West facility). With the high flows, CSOs were already on-going so the shutdown resulted in exacerbated CSOs (increased discharges at those locations).

More significant than the bypass was the extensive below-grade flooding and equipment damage to the West Point plant. The flooding of the primary treatment area led to the overflow of the sedimentation basins into area drains, catch basins and the stairwells. This led to flooding of the galleries in the primary, digester and secondary areas with water levels as high as 12 feet above the gallery floor. The high flood levels damage both mechanical and electrical equipment throughout the plant.

The immediate goal was to re-establish flow through the plant and to be able to discharge via the plant's deep outfall which is approximately 240 feet below the surface and 3600 feet offshore. Treatment processes not affected by the flooding include prechlorination, influent screening, and final effluent disinfection and dechlorination. This modified primary treatment process will remain in place until system repairs are completed that will support full secondary treatment through the plant.

The bypass, including the sequence of events leading to the bypass, is currently being evaluated by King County Operations, Maintenance, and Engineering staff. A comprehensive report covering the root cause of the bypass event and the extent of the damage to all plant equipment caused by the flooding is in process. The report will be forwarded to Ecology as soon as possible after its completion. The report will include all actions taken and proposed for implementation to prevent future problems and failures associated with this event. Pending this report and while the plant is functioning in the modified primary treatment mode, daily or weekly, as appropriate, status reports will be forwarded to Ecology via e-mail.

Sampling data for fecal coliform indicate a reduced impact to the receiving water due to the significant dilution of the influent domestic sewage with heavy stormwater flow reaching the plant.

Samples were taken from 12 different locations with results provided in the tables below. The tables summarize both fecal coliform and enterococcus results.

Water Quality Sampling — Fecal Coliform test results (cfu/100 ml)

Sample locations	Sample - date and time			
	Feb. 9 (10:25 to 11:15 a.m.)	Feb. 10 (9:08 to 11:45 a.m.)	Feb. 11 (8:24 to 10:05 a.m.)	Feb. 12 (8:54 to 11 a.m.)
South Beach, farthest from lighthouse	80	230	170	5
South Beach, middle	140	300	140	10
South Beach, nearest to lighthouse	110	200	100	14
North Beach, nearest to lighthouse	19,000	230	36	14
North Beach, middle	20,000	73	32	5
North Beach, farthest from lighthouse	13,000	190	48	1
Golden Gardens, south end of beach	90	99	29	10
Golden Gardens, middle of beach	120	110	50	5
Golden Gardens, north end of beach	70	71	5	<1
Carkeek Park, south end of beach	1300	42	14	5
Carkeek Park, middle of beach	900	28	14	2
Carkeek Park, north end of beach	3	29	13	4

Water Quality Sampling – Enterococcus test results (cfu/100 ml)

Sample locations	Sample - date and time			
	Feb. 9 (10:25 to 11:15 a.m.)	Feb. 10 (9:08 to 11:45 a.m.)	Feb. 11 (8:24 to 10:05 a.m.)	Feb. 12 (8:54 to 11 a.m.)
South Beach, farthest from lighthouse	50	340	140	
South Beach, middle	300	290	140	
South Beach, nearest to lighthouse	90	170	130	
North Beach, nearest to lighthouse	22,000	190	21	
North Beach, middle	12,000	99	23	
North Beach, farthest from lighthouse	12,000	120	41	
Golden Gardens, south end of beach	270	73	44	
Golden Gardens, middle of beach	180	140	32	
Golden Gardens, north end of beach	1400	120	18	
Carkeek Park, south end of beach	7000	90	23	
Carkeek Park, middle of beach	<900	27	23	
Carkeek Park, north end of beach	2	27	13	

If you have additional questions concerning this event, please contact me at 206-263-9481 or Eugene Sugita at 206-477-9782.

Sincerely,

Robert Waddle
Operations & Maintenance Section Manager

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision, in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

cc: Laura Fricke, Municipal Unit Supervisor, Department of Ecology (DOE)
Amy Jankowiak, Compliance Specialist, Department of Ecology (DOE)
Mark Isaacson, Division Director, Wastewater Treatment Division (WTD), Department of Natural Resources and Parks (DNRP)
Jeff Lafer, Project/Program Manager IV, WTD, DNRP
Al Williamson, Assistant Manager, West Section, WTD, DNRP

King County
Department of Natural Resources and Parks
Wastewater Treatment Division
West Section
West Point Treatment Plant
1400 Utah Street West
Seattle, WA 98199-1004
206-263-3800 Fax 206-263-3850
TTY Relay: 711

February 21, 2017

Shawn McKone
Permit Manager
Washington Department of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008-5452

Mark Toy
Washington Department of Health
Environmental Public Health Division
Office of Environmental Health and Safety
P.O. Box 47824
Olympia, WA 98504-7824

Teri Barclay
Public Health Seattle-King County
2124 4th Avenue
Seattle, WA 98121

Re: Weather-related Plant Bypass Event, West Point Treatment Plant, February 15, 2017

Dear Mr. McKone, Mr. Toy, and Ms. Barclay:

West Point Treatment Plant is currently at half capacity due to the February 9, 2017 flooding event that caused significant damage to the plant. On February 15, the region experienced steady and heavy rain, 1.63 inches of rainfall was recorded. Early Wednesday morning, the emergency CSO bypass gate was opened to relief the high incoming flows. The overflow was reported to the Department of Ecology and assigned ERTS number 670753.

During the heavy rain, West Point was pumping 252 MGD and all three CSO facilities were operating at near or maximum capacity. When the wet well reached 109.2 feet, the emergency CSO bypass gate was opened. The bypass gate was opened twice during the day; the first event was February 15 at 3:50 a.m. through 10:37 a.m. The gate was reopened on February 15 at 4:01 p.m. and closed on February 16 at 6:05 a.m.; the estimated total bypass flow for both durations of

44.39 million gallons were discharged through the plant emergency marine outfall, which is approximately 35 feet below the surface and 490 feet offshore. The high flows and West Point at reduced capacity resulted in exacerbated CSOs at the CSO facilities (increased discharges at those locations).

Sampling data for fecal coliform indicate a reduced impact to the receiving water from the bypass because the incoming heavy flows were so dilute.

Samples were taken from 12 different locations, and the results from those samples are summarized in the tables below. The first table summarizes fecal coliform results; the latter summarizes enterococcus results.

Water Quality Sampling — Fecal Coliform test results (cfu/100 ml)

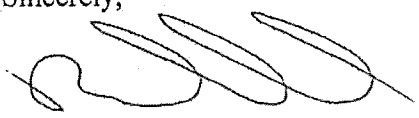
Sample locations	Sample - date and time					
	Feb. 15 (8:20 - 9:45 a.m.)	Feb. 16 (7:09 – 8:54 a.m.)	Feb. 17 (7:40 - 8:55 a.m.)	Feb. 18 (7:46 – 10:09 a.m.)	Feb. 19 (8:30 – 9:54 a.m.)	Feb 20 (8:57 – 10:17 a.m.)
South Beach, farthest from lighthouse	60	600	80	80	59	2
South Beach, middle	51	690	190	2	12	1
South Beach, nearest to lighthouse	64	770	140	8	15	3
North Beach, nearest to lighthouse	19	230	19	10	3	2
North Beach, middle	22	110	25	2	2	2
North Beach, farthest from lighthouse	23	72	24	2	5	<MDL (1)
Golden Gardens, south end of beach	32	44	26	19	42	17
Golden Gardens, middle of beach	32	72	26	13	8	2
Golden Gardens, north end of beach	12	20	17	4	9	1
Carkeek Park, south end of beach	15	100	13	4	25	17
Carkeek Park, middle of beach	5	47	10	<MDL (1)	12	4
Carkeek Park, north end of beach	14	21	6	<MDL (1)	10	3

Water Quality Sampling – Enterococcus test results (cfu/100 ml)

Sample locations	Sample - date and time					
	Feb. 15 (8:20-9:45 a.m.)	Feb. 16 (7:09 – 8:54 a.m.)	Feb. 17 (7:40 – 8:55 a.m.)	Feb. 18 (7:46 – 10:09 a.m.)	Feb 19 (8:30 – 9:54 a.m.)	Feb 20 (8:57 – 10:17 a.m.)
South Beach, farthest from lighthouse	80	400	160	4	13	2
South Beach, middle	50	500	110	4	14	5
South Beach, nearest to lighthouse	50	580	90	8	14	3
North Beach, nearest to lighthouse	50	140	15	21	5	2
North Beach, middle	63	130	23	10	4	6
North Beach, farthest from lighthouse	200	99	32	8	4	4
Golden Gardens, south end of beach	17	70	32	15	16	8
Golden Gardens, middle of beach	17	320	19	17	7	5
Golden Gardens, north end of beach	19	31	19	4	3	<MDL (1)
Carkeek Park, south end of beach	140	500	25	50	14	7
Carkeek Park, middle of beach	63	360	22	3	11	<MDL (1)
Carkeek Park, north end of beach	28	46	14	5	3	1

If you have additional questions concerning this event, please contact me at 206-263-9481 or Eugene Sugita at 206-477-9782.

Sincerely,



Robert Waddle
Operations & Maintenance Section Manager

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision, in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

cc: Laura Fricke, Municipal Unit Supervisor, Department of Ecology (DOE)
Amy Jankowiak, Compliance Specialist, DOE
Mark Isaacson, Division Director, Wastewater Treatment Division (WTD), Department of Natural Resources and Parks (DNRP)
Jeff Lafer, Project/Program Manager IV, WTD, DNRP
Eric Mandel, Project Control Engineer III, WTD, DNRP
Al Williamson, West Section Assistant Manager, WTD, DNRP

King County
Department of Natural Resources and Parks
Wastewater Treatment Division
West Section
West Point Treatment Plant
1400 Utah Street West
Seattle, WA 98199-1004
206-263-3800 Fax 206-263-3850
TTY Relay: 711

February 28, 2017

Shawn McKone
Permit Manager
Washington Department of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008-5452

Mark Toy
Washington Department of Health
Environmental Public Health Division
Office of Environmental Health and Safety
P.O. Box 47824
Olympia, WA 98504-7824

Teri Barclay
Public Health Seattle-King County
2124 4th Avenue
Seattle, WA 98121

Re: Weather-related Plant Bypass Event, West Point Treatment Plant, February 15, 2017

Dear Mr. McKone, Mr. Toy, and Ms. Barclay:

In the Bypass Report that was dated February 21, 2017, we reported that an estimated 44.39 million gallons (MG) of stormwater and sewage were discharged through West Point Treatment Plant's (West Point) emergency marine outfall on February 15-16. A further review of the data has allowed us to make a better estimate of the discharge volume. The revised estimate is that 58.3-MG was discharged via the Emergency CSO Bypass Gate and Emergency Marine Outfall on February 15-16.

West Point is currently at half capacity due to the February 9 flooding event that caused significant damage to the plant. On February 15, the region experienced steady and heavy rain with 1.63 inches of rainfall recorded. Early Wednesday morning, the Emergency CSO Bypass

gate was opened to relief the high incoming flows. The overflow was reported to the Department of Ecology and assigned ERTS number 670753.

During the heavy rain, West Point was pumping 252 MGD and all three CSO facilities were operating at near or maximum capacity. When the wet well reached 109.2 feet, the Emergency CSO Bypass gate was opened. The bypass gate was opened twice during the day; the first event was February 15 at 3:50 a.m. through 10:37 a.m. The gate was reopened on February 15 at 4:01 p.m. and closed on February 16 at 6:05p.m.; the estimated total bypass flow for both durations of 58.3 million gallons were discharged through the plant emergency marine outfall, which is approximately 35 feet below the surface and 490 feet offshore. The high flows and West Point at reduced capacity resulted in exacerbated CSOs at the CSO facilities (increased discharges at those locations).

Sampling data for fecal coliform indicate a reduced impact to the receiving water from the bypass because the incoming heavy flows were so dilute.

Samples were taken from twelve different locations, and the results from those samples are summarized in the tables below. The first table summarizes fecal coliform results; the latter summarizes enterococcus results.

Water Quality Sampling — Fecal Coliform test results (cfu/100 ml)

	Sample - date and time					
Sample locations	Feb. 15 (8:20 - 9:45 a.m.)	Feb. 16 (7:09 – 8:54 a.m.)	Feb. 17 (7:40 - 8:55 a.m.)	Feb. 18 (7:46 – 10:09 a.m.)	Feb. 19 (8:30 – 9:54 a.m.)	Feb 20 (8:57 – 10:17 a.m.)
South Beach, farthest from lighthouse	60	600	80	80	59	2
South Beach, middle	51	690	190	2	12	1
South Beach, nearest to lighthouse	64	770	140	8	15	3
North Beach, nearest to lighthouse	19	230	19	10	3	2
North Beach, middle	22	110	25	2	2	2
North Beach, farthest from lighthouse	23	72	24	2	5	<MDL (1)
Golden Gardens, south end of beach	32	44	26	19	42	17
Golden Gardens, middle of beach	32	72	26	13	8	2

Golden Gardens, north end of beach	12	20	17	4	9	1
Carkeek Park, south end of beach	15	100	13	4	25	17
Carkeek Park, middle of beach	5	47	10	<MDL (1)	12	4
Carkeek Park, north end of beach	14	21	6	<MDL (1)	10	3

Water Quality Sampling – Enterococcus test results (cfu/100 ml)

	Sample - date and time					
Sample locations	Feb. 15 (8:20- 9:45 a.m.)	Feb. 16 (7:09 – 8:54 a.m.)	Feb. 17 (7:40 – 8:55 a.m.)	Feb. 18 (7:46 – 10:09 a.m.)	Feb 19 (8:30 – 9:54 a.m.)	Feb 20 (8:57 – 10:17 a.m.)
South Beach, farthest from lighthouse	80	400	160	4	13	2
South Beach, middle	50	500	110	4	14	5
South Beach, nearest to lighthouse	50	580	90	8	14	3
North Beach, nearest to lighthouse	50	140	15	21	5	2
North Beach, middle	63	130	23	10	4	6
North Beach, farthest from lighthouse	200	99	32	8	4	4
Golden Gardens, south end of beach	17	70	32	15	16	8
Golden Gardens, middle of beach	17	320	19	17	7	5
Golden Gardens, north end of beach	19	31	19	4	3	<MDL (1)
Carkeek Park, south end of beach	140	500	25	50	14	7
Carkeek Park, middle of beach	63	360	22	3	11	<MDL (1)
Carkeek Park, north end of beach	28	46	14	5	3	1

If you have additional questions concerning this event, please contact me at 206-263-9481 or Eugene Sugita at 206-477-9782.

Sincerely,

Robert Waddle
Operations & Maintenance Section Manager

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision, in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

cc: Laura Fricke, Municipal Unit Supervisor, Department of Ecology (DOE)
Amy Jankowiak, Compliance Specialist, Department of Ecology (DOE)
Mark Isaacson, Division Director, Wastewater Treatment Division (WTD), Department of Natural Resources and Parks (DNRP)
Jeff Lafer, Project/Program Manager IV, WTD, DNRP
Eric Mandel, Project Control Engineer III, WTD, DNRP
Al Williamson, West Section Assistant Manager, WTD, DNRP

0450hrs Division Channel

FECAL COLIFORM TEST WORKSHEET

MULTIPLE TUBE FERMENTATION TECHNIQUE - using Most Probable Number (MPN)

Tester (in) BB **Tester (out)** ML

Sample Date 2-9-17 **Test Date** 2-9-17

Sample Location

(place a mark in the appropriate box)

WP Final Eff.	EW Eff.	CP Eff.	Alki Eff.	Other
				X

Multiple Tubes					Dilution Factor	Multiple Tubes Duplicate				
1	2	3	4	5		1	2	3	4	5
+	+	+	+	+	1					
+	+	+	+	+	10					
+	+	+	+	+	100					
+	+	+	+	+	1,000					
+	−	−	−	−	10,000					
−	−	−	−	−	100,000					
−	−	−	−	−	1,000,000					

		DF
Combination of positives	5-1-0	1000
Fecal Col. / 100 ml (MPN)	300000	

DF

Combination of positives		
Fecal Col. / 100 ml (MPN)		

Incubate for 3 hours at 35 +/- 0.5 C. Transfer to a water bath at 44.5 +/- C, and incubate for an additional 21 +/- 2 hrs. Gas production, not growth, indicates a positive culture tube for fecal coliform colonies. Positive tubes are indicated with a "+"

COMMENTS

Division Channel

Temp:

pH:

Res. Cl_2: Hach = Analyzer =

Time that Sample was taken:	0450
Time that Sample was tested:	0715
Time of transfer to water bath:	1015
Time of analysis:	0740

Division Channel 0525 hrs

FECAL COLIFORM TEST WORKSHEET

MULTIPLE TUBE FERMENTATION TECHNIQUE - using Most Probable Number (MPN)

Tester (in) 1315 **Tester (out)** ML

Sample Date 2-9-17 **Test Date** 2-9-17

Sample Location

(place a mark in the appropriate box)

WP Final Eff.	EW Eff.	CP Eff.	Alki Eff.	Other
				X

Multiple Tubes					Dilution Factor	Multiple Tubes Duplicate				
1	2	3	4	5		1	2	3	4	5
+	+	+	+	+	1					
+	+	+	+	+	10					
+	+	+	+	+	100					
+	+	+	+	+	1,000					
+	+	+	+	+	10,000					
−	−	−	−	−	100,000					
−	−	−	−	−	1,000,000					
					DF					DF

Combination of positives	5-0-0	10,000
Fecal Col. / 100 ml (MPN)	2300000	

Combination of positives		
Fecal Col. / 100 ml (MPN)		

Incubate for 3 hours at 35 +/- 0.5 C. Transfer to a water bath at 44.5 +/- C, and incubate for an additional 21 +/- 2 hrs. Gas production, not growth, indicates a positive culture tube for fecal coliform colonies. Positive tubes are indicated with a "+"

COMMENTS

Temp:

pH:

Res. Cl_2: Hach = Analyzer =

Time that Sample was taken:	0525
Time that Sample was tested:	0815
Time of transfer to water bath:	1115
Time of analysis:	0738

Division Channel 0630 hrs

FECAL COLIFORM TEST WORKSHEET

MULTIPLE TUBE FERMENTATION TECHNIQUE - using Most Probable Number (MPN)

Tester (in) BJS **Tester (out)** ML

Sample Date 2-9-17 **Test Date** 2-9-17

Sample Location

(place a mark in the appropriate box)

WP Final Eff.	EW Eff.	CP Eff.	Alki Eff.	Other
				X

Multiple Tubes					Dilution Factor	Multiple Tubes Duplicate				
1	2	3	4	5		1	2	3	4	5
+	+	+	+	+	1					
+	+	+	+	+	10					
+	+	+	+	+	100					
+	+	+	+	+	1,000					
+	+	+	−	−	10,000					
−	−	−	−	−	100,000					
−	−	−	−	−	1,000,000					

DF DF

Combination of positives	5-3-0	1000
Fecal Col. / 100 ml (MPN)	800 000	

Combination of positives		
Fecal Col. / 100 ml (MPN)		

Incubate for 3 hours at 35 +/- 0.5 C. Transfer to a water bath at 44.5 +/- C, and incubate for an additional 21 +/- 2 hrs. Gas production, not growth, indicates a positive culture tube for fecal coliform colonies. Positive tubes are indicated with a "+"

COMMENTS

Temp:

pH:

Res. Cl_2: Hach = Analyzer =

Time that Sample was taken:	0630
Time that Sample was tested:	0815
Time of transfer to water bath:	1115
Time of analysis:	0734

Division Channel 0930 hrs

FECAL COLIFORM TEST WORKSHEET

MULTIPLE TUBE FERMENTATION TECHNIQUE - using Most Probable Number (MPN)

Tester (in) ML **Tester (out)** ML

Sample Date 02-09-17 **Test Date** 02-09-17

Sample Location

(place a mark in the appropriate box)

WP Final Eff.	EW Eff.	CP Eff.	Alki Eff.	Other
				X

RS influent

Multiple Tubes					Dilution Factor	Multiple Tubes Duplicate				
1	2	3	4	5		1	2	3	4	5
+	+	+	+	+	1					
+	+	+	+	+	10					
+	+	+	+	+	100					
+	+	+	+	+	1,000					
−	−	−	−	−	10,000					
−	−	−	−	−	100,000					
+	−	−	−	−	1,000,000					

DF

Combination of positives	5-0-1	1000
Fecal Col. / 100 ml (MPN)	300000	

DF

Combination of positives		
Fecal Col. / 100 ml (MPN)		

Incubate for 3 hours at 35 +/- 0.5 C. Transfer to a water bath at 44.5 +/- C, and incubate for an additional 21 +/- 2 hrs. Gas production, not growth, indicates a positive culture tube for fecal coliform colonies. Positive tubes are indicated with a "+"

COMMENTS

Temp:

pH:

Res. Cl_2: Hach = Analyzer =

Time that Sample was taken:	0930
Time that Sample was tested:	1015
Time of transfer to water bath:	1315
Time of analysis:	1110

Division Channel 1100 hrs.

FECAL COLIFORM TEST WORKSHEET

MULTIPLE TUBE FERMENTATION TECHNIQUE - using Most Probable Number (MPN)

Tester (in) ML **Tester (out)** ML

Sample Date 02-09-2017 **Test Date** 02-09-2017

Sample Location

(place a mark in the appropriate box)

WP Final Eff.	EW Eff.	CP Eff.	Alki Eff.	Other
				X

RS influent

Multiple Tubes					Dilution Factor	Multiple Tubes Duplicate				
1	2	3	4	5		1	2	3	4	5
+	+	+	+	+	1					
+	+	+	+	+	10					
+	+	+	+	+	100					
+	+	+	+	+	1,000					
+	−	−	−	−	10,000					
−	−	−	−	−	100,000					
−	−	−	−	−	1,000,000					

DF

Combination of positives	5-1-0	1000
Fecal Col. / 100 ml (MPN)	300000	

DF

Combination of positives		
Fecal Col. / 100 ml (MPN)		

Incubate for 3 hours at 35 +/- 0.5 C. Transfer to a water bath at 44.5 +/- C, and incubate for an additional 21 +/- 2 hrs. Gas production, not growth, indicates a positive culture tube for fecal coliform colonies. Positive tubes are indicated with a "+"

COMMENTS

Temp:

pH:

Res. Cl_2: Hach = Analyzer =

Time that Sample was taken:	1100
Time that Sample was tested:	1133
Time of transfer to water bath:	0233
Time of analysis:	1107

Division Channel 1245 hrs

FECAL COLIFORM TEST WORKSHEET

MULTIPLE TUBE FERMENTATION TECHNIQUE - using Most Probable Number (MPN)

Tester (in) KB **Tester (out)**

Sample Date 2-9-17 **Test Date** 2-9-17

Sample Location

(place a mark in the appropriate box)

WP Final Eff.	EW Eff.	CP Eff.	Alki Eff.	Other
				X

Multiple Tubes					Dilution Factor	Multiple Tubes Duplicate				
1	2	3	4	5		1	2	3	4	5
+	+	+	+	+	1					
+	+	+	+	+	10					
+	+	+	+	+	100					
+		+			1,000					
+	+				10,000					
					100,000					
					1,000,000					

Combination of positives	5-2-1	DF 100
Fecal Col. / 100 ml (MPN)	90000.	

Combination of positives		DF
Fecal Col. / 100 ml (MPN)		

Incubate for 3 hours at 35 +/- 0.5 C. Transfer to a water bath at 44.5 +/- C, and incubate for an additional 21 +/- 2 hrs. Gas production, not growth, indicates a positive culture tube for fecal coliform colonies. Positive tubes are indicated with a "+"

COMMENTS

Ten rows

Temp:

pH:

Res. Cl_2: Hach = Analyzer =

Time that Sample was taken:	1245
Time that Sample was tested:	1445
Time of transfer to water bath:	1747
Time of analysis:	1315

RS Division Channel 1900 hrs.

FECAL COLIFORM TEST WORKSHEET

MULTIPLE TUBE FERMENTATION TECHNIQUE - using Most Probable Number (MPN)

Tester (in)	ML	**Tester (out)**	MS
Sample Date	02-09-2017	**Test Date**	02-10-2017

Sample Location

(place a mark in the appropriate box)

WP Final Eff.	EW Eff.	CP Eff.	Alki Eff.	Other
				X

Multiple Tubes					Dilution Factor	Multiple Tubes Duplicate				
1	2	3	4	5		1	2	3	4	5
+	+	+	+	+	1					
+	+	+	+	+	10					
+	+	+	+	+	100					
	+				1,000					
					10,000					
					100,000					
					1,000,000					

		DF
Combination of positives	5-1-0	100
Fecal Col. / 100 ml (MPN)	30,000	

		DF
Combination of positives		
Fecal Col. / 100 ml (MPN)		

Incubate for 3 hours at 35 +/- 0.5 C. Transfer to a water bath at 44.5 +/- C, and incubate for an additional 21 +/- 2 hrs. Gas production, not growth, indicates a positive culture tube for fecal coliform colonies. Positive tubes are indicated with a "+"

COMMENTS

Temp:

pH:

Res. Cl_2: Hach = Analyzer =

Time that Sample was taken:	1900
Time that Sample was tested:	0015
Time of transfer to water bath:	0315
Time of analysis:	22:28

RS from Division Channel 0100

FECAL COLIFORM TEST WORKSHEET

MULTIPLE TUBE FERMENTATION TECHNIQUE - using Most Probable Number (MPN)

Tester (in) ML **Tester (out)** ST

Sample Date 02-10-2017 **Test Date** 02-10-2017

Sample Location

(place a mark in the appropriate box)

WP Final Eff.	EW Eff.	CP Eff.	Alki Eff.	Other
				X RS1

Multiple Tubes					Dilution Factor	Multiple Tubes Duplicate				
1	2	3	4	5		1	2	3	4	5
+	+	+	+	+	1					
+	+	+	+	+	10					
+	+	+	+	+	100					
+				+	1,000					
					10,000					
					100,000					
					1,000,000					
				DF						DF

Combination of positives	5-5-2	10
Fecal Col. / 100 ml (MPN)	5,00 (10) =	50,000

Combination of positives		
Fecal Col. / 100 ml (MPN)		

Incubate for 3 hours at 35 +/- 0.5 C. Transfer to a water bath at 44.5 +/- C, and incubate for an additional 21 +/- 2 hrs. Gas production, not growth, indicates a positive culture tube for fecal coliform colonies. Positive tubes are indicated with a "+"

COMMENTS

Temp:

pH:

Res. Cl_2: Hach = Analyzer =

Time that Sample was taken:	0100
Time that Sample was tested:	0717
Time of transfer to water bath:	1018
Time of analysis:	0717 +2

RS from Division Channel 0700

FECAL COLIFORM TEST WORKSHEET

MULTIPLE TUBE FERMENTATION TECHNIQUE - using Most Probable Number (MPN)

Tester (in) ML **Tester (out)** ST

Sample Date 02-10-2017 **Test Date** 02-10-2017

Sample Location

(place a mark in the appropriate box)

WP Final Eff.	EW Eff.	CP Eff.	Alki Eff.	Other
				X RS1

Multiple Tubes					Dilution Factor	Multiple Tubes Duplicate				
1	2	3	4	5		1	2	3	4	5
+	+	+	+	+	1					
+	+	+	+	+	10					
+	+	+	+	+	100					
+	+				1,000					
					10,000					
					100,000					
					1,000,000					

		DF
Combination of positives	5-5-2	10
Fecal Col. / 100 ml (MPN)	5,000 x 10 = 50,000	

		DF
Combination of positives		
Fecal Col. / 100 ml (MPN)		

Incubate for 3 hours at 35 +/- 0.5 C. Transfer to a water bath at 44.5 +/- C, and incubate for an additional 21 +/- 2 hrs. Gas production, not growth, indicates a positive culture tube for fecal coliform colonies. Positive tubes are indicated with a "+"

COMMENTS

Temp:

pH:

Res. Cl_2: Hach = Analyzer =

Time that Sample was taken:	0700
Time that Sample was tested:	0840
Time of transfer to water bath:	1141
Time of analysis:	0840 ± 2

DV 0600

FECAL COLIFORM TEST WORKSHEET

MULTIPLE TUBE FERMENTATION TECHNIQUE - using Most Probable Number (MPN)

Tester (in)	EE	**Tester (out)**	EE
Sample Date	2-15-17	**Test Date**	2-15-17

Sample Location

(place a mark in the appropriate box)

WP Final Eff.	EW Eff.	CP Eff.	Alki Eff.	Other
				X

Multiple Tubes					Dilution Factor	Multiple Tubes Duplicate				
1	2	3	4	5		1	2	3	4	5
+	+	+	+	+	1					
+	+	+	+	+	10					
+	+	+	+	+	100					
+	+	+	+	+	1,000					
	+				10,000					
					100,000					
					1,000,000					

	DF		DF
Combination of positives	5-1-0	1000	Combination of positives		
Fecal Col. / 100 ml (MPN)	300,000		Fecal Col. / 100 ml (MPN)		

Incubate for 3 hours at 35 +/- 0.5 C. Transfer to a water bath at 44.5 +/- C, and incubate for an additional 21 +/- 2 hrs. Gas production, not growth, indicates a positive culture tube for fecal coliform colonies. Positive tubes are indicated with a "+"

COMMENTS

8 rows

Temp:

pH:

Res. Cl_2: Hach = Analyzer =

Time that Sample was taken:	0600	
Time that Sample was tested:	0920	
Time of transfer to water bath:	1220	
Time of analysis:	0820	

Division Channel 1000 hrs

FECAL COLIFORM TEST WORKSHEET

MULTIPLE TUBE FERMENTATION TECHNIQUE - using Most Probable Number (MPN)

Tester (in) BK **Tester (out)** BK

Sample Date 2-15 **Test Date** 2-15-17

Sample Location

(place a mark in the appropriate box)

WP Final Eff.	EW Eff.	CP Eff.	Alki Eff.	Other
				X

Multiple Tubes					Dilution Factor	Multiple Tubes Duplicate				
1	2	3	4	5		1	2	3	4	5
+	+	+	+	+	1					
+	+	+	+	+	10					
+	+	+	+	+	100					
+	+	+	+	+	1,000					
	+	+		+	10,000					
			+		100,000					
					1,000,000					

		DF
Combination of positives	5-3-1	1000
Fecal Col. / 100 ml (MPN)	1,000,000 1,100,000	

		DF
Combination of positives		
Fecal Col. / 100 ml (MPN)		

Incubate for 3 hours at 35 +/- 0.5 C. Transfer to a water bath at 44.5 +/- C, and incubate for an additional 21 +/- 2 hrs. Gas production, not growth, indicates a positive culture tube for fecal coliform colonies. Positive tubes are indicated with a "+"

COMMENTS

8 rows

Temp:

pH:

Res. Cl_2: Hach = Analyzer =

Time that Sample was taken:	1100
Time that Sample was tested:	1120
Time of transfer to water bath:	1420
Time of analysis:	1030

1615 2/15/2017

Division Channel
1615hrs.

FECAL COLIFORM TEST WORKSHEET

MULTIPLE TUBE FERMENTATION TECHNIQUE - using Most Probable Number (MPN)

Tester (in) ST **Tester (out)** ML

Sample Date 2/15/17 **Test Date** 2/15/17

Sample Location

(place a mark in the appropriate box)

WP Final Eff.	EW Eff.	CP Eff.	Alki Eff.	Other ✓ RS

Multiple Tubes					Dilution Factor	Multiple Tubes Duplicate				
1	2	3	4	5		1	2	3	4	5
+	+	+	+	+	1					
+	+	+	+	+	10					
+	+	+	+	+	100					
+	+	+	+	+	1,000					
+	+	+	+	+	10,000					
−	−	+	−	−	100,000					
−	−	−	−	−	1,000,000					

		DF
Combination of positives	5-1-0	10000
Fecal Col. / 100 ml (MPN)	3000000	

		DF
Combination of positives		
Fecal Col. / 100 ml (MPN)		

Incubate for 3 hours at 35 +/- 0.5 C. Transfer to a water bath at 44.5 +/- C, and incubate for an additional 21 +/- 2 hrs. Gas production, not growth, indicates a positive culture tube for fecal coliform colonies. Positive tubes are indicated with a "+"

COMMENTS

Division channel RS sample was found in the incubator (ST)

Temp:

pH:

Res. Cl_2: Hach = Analyzer =

Time that Sample was taken:	1615
Time that Sample was tested:	2315
Time of transfer to water bath:	0215 AM
Time of analysis:	2205

2230

Division channel 22:30

FECAL COLIFORM TEST WORKSHEET

MULTIPLE TUBE FERMENTATION TECHNIQUE - using Most Probable Number (MPN)

Tester (in)	ST	**Tester (out)**	ML
Sample Date	2/15/17	**Test Date**	2/15/17

Sample Location
(place a mark in the appropriate box)

WP Final Eff.	EW Eff.	CP Eff.	Alki Eff.	Other
				✓ RS

Multiple Tubes					Dilution Factor	Multiple Tubes Duplicate				
1	2	3	4	5		1	2	3	4	5
+	+	+	+	+	1					
+	+	+	+	+	10					
+	+	+	+	+	100					
+	+	+	+	+	1,000					
−	−	−	−	+	10,000					
−	−	−	−	−	100,000					
−	−	−	−	−	1,000,000					

	DF		DF
Combination of positives	5-1-0	Combination of positives	
Fecal Col. / 100 ml (MPN)	300000	Fecal Col. / 100 ml (MPN)	

Incubate for 3 hours at 35 +/- 0.5 C. Transfer to a water bath at 44.5 +/- C, and incubate for an additional 21 +/- 2 hrs. Gas production, not growth, indicates a positive culture tube for fecal coliform colonies. Positive tubes are indicated with a "+"

COMMENTS	
Temp:	
pH:	
Res. Cl_2: Hach =	Analyzer =
Time that Sample was taken: 2230	
Time that Sample was tested: 2340	
Time of transfer to water bath: 0240 AM	
Time of analysis: 2205	

2-15-17 2230

Division Channel 0500

FECAL COLIFORM TEST WORKSHEET

MULTIPLE TUBE FERMENTATION TECHNIQUE - using Most Probable Number (MPN)

Tester (in)	ISB	**Tester (out)**	ML
Sample Date	2-16	**Test Date**	2-16-17

Sample Location

(place a mark in the appropriate box)

WP Final Eff.	EW Eff.	CP Eff.	Alki Eff.	Other

Multiple Tubes					Dilution Factor	Multiple Tubes Duplicate				
1	2	3	4	5		1	2	3	4	5
+	+	+	+	+	1					
+	+	+	+	+	10					
+	+	+	+	+	100					
–	–	–	+	+	1,000					
–	–	–	–	–	10,000					
–	–	–	–	–	100,000					
–	–	–	–	–	1,000,000					

		DF
Combination of positives	5-2-0	100
Fecal Col. / 100 ml (MPN)	50000	

		DF
Combination of positives		
Fecal Col. / 100 ml (MPN)		

Incubate for 3 hours at 35 +/- 0.5 C. Transfer to a water bath at 44.5 +/- C, and incubate for an additional 21 +/- 2 hrs. Gas production, not growth, indicates a positive culture tube for fecal coliform colonies. Positive tubes are indicated with a "+"

COMMENTS

Temp:

pH:

Res. Cl_2: Hach = Analyzer =

Time that Sample was taken:	0500
Time that Sample was tested:	0800
Time of transfer to water bath:	1100
Time of analysis:	0802