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Port of Longview Industrial Wastewater Discharge Permit Compliance Manual

27 January 2022

Revised:
January 2024

Prepared for

Port of Longview
10 International Way
Longview, Washington 98632

KJ Project No. 2165003.00

WASTEWATER DISCHARGE PERMIT COMPLIANCE MANUAL

Port of Longview, USA
10 International Way
Longview, Washington 98632

FOR

Berth 7 (Outfall 004)

27 January 2022

To be Reviewed or Revised, Port of Longview,
January: 2023, 2024, 2025, 2026

Includes:
Treatment System Operating Plans
Permit Compliance Program
Spill Control Plan
Solid Waste Control Plan

In compliance with the provisions of
State of Washington Department of Ecology
State Waste Discharge Permit Number ST 6081

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List of Acronyms

%	percent
#	number
ºF	degrees Fahrenheit
μm	micrometer
A	amp
ACH	aluminum-chlorohydrate
Alum	aluminum sulfate
BV	ball valve
CAF	cavitation air floatation unit
City	City of Longview, Washington
CFR	Code of Federal Regulations
cfm	cubic feet per minute
COC	chain-of-custody
County	Cowlitz County, Washington
CPC	calcined petroleum coke
CTP	coal tar pitch
CPU	central processing unit
DDG	distiller dried grains
DMR	discharge monitoring report
Dp	differential pressure
Ecology	Washington State Department of Ecology
E-stop	emergency stop
ERP	emergency response plan
ETM	elapsed time meter
FOG	fats, oils, and greases
ft^2	square feet
ft^3	cubic feet
gal	gallons
gpd	gallons per day
gpm	gallons per minute
gpm/ft^2	gallons per minute per square foot
GLB	Gear Locker B
HDPE	high-density polyethylene
HMI	human-machine interface
HOA	hand/off/auto
hp	horsepower
HVAC	heating, ventilation, and air conditioning
in	inch(es)
I/O	Input/output
IPC	inclined plate clarifier
IWTP	industrial wastewater treatment plant
kVa	kilovolt-amp
lbs	pounds
lbs/day	pounds per day
LSH	level switch high
LSHH	level switch high-high

LSL	level switch low
M	mixer
mA	milliamp
MCC	motor control center
Manual	Wastewater Discharge Permit Compliance Manual
max	maximum
MG	million gallons
mg/L	milligrams per liter
MM	million
MSDS	material safety data sheet
N	normal
N/A	not applicable
NC	normally closed
NH_3	ammonia
NO	normally open
O&M	operations and maintenance
OBC	other bulk commodities
P	pump
Permit	State Waste Discharge Permit No. ST 6081
PLC	programmable logic controller
Port	Port of Longview
POTW	publicly-owned treatment works
psi	pounds per square inch
psig	pounds per square inch gauge
SAW	Secure Access Washington
SDS	safety data sheet
sq. in.	square inch(es)
SU	standard unit
T	tank/tower (used for tanks, inclined plate clarifiers, and other equipment)
TDH	total dynamic head
THHN	thermoplastic high heat-resistant nylon-coated
TRRWA	Three Rivers Regional Wastewater Authority
TRRWP	Three Rivers Regional Wastewater Plant
TSOP	Treatment System Operating Plan
TSS	total suspended solids
TTO	total toxic organics
VAC	voltage in alternating current
WAC	Washington Administrative Code
y^3	cubic yard

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Treatment System Operating Plan

Treatment System Operating Plan (TSOP)

This TSOP is a concise summary of specifically defined elements in the Port of Longview's (Port) Wastewater Discharge Permit Compliance Manual (Manual) that has been prepared to satisfy the requirement to have an Operations and Maintenance Manual under Washington State Department of Ecology (Ecology) State Waste Discharge Permit Number ST 6081 (Permit). The TSOP is organized to directly address the information listed in section S4.A.3 of the Permit. The Permit text for each type of information that must be included is presented below in bold italics and addressed in the text that follows.

> ***(a) A baseline operating condition, which describes the operating parameters and procedures, used to meet the effluent limits of S1 at the production levels used in developing these limits.***

Industrial wastewater and incidental contact stormwater runoff are collected during cargo handling operations and cleanup at Berths 5, 6, and 7 and Gear Locker B and pumped to the Berth 7 Industrial Wastewater Treatment Plant (IWTP) for treatment, where the wastewater is stored in influent tanks or the storage pond. Wastewater is pretreated to remove solids and adjust pH as necessary, then discharged to the Three Rivers Regional Wastewater Plant (TRRWP). The storage pond is the system's primary solids removal and wastewater storage mechanism. Operation of the IWTP is started and stopped as needed to process the volume of industrial wastewater that is collected, and to maintain adequate storage capacity for the total volume of wastewater anticipated to be collected each year. Influent and effluent at the IWTP is typically within Permit limits for pH. The IWTP has the ability to adjust pH when necessary to keep discharged effluent within Permit limits.

Influent to the IWTP is received in either the storage pond or the influent tanks. The influent tanks can serve as temporary storage where the wastewater's characteristics can be assessed prior to treatment. From the tanks, wastewater can flow by gravity directly to the storage pond or it can be pumped to the IWTP for pretreatment and discharge to sanitary sewer. Wastewater from the pond can be pumped to the IWTP for treatment prior to discharge, or back to the tanks. This flexibility facilitates assessment of the pollutant characteristics of wastewater generated during specific cargo loading operations and the application of appropriate unit processes to target specific pollutants if needed.

Inclined plate clarifiers (IPCs) in the IWTP can be used to remove total suspended solids (TSS) from wastewater associated with various cargos, including calcined coke. The plant also has a coagulant and polymer dosing system, and a pH neutralization system and duplex bag filters that can also be used as needed for additional solids removal. All wastewater is treated through a clarifier prior to discharge from the IWTP. Because TSS settles out in the pond, pond effluent TSS is generally below discharge limits and chemical addition is not required in the clarifier, thus sludge production from the IPCs has been substantially reduced.

> ***(b) In the event of production rates, which are below the baseline levels used to establish these limits, the plan must describe the operating procedures and***

conditions needed to maintain design treatment efficiency. The monitoring and reporting must be described in the plan.

The treatment efficiency of the IWTP is not directly related to production rates or the baseline levels used to establish permit limits. The IWTP can be stopped and started as needed to process the volume of wastewater that is collected. Biological or TSS loading to the treatment plant does not affect operations at the IWTP since settling does not rely on biological processes. Monitoring and Reporting are performed normally in accordance with Sections 3 and 4 of the Manual.

In the dry season when there is less incidental stormwater collected, the volume of industrial wastewater collected may be lower and pollutant concentrations may be higher. In addition, the storage pond may be drained for cleaning and sediment removal or due to the limited settling likely to occur in the relatively shallow water remaining in the pond. Under these conditions, industrial wastewater may be stored in influent tanks prior to processing and may be processed using the IPC's, coagulant and polymer and pH dosing systems, and duplex bag filters.

(c) In the event of an upset, due to plant maintenance activities, severe stormwater events, startups or shut downs, or other causes, the plan must describe the operating procedures and conditions employed to mitigate the upset. The monitoring and reporting must be described in the plan.

In the event of an upset, an influent tank or the storage pond can a be used to contain treated wastewater which cannot yet be discharged (due to daily flow limitations or water quality that does not meet the permitted levels). To return treated effluent to storage, the operator must configure the appropriate valves to allow effluent pump P-190 to pump water from the effluent tanks (T-170 and T-175) to one of four inlet tanks (T-100, T-105, T-110, or T-115). From there, the water can be gravity drained to the storage pond and detained for eventual reprocessing. No special operating procedures are needed for the treatment equipment at the IWTP during startups and shutdowns. Monitoring and Reporting are performed normally in accordance with Sections 3 and 4 of the Manual.

Water used for cleaning during maintenance activities can be pumped to the storage tanks for processing. The volume of wastewater in the storage pond is managed to maintain adequate capacity to contain the volume of wastewater that is anticipated to be generated, and the storage pond is designed with freeboard to contain the volume of stormwater that that falls on the pond during a severe stormwater event. The Berth 7 IWTP includes two parallel treatment trains, each consisting of a chemical dosing system and IPC which provide redundancy and reduces risk when managing upsets, maintenance activities, and storm events.

(d) A description of any regularly scheduled maintenance or repair activities at the facility which would affect the volume or character of the wastes discharged to the wastewater treatment system and a plan for monitoring and treating/controlling the discharge of maintenance- related materials (such as cleaners, degreasers, solvents, etc.).

Regularly scheduled maintenance or repair activities that would affect the volume or character of the wastes discharged to the wastewater treatment system are not performed at the Berth 7

IWTP and maintenance-related materials such as cleaners, degreasers, or solvents that would require treatment and control are not generated.

Section 1: Introduction

1.1 Purpose

This Manual defines the facilities, operating plans, and personnel responsibilities for complying with State Waste Discharge Permit requirements at:

Port of Longview, WA
10 International Way
Longview, Washington 98632
(360) 425-3305

The Port adopts this manual to define the program for complying with the Ecology Permit No. ST 6081 first issued to the Port in 1996, reissued in 2011, and most recently reissued 27 June 2021, effective 1 August 2021, modified 30 August 2021, with an expiration date of 31 July 2026. A copy of the Permit, issued in 2021, is included in Appendix A of this Manual. This Manual includes the operating plans for the treatment systems at the Berth 7 IWTP, the solid waste management plan, the spill control plan, and general operating procedures for permit compliance.

1.2 Permit Requirements

The Permit sets forth these requirements for the Port's Facility:

Discharge Limitations

Monitoring Requirements
- Wastewater Monitoring
- Sampling and Analytical Procedures
- Flow Measurement
- Laboratory Accreditation

Reporting and Recordkeeping
- Monitoring Reports
- Records Retention
- Recording of Results
- Additional Monitoring by the Permittee
- Noncompliance Notification
- Dangerous Waste Discharge Notification
- Spill Notification
- Maintain a Copy of Permit

Operation and Maintenance
- O&M Manual
- Bypass Procedures

Spill Plan

Dilution Prohibited

Solid Waste Disposal
- Solid Waste Handling
- Leachate
- Solid Waste Control Plan

Prohibited Discharges
- General Prohibitions
- Specific Prohibitions
- Prohibited Unless Approved

Duty to Reapply

General Conditions

The current Permit is reviewed in detail by Port staff responsible for Permit compliance. The current Permit remains in effect until an updated Permit is issued by Ecology. The Port will reapply for Permit coverage as directed by Ecology in the Permit update.

1.3 Site Description

The Port is a public port district located in Cowlitz County (County), Washington, partially within and adjacent to the City of Longview (City), Washington. The Port is the first deep-water port upstream from the Columbia River mouth at Astoria and is located on the northern bank of the river, 66 river miles from the Pacific Ocean. The Port property is accessed and divided by various paved and unpaved roads and two rail access points. The primary roads are Port Way, Terminal Way, Panel Way, North Tie Road, Paper Way, International Way, and East Mill Road. The Port location and site map are shown on Figure 1.1.

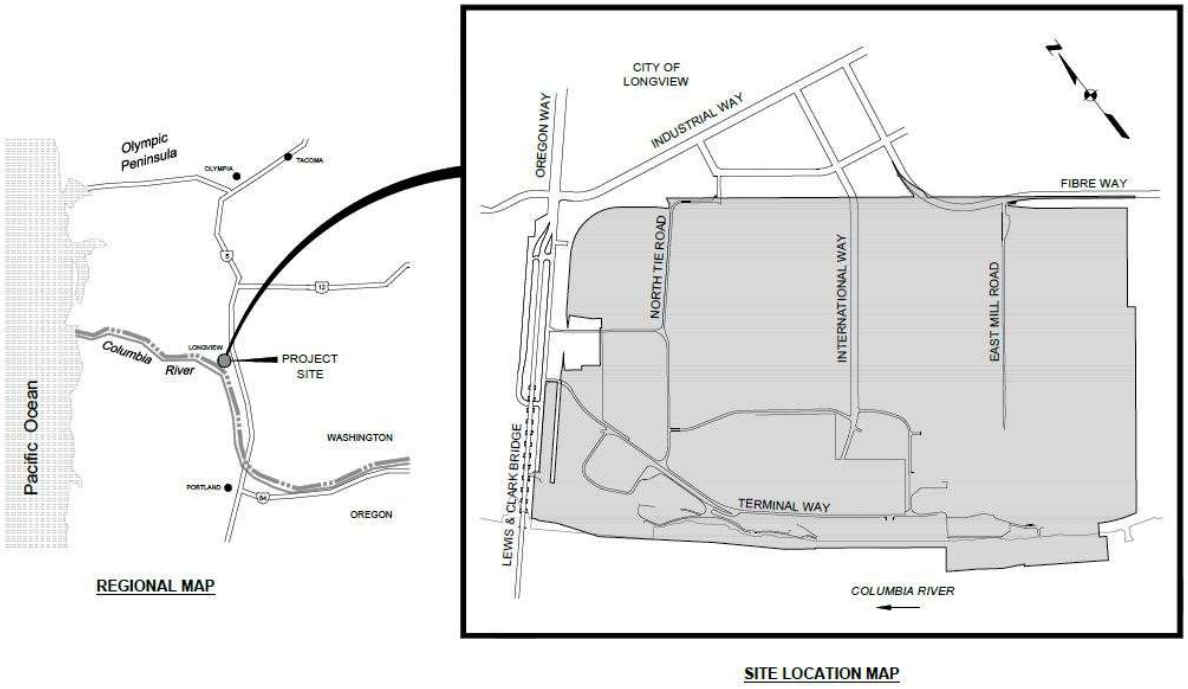

Figure 1.1: Port of Longview Site Map

Port properties consist of warehouses, industrial and commercial buildings, marine facilities, a grain terminal, several ship load-out facilities (berths), industrial wastewater collection and treatment facilities, and undeveloped land. Port operations include loading and unloading of containerized, breakbulk and bulk cargo to and from ocean shipping vessels, warehousing of marine related cargo, and transportation of cargo to and from domestic transportation facilities. The Port imports and exports various commodities, which have included calcined petroleum coke (CPC); bulk ores and minerals such as soda ash, bentonite clay; other bulk commodities

(OBC); agricultural products such as soya meal, distiller dried grains (DDG), and urea and other fertilizers; scrap metal; logs; wood pellets; windmill components, and miscellaneous breakbulk cargos. Operations at leased Port properties include steel manufacturing, a white bulk export facility, export CPC facility, and an export grain terminal.

1.4 Major Industrial Activities

The Port's eight berths and the types of cargo handled at each are described briefly in the following list. Note that there is no Berth 3 because its former area is now included in Berth 2.

Berth 1: Primarily not used but has been used for import and export of bulk commodities.

Berth 2: Multi-purpose ship loading facility for bulk materials, including bentonite clay, soda ash, potash, and other agricultural products.

Berth 4: Former grain handling facility; currently unused and available for redevelopment.

Berth 5: Dedicated export facility for the storage and transfer of CPC from railcars to ships.

Berth 6: Import and export facility for handling breakbulk cargo such as logs, and bulk commodities, with on-dock rail.

Berth 7: Import and export dry bulk and breakbulk handling facility with a portable hopper conveyor system and on-dock rail.

Ro-Ro: Direct break bulk to barge handling dock adjacent to Berth 7.

Berth 8: Multipurpose bulk cargo facility, including export logs.

Berth 9: Export grain terminal.

1.5 Wastewater Treatment and Discharge

The Port collects and treats wastewater and incidental stormwater generated at several of its berths during ship loading and unloading and associated activities, including washdown of conveyors and other equipment. Stormwater that is commingled with industrial wastewater is considered industrial wastewater. Permanent collection and conveyance systems are currently installed at Berth 2, Berth 5, Berth 7, and a portion of Berth 6. These systems are controlled by valves that can be set to direct wastewater to pretreatment plants or to discharge stormwater between cargo-handling activities.

The Berth 2 collection system is associated with the Berth 2 IWTP and Outfall 002. A Port tenant has a state waste discharge permit associated with Outfall 002. The Berth 2 collection system, Berth 2 IWTP, and Outfall 002 are not addressed further in this Manual. An expanded collection system servicing Berth 7 and a small portion of Berth 6 was completed in 2021. A stormwater collection and treatment system has been installed to service the remainder of Berth 6. Berth 5 and Berth 7 wastewaters are conveyed to the Berth 7 IWTP, which discharges to Outfall 004.

Outfall 004 discharges treated wastewater from the Berth 7 IWTP. Wastewater treated at the Berth 7 IWTP consists of wash water from the washdown of equipment and incidental stormwater collected in containment areas at Berths 5, 6, and 7. It also includes wastewater from a dewatering box containment area at Gear Locker B adjacent to and west of Warehouse 8. The far eastern section of the laydown area behind Berth 6/7 can also be contained and directed to the IWTP. The Berth 7 IWTP was designed to handle wastewater from the processing of multiple bulk commodities.

Wastewater is generally pretreated to remove solids, then discharged to the Three Rivers Regional Wastewater Plant (TRRWP), which is operated by the Three Rivers Regional Wastewater Authority (TRRWA). Schematic drawings of the collection and treatment systems are provided in Appendix B. Wastewater from Outfall 004 is conveyed through the County's sanitary sewer to the TRRWP via a line constructed in 2001 parallel to International Way.

Section 2: Personnel and Duties

The Port has three employees within the Environmental Services Department who are responsible for operation and maintenance (O&M) of the wastewater treatment facilities and regulatory compliance. Additionally, Port Maintenance Laborers assist with O&M of the treatment plant. The names, general duties, and contact information for these individuals are listed in Table 2.1. One person in each of the position listings in the table, except the Safety Program Manager position, is the minimum staffing adequate to operate and maintain the treatment processes and carry out compliance monitoring required by the permit. The Environmental Field Manager can fill the duties of the Safety Program Manager for the IWTP, if necessary.

Table 2.1: Port Staff Responsible for Wastewater Treatment Operations

Name	Position	Duties	Phone Number
Lisa Hendriksen	Director of Planning and Environmental Services	• Manages Port environmental programs • Assigns personnel for environmental management • Primary contact with regulatory agencies • Signs and transmits report to Ecology • Maintains environmental records • Coordinates spill response	(360) 425-3305
Sean Kelly	Environmental Field Manager	• Conducts Port environmental operations • Operates containment and treatment systems • Signs and transmits report to Ecology • Conducts monitoring and facility inspections • Prepares report forms • Coordinates sludge disposal • Coordinates/prepares updates of the manual • Spill response coordination and team member • Maintains Environmental Records • Coordinates employee training	(360) 425-3305
Keith Gardner	Environmental Technician	• Operates containment and treatment systems • Conducts monitoring and facility inspections • Prepares report forms • Provides information for updates to manual • Spill response team member	(360) 425-3305

Name	Position	Duties	Phone Number
Shain Shoemaker	Maintenance Laborer	• Conducts cleaning of containment conveyances, tanks, and pond • Operates containment in coordination with Environmental Technician and Field Manager • Spill response team member	(360) 425-3305
Tim Karnoski	Safety Program Manager	• Conducts safety audits • Implements Port safety guidelines and programs	(360) 425-3305

Section 3: Monitoring

The current Permit requires monitoring of the daily discharge volume at the outfall and monitoring of specified pollutant parameters twice per month. Some of the pollutant parameters that are required to be monitored do not have effluent limitations. Wastewaters associated with multiple ship loading and unloading operations are combined. The Port collects composite samples prior to discharge as described in Section 3.1. The Port has installed an automatic flow-proportional sampler at Outfall 004, which is described in Section 10.9.18 and Appendix G in the *Sampler* section. The current Permit also requires one sample to be analyzed for cyanide, total phenolic compounds, total toxic organics (TTO), and certain priority pollutants, once during the 5-year Permit cycle.

3.1 Sampling Procedures

The steps required for sampling Port Outfall 004 are as follows:

1. Have an adequate supply of appropriate bottles and chain-of-custody (COC) forms provided by the analytical laboratory.
2. Fill out a Log Sheet for every day there is wastewater activity at the IWTP.
3. A pre-discharge sample can be collected to help ensure Permit compliance. However, sampling during discharge must still be conducted, per the Permit.
4. Sampling is typically done twice a month, approximately 2 weeks apart. Samples are collected more frequently if the operator observes or suspects a change in discharge effluent quality.
5. Configure the automatic sampler to take time-based or flow-based samples to form a composite sample for analysis. See the quick reference guides and manuals in Appendix G, under the *Sampler* tab.
6. Carefully transfer the composite sample to laboratory bottles.
    a. Completely fill out bottle labels when sampling. Do not rinse the bottles before using. Do not reuse bottles.
    b. If samples are stored at the Port before delivery to the laboratory, store them in a refrigerator.
    c. Put samples in a cooler with ice packs (gel packs) for delivery to laboratory or pickup by laboratory courier service.
    d. Fill out COC form and analysis request form to accompany samples.
7. Oil & Grease samples are grab samples collected with an amber glass bottle provided by the laboratory.
8. pH samples are grab samples collected in a clean bottle and tested on site with a pH meter that meets the Permit standards listed in Table 3.1 of this manual. Record these results on the Log Sheet for Berth 7 IWTP. Transfer this information to the “Wastewater Discharge Volumes and Analytical Results” form.

9. When the test results are received from the laboratory, record these results on the "Wastewater Discharge Volumes and Analytical Results" form. The Port keeps this form as an electronic file.
10. Record discharge flow by noting the totalizer reading on the electronic flow meter (FQI-182) every workday that Berth 7 IWTP is running. Record these results on the Log Sheet for Berth 7 IWTP. Transfer this information to the "Wastewater Discharge Volumes and Analytical Results" form. Submitted discharge monitoring reports (DMRs) and laboratory reports are also kept digitally.

3.2 Resampling

Resampling is conducted if the analytical results of wastewater monitoring indicate wastewater characteristics that are not in compliance with discharge requirements. The steps for resampling are as follows:

1. If discharging, stop discharging.
2. Reprocess the water to attempt to bring it within compliance.
3. Sample and analyze the wastewater again.

3.3 Analytical Procedures

All sampling and analytical methods used to meet the monitoring requirements in the Permit shall conform to the Guidelines Establishing Test Procedures for the Analysis of Pollutants contained in 40 Code of Federal Regulations (CFR) 136. The laboratory used for testing must be registered or accredited under the provisions of the Accreditation of Environmental Laboratories, Chapter 173-50 Washington Administrative Code (WAC). The methods required for all pollutants monitored at Port outfalls are listed in Table 3.1. A complete list of recommended analytical protocols can be found in the Appendix A of the Permit, which is included in Appendix A of this manual.

Table 3.1: Approved Analytical Methods for Contaminants Monitored at Port Outfalls

Parameter	Recommended Analytical Protocol
TSS (mg/L)	SM2540-D
Oil and grease (mg/L)	1664A
Ammonia (lbs/day)	SM4500-NH3-GH
Ammonia (mg/L)	SM4500-NH3-GH
Copper (mg/L)	200.8
Zinc (mg/L)	200.8
pH	SM4500-H^+B

Abbreviations:

TSS	Total Suspended Solids
mg/L	milligrams per liter
lbs/day	pounds per day

Section 4: Reporting and Recordkeeping

4.1 Reporting to Ecology

Ecology requires monitoring data to be submitted electronically on a monthly basis through SAW (Secure Access Washington) and the Water Quality Permitting Portal (WQWebPortal) on a DMR provided form through the web site. Specific instructions regarding filling out DMRs are provided in S3. REPORTING AND RECORDING REQUIREMENTS, parts A through E of the permit, The DMRs, laboratory monitoring results, and sample COCs are kept on electronic file in the Port's main office.

Use data recorded in the Port's Berth 7 Effluent Log Sheet (hard file), Wastewater Discharge Volumes and Analytical Results (e-file), and laboratory analytical reports to complete the DMR online.

Monitoring results must be submitted no later than the 15th day of the month following the completed monitoring period.

Reports or information submitted to Ecology shall be signed and certified by the Director of Planning and Environmental Services or an authorized representative as listed on the environmental personnel duty roster.

The Port reports the storage pond sediment depth at the inlet on the O&M Manual update annually.

4.2 Recordkeeping

All files, forms, and records associated with the operations of the Port's wastewater treatment facility are maintained in the Port's Environmental Office by the Director of Planning and Environmental Services and the Environmental Field Manager, and in the Maintenance Yard Office by the Environmental Technician, and/or in digital format located on the Port's Environmental Network Drive.

Port of Longview discharge compliance records include the following:

- Port Environmental Personnel Duty Roster
- Berth 7 (Outfall 004) Wastewater Discharge Volumes and Analytical Results
- Berth 7 (Outfall 004) Daily/Weekly Inspection – Sumps & IWTP
- Berth 7 (Oufall 004) Monthly, Quarterly, semi-Annual Inspection & Maintenance
- Berth 7 (Outfall 004) Maintenance Record
- Berth 7 (Outfall 004) Log Sheet
- Sludge and Solids Disposal Record
- Spill Report Form – All spills are kept in a digital file (Excel)

- Ecology Discharge Monitoring Report Copy of Record and Ecology cover letter.

These forms and reports, as well as analytical reports, calibration records (including flow meter verification tests), documents, and correspondence, are maintained by the Port for at least 3 years. These records may be maintained longer at the Port's discretion. Records which are not submitted to Ecology are available for viewing by Ecology staff upon request.

Examples of forms used for recordkeeping by Port staff are attached in Appendix C. Forms are maintained electronically in Excel. Detailed sampling procedures are outlined in Section 3.1.

Section 5: Permit Noncompliance Notification

Three operating conditions require notification to Ecology and the receiving publicly-owned treatment works (POTW), as identified in the Permit.

- Bypasses
- Upsets
- Permit noncompliance.

The Permit has specific requirements that define the types of events and notification requirements and should be reviewed to establish these requirements.

Anticipated bypasses require prior notice in writing to Ecology at least 30 days prior to the date of the bypass.

Unavoidable bypasses and upsets require Ecology and the TRRWP to be notified immediately. A detailed written report shall also be provided within 5 days, unless requested earlier by Ecology.

Any bypass is an unlikely situation for the IWTP due to its influent storage capacity and treatment equipment redundancies. See S4.A. of the permit for bypass procedures.

Permit noncompliance events require Ecology be immediately notified of the failure to comply and require the Port to take immediate action to stop, contain, and cleanup unauthorized discharges or otherwise stop the violation and correct the problem. Repeat sampling is also required, and the repeat sampling results must be sent to Ecology within 30 days.

See S3.F-J of the Permit for instructions on reporting violations and instances of non-compliance.

Section 6: Safety

6.1 Accident Prevention Program

The Port has Accident Prevention Programs (APP) managed by the Safety Program Manager. These programs and their associated training and forms apply to the IWTP. Programs and forms are available on the Port's Safety Network Drive. Below are safety topics of particular interest to the IWTP.

6.2 Chemical Hazards

All workers exposed to chemical hazards require annual training under the Worker "Right to Understand" requirements of the Global Harmonized System (GHS) per federal regulation including 29 CFR 1910 and State of Washington regulations including WAC Chapter 296-62. The written training program for this facility is on file at the Port. The safety data sheets (SDS) for the wastewater treatment chemicals, the bulk commodities, and other chemicals on site can be accessed through MSDS Online, and a chemical inventory of the Port is kept on electronic file by the Safety Program Manager. IWTP personnel must provide an SDS for any new chemical being considered for use in the IWTP for review with the Safety Program Manager.

Training is provided to Port employees on safe chemical handling, SDS review, and spill prevention, control, and response procedures.

A safety shower and emergency eyewash station are provided in the IWTP building in case of chemical contact.

6.3 Confined Spaces

All tanks, vaults, lift stations, and other enclosed structures are considered confined spaces and may also be Permit-required confined spaces if they contain hazards such as electrical, hazardous atmosphere, and others per WAC Chapter 296-809 Section 20002. In the event that Port personnel need to enter these structures, the entry procedures must conform to the requirements of WAC Chapter 296-809 and the Port's Confined Space program (WP-SFT-004). Training on this program is provided to all Port personnel who are involved in confined space entry.

6.4 Personal Protective Equipment

All Port staff and visitors to the IWTPs are required to wear sturdy close-toed shoes and high-visibility vests or jackets while onsite. In addition, hard hats should be worn as needed or in any construction areas. Safety glasses should be worn at all times. Port staff are trained regarding the Port's Personal Protective Equipment (PPE) policy (WP-SFT-007).

6.5 Contractor Safety

The Port's Contractor Safety Program (WP-SFT-011) enables Port staff sponsoring contractors who work in the IWTP to ensure the contractor has had the Port of Longview safety requirements covered with them and a signed Contractor Safety Checklist on file before the first day of work.

Section 7: Spill Control Plan

7.1 Spill Prevention and Response

Every possible effort must be made to prevent process spills and unauthorized discharges from the wastewater treatment facilities covered under the Permit from entering groundwater, surface water, storm drains, or the sanitary sewer.

All bulk commodities are to be handled within designated containment areas. All sludge is to be handled on the pad at the sludge tanks, Gear Locker B, and inside Warehouse 8 within designated truck loading areas. Continuous surveillance must be provided during sludge handling. All treatment chemical containers must be handled within designated unloading areas and stored inside the treatment buildings. All treatment equipment, tanks, pipelines, pumps, containment paving, catch basins, lift stations, and spill control equipment must be routinely inspected for integrity.

Oil or hazardous material spills in subbasins where industrial wastewater is being collected at the Berths can be contained in the pump station sump or directed to a specific tank at the IWTP for containment, treatment or proper transport and disposal as appropriate for the spilled materials. Chemical tanks at the plant have secondary containment for spill control. Spills inside the Berth 7 IWTP building would be collected in the building sump and pumped back to designated influent tanks.

There is a spill kit located in the IWTP that includes response materials, such as absorbents, selected to respond to chemical spills in the IWTP. Larger spill kits are located in or near industrial wastewater containment areas: near Berth 7 above the roll-on roll-off (RoRo) dock next the Berth 8 checker shack, at the upriver waterside corner of Transit Shed 6, and upland of Berth 5 across Terminal Way. The Port maintains additional spill kits at locations outside of the IWTP collection system. Additional spill kit locations are marked on the Water and Spill Response figure in Appendix D.

Spill prevention and response materials are provided in Appendix D:

- Emergency Spill Cleanup Plan with Port of Longview Spill Response Contacts
- Water and Spill Response Figure

Appendix D contains spill response instructions and spill response contact numbers for Port personnel, agencies to notify, and the Port's spill contractor. Operator training to implement the spill prevention and response plan is conducted annually and includes review of the spill control plan.

Oil and petroleum products, chemicals, and other materials used in the containment and collection areas may include gasoline, diesel, oils, hydraulic oil, gear oil, grease, antifreeze, and windshield washer fluid. These chemicals may be stored in the B7 laydown or Transit Shed 6 in the crane locker or PASHA gear lockers and are found in mobile equipment. The following have

been identified as locations where materials are used and/or stored on-site, which may become pollutants or cause pollution upon reaching state's waters in the event of a spill:

- Transformer #7 at Berth 5; Transformer #8 at Berth 7; (mineral oils)
- Mobil Fuel truck (gasoline, diesel, oil)
- Liebherr Cranes (diesel, hydraulic oil)
- Locomotives (diesel, oils, waste oils)
- Motive equipment such as loaders, and Port vehicles (gasoline, diesel, oil, hydraulic oil)
- Mobile equipment such as conveyors (oils)

Appendix E includes a list of the chemicals used in the IWTP and a map of the locations of these chemicals in the IWTP.

7.2 Spill Prevention and Response Training

The Director of Planning & Environmental Services and/or Environmental Field Manager are responsible for ensuring that spill prevention, awareness, and response training is provided to all employees involved with handling petroleum products, chemicals, and other potential pollutants to state's waters. Intermediate training sessions are conducted for appropriate personnel when a process or procedure changes, and for new employees who handle such materials.

The Director of Planning & Environmental Services and/or Environmental Field Manager reviews employee job descriptions to ensure oil handling personnel are trained at least once a year.

Specific individuals are designated and trained to inspect material storage areas and Port-wide for spills and potential pollution issues and are also trained on inspection procedures, frequency of inspections, record keeping requirements, and procedures for reporting and correcting detected problems.

In addition, the Occupational Safety and Health Act requires specific training for spill response personnel. The Director of Planning & Environmental Services and/or Environmental Field Manager, or other spill response personnel, should receive Hazardous Material Communication (Right-to-Know) training in accordance with 29 CFR 1910.1200.

Section 8: Solid Waste Control Plan

The Port handles and disposes of all solid waste materials from the wastewater facility covered by the Permit to prevent their entry into ground or surface water. These waste materials are properly disposed of as waste (non-dangerous and dangerous).

The Port's solid waste control plan is described in Table 8.1. The table includes the description, source, and handling and disposal methods for the solid wastes. The quantity of solid wastes normally generated varies significantly from year to year based on the number of ship loading and unloading operations conducted.

The Port keeps a record of the disposal of solid wastes. The disposal dates and quantities are recorded on the sludge disposal record form.

Dangerous wastes are classified according to the State Dangerous Waste Regulations (WAC Chapter 173-303).

Solid wastes are handled with methods and in locations that any generated filtrates and/or leachates are captured and returned to the IWTP as influent. If filtrates or leachates are suspected of being dangerous wastes, alternative measures to capture, transport and dispose will be used. No filtrates or leachates are currently dangerous wastes.

Table 8.1: Solid Waste Control Plan

Description	Source	Handling and Disposal Methods
Solid Waste	IWTP operations	Waste designation work, including laboratory analysis when necessary, has shown solid wastes associated with current operating of the Port's IWTP to designate as non-dangerous per WAC 173-303. If commodities are handled that are suspected of having the potential to change these designations, then designation procedures will be conducted, including analytical work, if necessary, per WAC 173-303.
Effluent Treatment Sludge (Clarifier Sludge)	Berth 7 IWTP System Sludge tanks 126, 141	Alternative method: Sludge is pumped to a dewater drop box or dewatering supersacks [1 cubic yard (yd^3) sacks] where it is allowed to dewater. Coagulants and Flocculants can be added to improve sludge dewatering. Filtrates and leachates are returned to the IWTP system.
Accumulated sludge in Wastewater Storage Tanks and Sludge Tanks	Berth 7 IWTP Tanks 100-120 Sludge tanks 126, 141	Sludges are removed, usually by vactor truck, and transferred to a dewatering box. Solids are often transferred from dewater box to supersacks (1 yd^3 sacks) for further drying. Filtrates and leachates are directed to Berth 7 IWTP system. Sludge is allowed to dewater and dry until it can pass the "paint filter" test. It is then transported to the Cowlitz County Landfill.

Description	Source	Handling and Disposal Methods
Accumulated sludge in pond	Pond	As needed (approximately every 2 years) the pond level is drawn down during summer (dry weather) months and inlet flows directed to tanks instead of the pond. Sludge in the bottom of the pond is allowed to dry, then swept into piles, then collected and placed in drop boxes for transport to the Cowlitz County Landfill.
Catch basin and lift station solids	Berth 7 Containment and IWTP catch basins and lift stations (sumps)	Same as Wastewater Storage Tanks, above
Dangerous Waste	Currently None	Proper storage, transportation and disposal are arranged for based on designation per WAC 173-303. Clean Harbors can be utilized through *Washington State Contract – Hazardous Waste Handling & Disposal Services* to assist in waste designation, transport, and disposal. Clean Harbors designation, transport, and disposal can be arranged online and/or with assistance from their customer support. These contacts are maintained by the Environmental Field Manager and the Contracts Manager. Transporter Name: Clean Harbors Environmental Services Address: 12402 SE Jennifer St., Suite 160 City: Clackamas, OR 97015-9057 Telephone number: (503) 785-0404 Website Address: www.cleanharbors.com Other certified handlers of dangerous waste may also be used. Waste that disignates as WT02, *special waste*, can often be disposed of at the Cowlitz County Landfill when proper arrangements are made. Cowlitz County Public Works Office, (360)-577-3030.
Water treatment filters Non-dangerous waste	Berth 7 IWTP	Disposed of as municipal solid waste.
Water treatment filters Dangerous waste	None currently	Follow dangerous waste procedures.

Description	Source	Handling and Disposal Methods
The following companies can transport non-hazardous (non-dangerous) waste for the Port. Other transporters are also available. Transporter: Waste Control Address: 1150 3rd Avenue City: Longview, WA 98632 Telephone: (360) 425-4302 OR Transporter: Tribeca Address: 1415 Port Way City: Woodland, WA 98674 Telephone: (360) 225-9094 OR Transporter Name: CCS, a division of PNE Corp Address: 55 International Way City: Longview, WA 98632 Telephone number: (360) 423-6316		

Section 9: Emergency Plans and Procedures

9.1 Emergency Plans and Procedures

The Port maintains a comprehensive emergency response plan (ERP) which includes procedures for various types of emergencies including fires, natural disasters, bomb threats, and spills. The Port updates the ERP as required and stores an electronic copy on the server, as well as a hard copy in the Department of Planning and Environmental.

9.2 Emergency Procedures for Plant Shutdown

In the event of a wastewater system upset, spill, failure, or demand by TRRWA that requires the plant to be shut down, the operator can shut down plant pumps and equipment without need for additional cleanup because sufficient storage is included onsite in the inlet tanks and storage pond to contain wastewater at the IWTP site until treatment is restored.

To shut down the plant in an emergency when equipment is operating in “Auto” mode as determined by the equipment hand switch, the operator can press one of the four emergency stop (E-stop) switches described in Section 10.9.26.9, which will terminate operation of all process equipment. When equipment is “Manual” mode and running under operator supervision, the operator must shut down each piece of equipment separately.

Section 10: Berth 7 IWTP Design and Operation

10.1 Berth 7 IWTP Plant Description

Containment is a term used to mean the collection and conveyance of wastewater and incidental stormwater to an IWTP for pretreatment, as opposed to discharging the flows as stormwater. The Berth 7 IWTP pretreats water from collection systems on Berths 5, Berth 7, portions of Berths 6, and Gear Locker B. Berth 7 IWTP effluent is discharged through Outfall 004 to the County's sanitary sewer where it is conveyed, initially via a line constructed in 2001 parallel to International Way, to the TRRWP. The Berth 7 IWTP includes provisions to remove TSS and adjust pH prior to discharge. Berths 5, 6, and 7 and Gear Locker B, and the Berth 7 IWTP are described in detail in the following sections.

A list of equipment in the IWTP and vendor names and contact information are provided in Appendix F. Equipment manuals, brochures, catalogs, and related detailed information is provided in Appendix G.

10.2 Wastewater Collection and Conveyance

The Port has upgraded the stormwater infrastructure at Berths 6 and 7 to separate and manage stormwater and industrial wastewater generated at both berths; construction was completed in 2021. The intent of the improvements is to allow the Port to contain and treat wastewater generated while industrial activity is occurring in selected areas on Berths 6 and 7 and to divert stormwater runoff collected from areas when industrial activity is not occurring to the stormwater conveyance system.

Much of the existing stormwater system and piping at Berths 6 and 7 were demolished and replaced. New infrastructure includes stormwater water quality flow diversion manholes, several new catch basins, and approximately 4,900 linear feet of storm drain piping, including collection inlets on the docks and a suspended gravity pipe conveyance system located on the underside of the docks. Berths 6 and 7 were separated into subbasins that can be separately contained and collected. Valves were installed at the berths in most subbasins for selection of stormwater or industrial wastewater.

The existing industrial wastewater sump and submersible pump station located at Berth 7 was retrofit with new submersible pumps and is used to pump industrial wastewater to the pond and tanks at the Berth 7 IWTP through the existing 4- and 6-inch high density polyethylene (HDPE) lines. A new lift station and valve vault and approximately 400 linear feet of 6-inch force main was installed in the vicinity of the existing industrial wastewater pump station to pump stormwater up to the water quality flow rate to an existing stormwater ditch where it will flow through the Port's stormwater system to the Finger Slough retention pond.

Containment, collection, and conveyance systems that convey wastewater to the Berth 7 IWTP are described in more detail in the following sections.

10.2.1 Berth 5

Berth 5 is an approximately 3.2-acre export facility for storage and transfer of CPC from railcars to ships. The facility includes two enclosed rail dump pits, five storage silos, and an enclosed conveyor system and ship-loading equipment. Wastewater from the upland facility and dock containment area are conveyed to a sump and pump station, then pumped to conveyance piping under the Berth 6 dock and sent directly to the storage pond at Berth 7 IWTP. However, Berth 5 wastewater can also be pumped to tank T-120 or T-110. Tank T-120 is baffled and can discharge from an outlet pipe at mid-height of the tank. This allows more suspended solids in the influent to settle in the tank instead of the pond, if desired.

10.2.2 Berth 6

Berth 6 is primarily used for import and export of break bulk cargo and logs and for warehousing of bulk materials. Berth 6 consists of approximately 33 acres of open storage laydown, approximately 3.0 acres of docks, and an approximately 2.9 acre covered building called Transit Shed 6, which is at the southern end of Berth 6. The transit shed is used for storage and transfer of bulk commodities, vehicle parking, and storage of other materials. Dock and backup surfaces upriver of Transit Shed 6 are tied into the Berth 7 collection system and can be sent to the Berth 7 IWTP. In 2021, completion of a Berth 7 collection system expansion incorporated the dock in front of the upriver, riverside door of Transit Shed 6 into the collection system. The collection system is illustrated in the Berth 7 Containment drawings in Appendix B. The collection systems are referred to as containment systems when they direct flows as wastewater to the IWTP versus into stormwater conveyance.

10.2.3 Berth 7

Originally developed in the late 1960s to handle containers, Berth 7 has been converted to transfer bulk imports and exports, including urea, CPC, iron ores, and occasionally other miscellaneous bulk cargo. The dock area of Berth 7 is approximately 2.5 acres, and the upland area of Berth 7 is approximately 3.3 acres. Drain holes collect and direct stormwater and wastewater on the Berth 7 dock to a piped system below the dock that includes valves to direct flows to decision manholes where valves are configured to direct flows as stormwater to a pump station or as wastewater to a separate pump station. As stormwater, flows will be conveyed inland to existing stormwater ditches. A stormwater quality flow bypass will allow discharge to the river during high flow events when there is no industrial activity at Berth 7. As wastewater, flows will be conveyed to the Berth 7 IWTP. Similarly, catch basins and in-ground conveyances at the upland area of Berth 7 convey flows to decision manholes. Valves are configured at these decision manholes to direct flows as stormwater inland to a stormwater ditch or as wastewater to a sump at the Berth 7 IWTP.

10.2.4 Dewater Box Pad at Gear Locker B by Warehouse 8

Gear Locker B refers to an area west of and adjacent to Warehouse 8. It is used for collecting filtrate from dewatering drop boxes. Wastewater from the Gear Locker B area is collected and directed to the sump at the Berth 7 IWTP.

10.2.5 Wastewater Storage Pond

An HDPE-lined storage pond was constructed and put on-line in the fourth quarter of 2015 at the Berth 7 IWTP. The pond includes an inlet, an ecology block wall that is used to divide the pond area and increase hydraulic residence time, outlet piping to a pump station with self-priming pumps, and gravity piping from existing tanks to the pond inlet. The pond pumps can pump to the existing IWTP or tanks. The pond was designed to provide additional storage capacity and settling prior to treatment and was sized to match the permitted and actual current capacity of the IWTP. The Port uses an automatic flow-proportional sampler at Outfall 004. Testing has shown effluent quality in the storage pond typically meets permit limits. The Port may request approval from Ecology to allow direct discharge from the pond to Outfall 004 with appropriate monitoring.

10.3 Major Treatment Processes

The major process equipment in the Berth 7 IWTP includes an approximately 1.5-million-gallon storage pond that provides settling, influent tanks, a cavitation air flotation (CAF) unit, two IPCs, and two duplex bag filters. The storage pond includes an ecology block wall used to divide the pond area to increase hydraulic residence time and provide additional settling and increases IWTP capacity and operational efficiency. The CAF unit was designed to treat CPC wastewater or other wastes with floatable solids but was not used by the Port. The IPCs have been used by the Port to remove TSS from wastewater associated with various cargos, including calcined coke. The pond is now the primary means by which solids are removed from the influent water. Coagulants are rarely used at the clarifiers. The duplex bag filters are used on an “as needed” basis for additional solids removal; but have not been used since the pond was put on-line. Very little sludge is generated at the IPCs since the pond was put on-line. The sludge is pumped to conical shaped tanks for further settling. Sludge from these tanks is then pumped to a dewatering box or 1-cubic yard dewatering bags for further thickening of the sludge, sometimes aided by the addition of a coagulant and/or flocculant. Filtrate from the dewatering box or bags and supernatant from the conical tanks is returned to the pond or influent tanks. The dewatered sludge is hauled for proper disposal off-site. When the sediment depth is 18 inches or greater, the Port cleans out the sediment from the pond. The pond is drawn down to empty approximately every 2 years and the sludge allowed to dry before being collected and disposed of properly.

The plant also has coagulant and polymer dosing systems and a pH neutralization system. The dosing systems add coagulant and flocculant to the clarifiers to coagulate solids and accelerate settling. Aluminum sulfate (alum) and NALCO 71257, diluted to a 10 percent (%) concentration, are historically the chemicals typically used in the Berth 7 IWTP dosing systems; but currently they are rarely used. An anti-foaming agent can also be added via the dosing systems to reduce the foaming associated with detergents or other chemicals that might enter the waste stream. The pH neutralization system can, as required, adjust the water’s pH to increase precipitation of solids and/or return the water to within the regulatory pH range. The pH system uses sulfuric acid to lower the water’s pH and caustic (sodium hydroxide) to raise the water’s pH.

10.4 Flow Pattern and Plant Operation

Industrial wastewater and incidental stormwater is collected at Berths 5, 6, and 7 and Gear Locker B and pumped to the Berth 7 IWTP for treatment, where it is collected in influent tanks or the storage pond. The influent tanks serve as temporary storage where the wastewater's characteristics can be assessed prior to treatment. From the tanks, wastewater can follow one of three paths: 1) it can flow by gravity directly to the storage pond; 2) it can be pumped to the IWTP for pretreatment prior to storage in the pond; or 3) it can be pumped to the IWTP for treatment and discharged to sanitary sewer. Wastewater from Berth 5 is typically pumped to tank T-120 or the storage pond. See 10.2.1 Berth 5 for possible flow paths of this water. Wastewater from the pond can be pumped to the IWTP for treatment prior to discharge, or back to the tanks. This flexibility facilitates assessment of the pollutant characteristics of wastewater generated during specific cargo loading operations and the application of appropriate unit processes to target specific pollutants. Because treatment operations at the plant do not rely on biological operation when loading is less than anticipated, it is less work for the Port. The Port may seek Ecology approval and implement appropriate monitoring prior to discharging directly from the storage pond. Pond effluent is typically within discharge pollutant limits prior to passing through the clarifiers. Discharging directly from the pond would reduce energy consumption and equipment maintenance and wear.

The Berth 7 IWTP treatment process is generally settling in the storage pond. Pond effluent then passes through an IPC, where coagulant and flocculant addition, pH adjustment and mixing, and clarification can be used, if needed. This can be followed by filtration through bag filters. All treatment processes are not required for all wastewater streams to meet effluent limitations. The plant has two parallel treatment trains, in addition to the unused CAF system. After treatment, water is pumped to outlet storage tanks where it is held for discharge to Outlet 004 and the sanitary sewer. Tank discharge is sampled for permit compliance. A process flow diagram for the Berth 7 IWTP is shown in Appendix B.

10.5 Expected Efficiency

To meet the Permit limits, the Berth 7 IWTP was designed to provide removal of suspended solids and adjustment of pH to within the acceptable range. Oil, grease, and zinc have not historically been a problem at this site, so no treatment process is included that specifically targets these contaminants. However, the treatment processes that target suspended solids also provide removal of non-emulsified oil and grease and particulate zinc. Ammonia is only a concern if the Port is treating a known ammonia or nitrogen bearing waste stream, such as urea.

Table 10.1 presents an effluent wastewater characterization calculated using DMR data downloaded from Ecology's online database for the period from 1 December 2011 through 31 August 2020. The Berth 7 IWTP was generally in compliance with the Permit during this time period, exceeding the limit for flow once in December 2015, and for zinc three times in November 2012, April 2015, and July 2015. Ecology responded to these exceedances with informal action in the form of a letter to the Port. The maximum daily flow to Outfall 004 has triggered a warning in Ecology's permit database for exceeding the limit 15 times between December 2011 and March 2014, but the maximum daily flow has been less than the maximum flow permitted to accommodate excessive stormwater and is, therefore, not an exceedance of a

permit limit or violation. The Berth 7 IWTP has been in compliance with the permit since August 2020, including since its reissuance and modification in June and August 2021, respectively. The Berth 7 IWTP is expected to continue to produce an effluent quality that complies with the Permit.

Table 10.1: Outfall 004 Effluent Wastewater Characterization[a]

Parameter	Maximum	Average
Flow (gpd, daily maximum)	100,000	22,789
TSS (mg/L)	123	10.93
Ammonia (lbs/day)	123	1.66
Oil and grease (mg/L)	7.64	4.19
pH	9.0	5.5 – 9.0 [b]
Zinc (mg/L)	5.4	0.46

Notes:

(a) As reported in Table 2: Wastewater Characterization in the Fact Sheet for Port of Longview State Waste Discharge Permit ST 6081, for the period from 1 December 2011 through 31 August 2020. An error in the reported maximum flow has been corrected.
(b) The minimum and maximum values are reported for pH..

10.6 Principle Design Criteria

As mentioned previously, major process equipment at the Berth 7 IWTP includes a storage (settling) pond two IPC units, a CAF system, and a bag filtration system. Major design criteria for clarifiers and bag filters are summarized in Table 10.2 and discussed below.

Table 10.2: Design Criteria for Major Process Equipment at the Berth 7 IWTP

Equipment	Manufacturer	Model # / Serial #	Capacities and Flow Rates [a]	Design Basis[b]
Inclined Plate Clarifier (T-125)	Andco Environmental Processes, Inc.	G050 / 13126	~254 ft^3 ~1,900 gallons Typical: 15-25 gpm Max: 60 gpm	0.062 gpm/ft^2 at 20 gpm 0.124 gpm/ft^2 at 40 gpm 0.186 gpm/ft^2 at 60 gpm
Inclined Plate Clarifier (T-140)	Andco Environmental Processes, Inc.	G020 / 13126[c]	~114 ft^3 ~ 852 gallons Typical: 15-25 gpm Max: 60 gpm	0.150 gpm/ft^2 at 20 gpm 0.300 gpm/ft^2 at 40 gpm 0.450 gpm/ft^2 at 60 gpm

Equipment	Manufacturer	Model # / Serial #	Capacities and Flow Rates [(a)]	Design Basis[(b)]
Bag Filters (F-105 A/B & F-110 A/B)	Ronningen-Petter Products	D-CST-224-CS (SE filters) / A13825, A13809, A13822, A13821	Total Surface Area: 1,020 in^2 In parallel: 225 gpm	5.7 gpm/ft^2 at 40 gpm 31.8 gpm/ft^2 at 225 gpm
Cavitation Air Flotation Unit (T-135)	HydroCal	CAFBA-10 / HCAF2147A1198 Aerator: HA166MG1198	~39 ft^2 x 4-foot depth ~156 ft^3 ~1,170 gallons	0.51 gpm/ft^2 at 20 gpm 1.02 gpm /ft^2 at 40 gpm

Notes:

(a) Flowrates are estimated based on discussions with operators and vendors. Historically, the IWTP has operated between approximately 15 and 25 gallons per minute (gpm).
(b) Refer to Sections 10.6.1 through 10.6.3 for discussion of design loading calculations. 40 gpm is the assumed high flow rate used for the settling calculations.
(c) Serial numbers were obtained from manufacturer's nameplates affixed to the equipment and are the same for both clarifiers.

Abbreviations:

gpm/ft^2 = gallons per minute per square foot
ft^3 = cubic feet

10.6.1 Inclined Plate Clarifiers

The two IPCs (T-125 and T-140) make up the primary treatment process for the removal of solids at the Berth 7 IWTP. The manufacturer of the two IPCs (Andco Environmental Processes) is no longer in business. However, based on a similar (size and projected area) IPC (model # 560/60) produced by Water & Wastewater Equipment Co., T-125 and T-140 are expected to reduce TSS by 95% at a hydraulic loading of 0.2 gallons per minute per square foot (gpm/ft^2). Another manufacturer estimates that, at a design loading of 0.2 gpm/ft^2, a typical IPC can treat wastewater with an influent TSS load of 1,000 to 1,700 mg/L. When TSS loading is less than design criteria, the settling to meet permit requirements occurs in the storage pond.

Historically, the IWTP has operated between approximately 15 and 25 gpm. At a design flow rate of 40 gpm, which was the high rate used for sizing of the storage pond and assessment of the IWTP's treatment capability, the hydraulic loading of the IPCs is 0.124 gpm/ft^2 for T-125 and 0.300 gpm/ft^2 for T-140. At a 20 gpm flow rate, IPC T-140 has a hydraulic loading of 0.150 gpm/ft^2. On the basis of the calculated design hydraulic loadings, both clarifiers are capable of reducing TSS expected in influent wastewater to meet permit requirements and would also be suitable for removal of precipitated heavy metals with chemical addition because overflow rates are estimated at less than 0.2 gpm/ft^2 at typical flow rates.

10.6.2 Cavitation Air Flotation Unit (not currently in use)

Original design parameters for the CAF unit are summarized in Table 10.3. The original system design was based on the conditions and parameters in Table 10.2 and on the expectation that the Port would continue to handle large volumes of CPC and other cargo with floatable solids. However, because the two IPCs have been found to provide adequate treatment of influent solids, the CAF is not currently in use, and future operation is not anticipated.

Table 10.3: Original Process Design Parameters for CAF

Parameter	Influent Peak Design Conditions	Influent Minimum Design Conditions	Effluent Performance Standards
Water Temperature	100ºF	35ºF	Not Applicable
Ambient Air Temperature	105ºF	35ºF	Not Applicable
Process Flow Rate	30 gpm	30 gpm	Not Applicable
Fats, Oils and Greases (FOG)	200 mg/L	200 mg/L	<50 mg/L[(b)]
TSS	5,000 – 8,000 mg/L[(a)]	5,000 – 8,000 mg/L[(a)]	<200 mg/L[(b)]
pH	12 SU	7 SU	N/A

Notes:

(a) At TSS loading of 20,000 mg/L, the unit should achieve the <200 mg/L requirement. It will be necessary to increase the chemical program and it may be necessary to increase the air-input volume by increasing the speed of the aerator from its standard setting.
(b) The effluent discharge from the CAF system shall meet or exceed the required performance standards.

Abbreviations:

ºF degrees Fahrenheit
N/A not applicable
SU standard unit

According to the manufacturer of the CAF (HydroCal), the removal of solids by the CAF system is largely based on the quality (the solids concentration) of the influent and the type and quantity of polymer/chemical added; solids removal is not highly dependent on particle size, temperature, or flowrate. Design sizing information could not be located specifically for the CAF; however, design parameters for dissolved air flotation systems which rely on the same removal mechanism suggest that the CAF, like the IPCs, is conservatively sized for the expected flow rates and influent concentrations.

10.6.3 Bag Filtration System

The bag filtration system is used when needed to further polish IPC effluent to meet discharge requirements. Currently, 25-micrometer (µm) polyester bags (Item: PE S 25 P 2 S H) are used, but plant staff has also used 50 µm bags to reduce the frequency of replacement. Solids removal is primarily based on the size of filter bag used (i.e., 25 µm or 50 µm) but can also be affected by flowrate and pressure. The manufacturer rated each duplex bag filter for continuous service up to 440 gpm, but the vendor, JB Systems, recommends operating the filters at no more than 250 gpm in parallel. Above this flow rate, particles may push through the filter bag material and/or around the filter bag at its collar.

10.7 Berth 7 IWTP Major Plant Unit Descriptions

The major process equipment inside the Berth 7 IWTP is listed in Table 1.2 and described in further detail below. Wastewater is now stored in the pond prior to being pumped into the IWTP for treatment in one of the two IPCs and final polishing using the bag filters when required. The CAF was initially installed to remove fines from CPC processing wastewater; however, these particles have been found to be removable by the IPCs and the CAF is not currently used.

10.7.1 Outdoor Storage Tanks

Prior to treatment, industrial wastewater is stored in one of several tanks located in a tank farm adjacent to the Berth 7 IWTP. The IWTP outdoor tank farm currently has a total of nine tanks. Most of the tanks were installed with the IWTP, except Tank T-120, which was added in 2011 and first used during the winter of 2011 and 2012. The outdoor storage tank names, capacities and current uses are listed in Table 10.4. Five tanks are currently dedicated for influent storage for a total capacity of 122,300 gallons, two tanks provide 31,000 gallons of effluent storage capacity, and two cone tanks provide 6,000 gallons of storage from the sludge pumped from the ICP. Portable tanks can be rented for additional storage capacity.

Table 10.4: IWTP Tank Farm Capacities and Uses

Tank	Capacity (gallon)	Material	Bottom	Typical Use	Frequency of Use (2021)
T-120	37,900	Steel		Influent from B5	Rarely used
T-105	37,900	Steel		Influent from B6/B7/WH8	Rarely used
T-100	15,500	HDPE	sloped	Influent from B6/B7/WH8	Rarely used
T-110	15,500	HDPE	sloped	Influent from B5	Rarely used
T-115	15,500	HDPE	sloped	Influent from B6/B7/WH8	Rarely used
Pond	1.5MM	HDPE liner	Sloped	Influent from B5/B6/B7/WH8	Typically used for all B5/B6/B7/GLB
T-170	15,500	HDPE	sloped	Treated effluent water	Typically used
T-175	15,500	HDPE	sloped	Treated effluent water	Typically used
T-126	3,000	HDPE	cone	Sludge	Sludge pumped from clarifier
T-141	3,000	HDPE	cone	Sludge	Sludge pumped from clarifier

Abbreviations:

B5 = Berth 5
B7 = Berth 7
B6 = Upriver portion of Berth 6
GLB = Gear Locker B dewater box drainage pad adjacent to Warehouse 8
MM = million

10.7.2 Storage Pond

The Port constructed an HDPE-lined storage pond at the Berth 7 IWTP to provide additional capacity prior to treatment. The additional storage capacity provided by the pond allows the Port to increase the total amount of industrial wastewater that can be collected and processed through the treatment plant without significantly increasing the plant throughput rate or exceeding permitted discharge limits. The pond has approximately 1.0 acre of surface area and 6.7-foot maximum depth and provides approximately 1.5 million gallons (MG) of storage.

The pond includes an ecology block wall is used to divide the pond area increase hydraulic residence time and enhances settling, and floating suction inlets that withdraw water from approximately 1 foot below the water surface. Floating skimmer booms can also be used, as needed, to reduce the amount of floatable materials that reach the outlet. These design features reduce solids in the water pumped out of the pond.

The Berth 7 IWTP must operate year-round at a relatively consistent daily discharge rate for the pond to be close to empty prior to the next wet season. When the pond level is low in the summer, industrial wastewater may need to be stored in tanks prior to processing. This may be necessary to allow the pond to be drained for cleaning and sediment removal and/or due to the limited settling likely to occur in the relatively shallow water remaining in the pond. Any water used to clean during this process can be pumped to the storage tanks for processing. Additionally, industrial wastewater flows may be more concentrated in the dry season due to less dilution by incidental contact stormwater and/or longer intervals between equipment cleaning operations.

10.7.3 Inclined Plate Clarifiers

There are two IPCs, T-125 and T-140, in use at the Berth 7 IWTP. T-125, which is shown on Figures 10.1 through 10.3, has a capacity of about 1,900 gallons, including the discharge trough, flocculation and flash mixing compartments, clarifying basin, and sedimentation cone. T-125 has 38 plates which are inclined at 60 degrees to promote solids settling. Approximately half of the plates are full length, and half are partial, as shown in Figure 10.3. T-140 has a total capacity of about 852 gallons and contains 23 plates, some of which are partial panels. Both clarifiers were manufactured by Andco Environmental Processes, which is no longer in business.

Figure 10.1: Front View of IPC T-125

Figure 10.2: Top View of IPC T-125 with Plates Submerged

Figure 10.3: T-125 Plate Pack, Removed for Cleaning on 31 May 2013

10.7.4 Cavitation Air Flotation Unit

The CAF unit was installed primarily to treat wastewater from CPC handled at Berth 5 and other wastes that form readily floatable solids when combined with an appropriate polymer. The CAF unit can be seen on Figure 10.4. Excluding the volume displaced by submerged equipment and piping (e.g., aeration system), the CAF unit has a capacity of about 156 cubic feet or 1,170 gallons. It employs a mechanical aerator to induce air bubbles that aid in floating the flocculated solids. A skimmer collects (skims) the floating solids and drops them into a collection tank. The contents of the skim tank are pumped to the sludge accumulation tanks as required.

The two IPCs have been found to provide adequate removal of floatable solids. Therefore, the CAF unit is not in operation, and Port staff do not expect to operate the CAF in the future.

Figure 100.4: Cavitation Air Flotation Unit

10.7.5 Bag Filtration System

The Berth 7 IWTP filtration system consists of two sets of duplex bag filters, F-105 A/B and F-110 A/B. The filters (Model: D-CST-224-CS; Figure 7) were manufactured in 1999 by Ronningen-Petter Products, which is now owned by JB Systems. The piping system for the duplex bag filters is configured to allow flow through each set of duplex filters individually, in parallel, or in series. Each duplex unit is provided with a differential pressure indicator and a differential pressure switch for automatic shutdown when the filters have reached maximum solids loading. The filter bags are usually changed when there is a 15 pounds per square inch (psi) pressure differential. The dimensions of the filters are depicted on Figure 10.6 and listed in Table 10.5.

Figure 10.5: Duplex Bag Filters

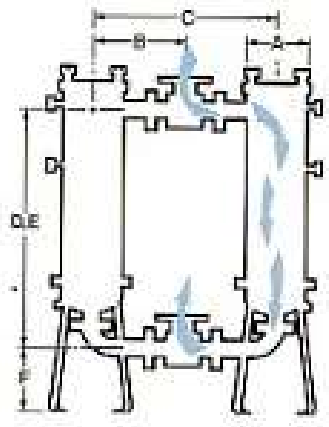

Figure 10.6: Duplex Bag Filter Diagram and Dimensions

Table 10.5: Duplex Bag Filter Specifications

Model #	Inlet/Outlet Diameter	Dimensions (Legs Extended)					Shipping Weight (approx.)	Surface Area Total
		A	B	C	D	E	Carbon	
D-224	2 in	11 3/8 in	13 1/8 in	26 ¼ in	35 7/16 in	8 ¼ in max	450 lbs	1020 sq. in.

Abbreviations:

in	inches
max	maximum
lbs	pounds
sq. in	square inches

10.7.6 Automatic Sampler

Berth 7 Effluent has a HACH automatic sampler. The sampler can be set up to sample on a time-basis or a flow-basis for normal events over a 24-hour period. Flow-basis sampling relies on receiving a pulse signal from the flowmeter

Figure 10.7: Automatic Sampler

10.7.7 Sludge Handling System

Sludge generated by the CAF and IPCs is collected in tanks where further settling occurs. A water level develops in the sludge tanks as further settling occurs. This water is drained out of the tanks to a small sump in the IWTP building where it is pumped back to inlet tanks or the pond. The sludge is fully dewatered by pumping to a dewatering box or super sacks, adding polymer enroute when necessary to flocculate the sludge to enhance drainage. Dewatered sludge is hauled offsite for proper disposal.

10.7.8 Auxiliary Equipment and Chemicals

The main process equipment (i.e., IPCs, CAF, and bag filters) is supported by auxiliary equipment which stores and transports influent and effluent water. Auxiliary equipment is listed below with a short description.

10.7.9 Pumps

10.7.9.1 Sump Pumps

- P-L1 & P-L2: Pump wastewater from Berth 7 dock sump by Transit Shed 6 which services containment areas A and B. Wastewater is typically pumped to the pond. Pumps are controlled by the pump control panel adjacent to the restrooms at Berth 7. Pumping to T-100, T-105, (T-110), T-115 and T-120 is also possible.

- P-L3 & P-L4: Pump wastewater from the Berth 5 sump to the pond or tanks T-110 and T-120. Pump is controlled by the pump control panel at Berth 5. Pumping to other tanks is also possible, but rarely utilized.
- P-L5 & P-L6: Pump wastewater from the large sump adjacent to the IWTP which services containment areas C and D and Gear Locker B. Wastewater is typically pumped to the pond. Pumps are controlled by the pump control panel located inside the IWTP building. Pumping to tanks T-100, T-105, T-110, and T-115 is also possible.
- P-160: The IWTP building sump pump. It is a free-standing submersible pump, which discharges to any selected inlet tank. Pump on/off switch is located at the MCC panel in the IWTP building.

10.7.9.2 Process Pumps

- P-120: A stainless steel end-suction centrifugal pump used to transport wastewater from tanks T-100, T-105, T-110, and T-115 to IPCs T-125 or T-140 or to CAF T-135.
- P-121A & P-121B: Chemical injection metering pumps with adjustable feed rates used to pump coagulant (e.g., alum) from T-121 to clarifiers T-125 and T-140.
- P-130: A stainless steel end-suction centrifugal pump used to transport wastewater from tanks T-100, T-105, T-110, and T-115 to IPCs T-125 or T-140 or to CAF T-135.
- P-131A & P-131B: Chemical injection metering pumps with adjustable feed rates that pump mixed polymer (e.g., 105 NALCO 717257) from T-131 to clarifiers T-125 and T-140.
- P-142: Pumps clarified water from tank T-142 to tanks T-170 and T-175.
- P-146A & P-146B: Chemical metering pumps that pump base (sodium hydroxide or its equivalent) from T-146 to the mixing chambers of clarifier T-125 and T-140, respectively. The pH probes control how much base is added to the mixing chamber. These pumps have adjustable speed and stroke. The speed can be controlled by the pH controller.
- P-147A & P-147B: Chemical metering pumps that pump acid (sulfuric acid or its equivalent) from T-147 to the mixing chambers of clarifier T-125 and T-140, respectively. The pH probes control how much acid is added to the mixing chamber. These pumps have adjustable speed and stroke. The speed can be controlled by the pH controller.
- P-145: A stainless steel end-suction centrifugal pump that pumps effluent from the pH neutralization tank to the bag filters and ultimately to the clarified water storage tanks.
- P-210 & 220: Semi-open impeller, self-priming, centrifugal pumps used to transport wastewater from the storage pond to IPCs T-125 or T-140 or to tanks T-100, T-105, T-110, T-115 or to Outfall 004. The basic materials of construction for wetted parts is grey iron, with steel wearing parts and motor shaft.

10.7.9.3 Sludge Pumps

- P-125: Pumps the solids removed in clarifier T-125 and T-140 to the sludge holding tanks and is used to drain the clarifier for cleaning. A pneumatic double-diaphragm pump.

- P-135: Pumps the solids collected in the skim tank and that settle in CAF T-135 to the sludge holding tanks. A pneumatic double-diaphragm pump. Removed from service.

10.7.9.4 Effluent Pump

- P-190: a stainless-steel end-suction centrifugal pump that pumps water from the clarified water storage tanks to Outfall 004.

10.7.10 In-Plant Storage Tanks

In addition to the outdoor storage tanks described in Section 14.4.1, there are several tanks inside the plant building, which are listed below.

- T-121: A 65-gallon plastic tank that stores coagulant for clarifier T-125 and T-140.
- T-130: Tank used to combine polymer from the polymer system with commodity wastewater. Discharges to CAF T-135. Disconnected.
- T-131: A 65-gallon plastic tank that stores polymers for clarifier T-125 and T-140.
- T-142: A 150-gallon tank that receives and temporarily stores clarified effluent before it is pumped to tanks T-170 and T-175. This tank was previously T-136, which was used as an air flotation skim tank.
- T-145: A continuous flow-through unit with a chambered reaction vessel. The pH sensors previously located in this tank have been repurposed to the mix chambers of clarifiers T-125 and T-140.
- T-146: A 55-gallon drum with spill containment that stores sodium hydroxide or its equivalent for the pH neutralization system.
- T-147: A 55-gallon drum with spill containment that stores sulfuric acid or its equivalent for the pH neutralization system.

10.7.11 Mixers

- M-121: Mixes coagulant in tank T-121. Removed.
- M-125: Flash mixer in the integral mix chamber of T-125.
- M-126: Slow mixer in the flocculation chamber of T-125 with adjustable speed controlled in the panel at the clarifier.
- M-130: Mixer associated with T-130 that mixes polymer with wastewater. Disconnected.
- M-131: Stirs polymers in T-131 before use and during polymer make-up operations.
- M-140: Flash mixer in the integral mix chamber of T-140.
- M-141: Slow mixer in the flocculation chamber of T-140 with adjustable speed controlled in the panel at the clarifier.

- M-145: Mixer for the first chamber of T-145, the pH neutralization tank.
- M-146: Mixer for the second chamber of T-145, the pH neutralization tank.

10.7.12 Air Compressor

The air compressor is a 15 horsepower (hp) unit with a 200-gallon receiver. The air compressor serves the pneumatic double-diaphragm pump P-125.

10.7.13 Chemicals

Chemicals are currently not typically required to attain wastewater discharges that meet permit limits. Flows stated in the following sections are usage estimates for when chemicals are used.

10.7.13.1 Coagulant and Polymers

- 10% NALCO 71257, Flows: between 10 gallons per day (gpd) and 40 gpd, average 20 gpd.
- Aluminum Sulfate (alum, coagulant), Flows: between 5 gpd and 30 gpd.

10.7.13.2 Acid and Base

- Sulfuric Acid, Flows: none required for CPC, between 10 gpd and 30 gpd for urea.
- Sodium Hydroxide (caustic) Between 0 gpd and 5 gpd for CPC and others, none for urea.

10.7.13.3 Other, Occasionally Used

- Aluminum Chlorohydrate (ACH, Ultrion 8187) – an alternative to alum as a coagulant for some commodities/cargos.
- NALMET 8702 – for reducing total zinc level.

10.8 Key Treatment Parameters

The Berth 7 IWTP relies on physical/chemical treatment processes to meet the discharge requirements listed in the Permit. The pond provides a relatively long hydraulic residence time for wastewater; thus, allowing for significant settling of solids and reduction of influent TSS in the pond. When the pond is not utilized, influent residence time in the influent tanks is shorter and the bulk of the treatment may be provided in the IPCs. In this case, the major operating parameter for the Berth 7 IWTP is the flow rate through the IPCs, and the flow rates used are well within the range for which adequate removal of solids is expected (see Section 10.3 and Table 10.2 for further discussion).

The coagulants and polymers employed to enhance settling in the IPCs can be critical to successful treatment for certain waste streams. The coagulants and polymers currently used at the IWTP are appropriate for the expected influent wastewater and have been effective to date. The IWTP operators and managers have experience adjusting chemical types and feed rates to

optimize settling and to treat varying waste streams, and future selection of chemical blends will be guided by this knowledge.

10.9 Berth 7 IWTP Operation of Process Units

The Berth 7 IWTP is a highly flexible treatment plant; much of the flow path through the facility can be altered to provide effective treatment for a wide range of influent flow and quality conditions. The operation of the key plant processes, including the selection of appropriate treatment alternatives, is outlined in this section.

10.9.1 Berth 5 Sump and Pumps P-L3 and P-L4

All water collected in the Berth 5 sump is pumped directly to the Berth 7 IWTP, but the operator must manually select which inlet tank or pond it should be directed to by configuring the valves appropriately. Flow from the Berth 5 sump is typically directed to the pond or inlet tank T-120.

There is some redundancy between pumps P-L3 and P-L4, and both pumps appear to be in good repair. In addition, these pumps are standard small sump pumps and therefore, are readily replaceable.

10.9.2 Berth 7 Sump and Pumps P-L1 and P-L2

The Berth 7 sump collects wastewater from the Berth 7 dock containment areas A and B. Containment area A also includes an upriver portion of the Berth 6 dock. Containment areas and associated conveyances are represented in the BERTH 7 CONTAINMENT drawings in Appendix B. The Berth 7 sump pumps directly to the Berth 7 IWTP. Flow from the Berth 7 sump is collected in the pond or inlet tank T-100, T-105, T-110, T-115, or T-120.

There is some redundancy between pumps P-L1 and P-L2, and both pumps appear to be in good repair. In addition, these pumps are standard small sump pumps; therefore, they are readily replaceable.

10.9.3 Berth 7 IWTP Sump and Pumps P-L5 and P-L6

The Berth 7 IWTP sump collects wastewater primarily from the Berth 7 C and D containment areas (which include the Truck Loadout area) and Gear Locker B. Containment areas and associated conveyances are represented in the BERTH 7 CONTAINMENT drawings in Appendix B. This sump pumps directly to the Berth 7 IWTP, and its flow is collected in the pond or tank T-100, 105, 110, 115, or 120; the operator must configure the valves manually to direct flow to the selected pond or tank.

There is some redundancy between pumps P-L5 and P-L6, and both pumps appear to be in good repair. In addition, these pumps are standard small sump pumps and therefore, are readily replaceable.

10.9.4 Inlet Tanks T-100, T-105, T-110, T-115, and T-120

T-110, T-115, and T-100 are all 15,500-gallon, poly, sloped bottom tanks, and T-105 is a 37,900-gallon steel tank. When used, these tanks typically receive wastewater from Berth 7, a portion of Berth 6, and a dewater box drainage area at Gear Locker B. Tank T-120, also a 37,900-gallon steel tank, is typically used for receiving wastewater from the Berth 5 sump.

T-105 and T-120 are each fitted with an outlet halfway up the tank and an internal baffle system that facilitates the settling of solids. Therefore, water can be decanted from tanks T-105 and T-120 through the upper outlets to reduce solids loading to the clarifiers or pond.

10.9.5 Storage Pond

The HDPE-lined storage pond provides additional storage capacity for influent wastewater and allows settling of solids prior to treatment, reducing the load on the IPCs. The pond was designed with a surface area of 1.0 acre and a capacity of approximately 1.5 MG. It is equipped with an ecology block wall is used to divide the pond area increase hydraulic residence time and promote setting. Floating skimmer booms can be employed, as needed, to remove floatable solids.

The storage pond is primarily intended to store untreated influent wastewater prior to treatment. To transfer untreated wastewater to the storage pond, the operator must configure the appropriate valves to allow water to drain from the influent tanks into the pond by gravity. The operator can also configure valves to pump directly to the storage pond from sumps associated with the collection systems at Berth 5, Berth 7, and the sump at Berth 7 IWTP.

The storage pond can also be used to contain treated wastewater which cannot yet be discharged (due to daily flow limitations or water quality that does not meet the permitted levels). To return treated effluent to storage, the operator must configure the appropriate valves to allow effluent pump P-190 to pump water from the effluent tanks (T-170 and T-175) to one of four inlet tanks (T-100, T-105, T-110, or T-115). From there, the water can be gravity drained to the storage pond and detained for eventual reprocessing.

Sampling and laboratory analysis have shown that pond effluent quality typically meets permit pollutant limits for discharge to Outfall 004.

10.9.6 Inclined Plate Clarifiers T-125 and T-140

Two IPCs are in use at the Berth 7 IWTP. IPC T-125 is larger (1,900 gallons) and is used more frequently than IPC T-140 (852 gallons). Each IPC is equipped with an integral mixing camber and flash mixer, as well as a flocculation chamber with a flocculator upstream of the clarifier plates to blend polymer with the incoming wastewater. After chemical addition, the water then passes through the chamber containing the inclined plates, which enhance the settling of flocculated solids. Solids accumulate in the bottom of the clarifier, from which they are pumped out into a sludge tank or sludge dewatering box as needed.

The two clarifiers operate in parallel, providing two redundant treatment trains. There is also some redundancy between the flocculator and flash mixer of each IPC unit. For example, if the flocculator on IPC T-140 were to fail, the flash mixer would still provide some mixing.

The average flow rate for the Berth 7 IWTP is around 20 gpm. At this flow rate, IPC T-140 has a hydraulic loading of 0.150 gpm/ft^2. The IPCs are expected to provide adequate removal of solids up to a hydraulic loading of 0.2 gpm/ft^2.

10.9.7 Cavitation Air Flotation Unit T-135

The CAF unit was installed primarily to treat CPC wash water handled at Berth 5 and other wastes with floatable solids. CPC solids tend to float and, when combined with the appropriate polymer, will form a flocculent that readily floats. The CAF unit employs a mechanical aerator to induce air bubbles that aid in floating the flocculated solids. A skimmer collects the floating solids, or skim, and drops them into a collection tank. The contents of the skim tank are pumped to the sludge accumulation tanks as required.

T-135 and its associated equipment have not been utilized in years, and future use is not anticipated.

10.9.8 Polymer and Coagulant Addition System

Coagulant and polymer are stored in separate 65-gallon tanks (T-121 and T-131, respectively). Coagulant is injected into the feed lines of the IPCs T-125 and T-140 via chemical metering pumps with adjustable feed rates. The coagulant feed rate is adjusted manually by the operator. A mixer for the coagulant feed tank is available and can be installed, if needed.

Polymer is typically made down to a final concentration of 10% and is injected into the mixing chambers of the IPCs T-125 and T-140 via chemical metering pumps with adjustable feed rates. The polymer feed rate is adjusted manually by the operator. The polymer feed tank is fitted with a mixer, and polymer is mixed before each use, during make-up, and as needed.

If necessary, both coagulant and polymer can be pumped directly from 55-gallon drums. The metering pumps used to inject these chemicals can be replaced with other metering pumps with similar capacity in the event of pump failure. In addition, another mixer can be employed to mix tank contents temporarily in the event of mixer failure.

Figure 10.8: Polymer Tank T-131 and Chemical Metering Pumps

10.9.9 Transfer Pumps P-120 and P-130

Two transfer pumps are available to pump wastewater from the inlet tanks to the treatment system. They can be used simultaneously for two, separate treatment trains to operate. See Section 10.6.23 Automatic Operation regarding treatment train operation.

Both transfer pumps have a capacity of approximately 30 gpm, depending on the height of the tank from which the pump is withdrawing water. Both pumps are stainless steel end-suction, centrifugal pumps. Each pump is controlled by the programmable logic controller (PLC) or can be turned off or operated in manual with a switch on the motor control center (MCC) panel.

Figure 10.9: Transfer Pump

10.9.10 Pond Pumps P-210 and P-220

Two transfer pumps are used to pump wastewater from the storage pond to the treatment system. They can be controlled by the PLC or manually. At the panel for the pond pumps

(Figure 10.10), select AUTO for PLC control and HAND for manual control. Both pumps connect to a single pipeline to feed the clarifiers, so only one pond pump can be used at a time to pump to the clarifiers. By configuring hand valves correctly, the operator can use either pond pump to feed either IPC.

Based on the configuration of manual valves, pump P-210 or P-220 can be used to pump storage pond water to storage tank T-100, T-105, T-110, or T-115.

These pumps are redundant due the critical need to draw from the storage pond on a daily basis when pond level, weather, and Port activity require it.

Both transfer pumps have a capacity of approximately 50 gpm, depending on the storage pond level and to where the pumps are pumping. Both are semi-open impeller, self-priming, centrifugal pumps. The basic materials of construction for wetted parts are grey iron, with steel wearing parts and motor shaft.

Figure 10.10: Pond Pumps P-210 & 220 and Control Knob for P-210

(Rheostat knob not functional)

10.9.11 Chemical Mixing Tank T-130 and Mixer M-130

These pieces of equipment are associated with the CAF and are not currently in use.

10.9.12 Sludge Pump P-125

Solids that settle out in the IPCs T-125 and T-140 are removed by sludge pump P-125 and pumped to the sludge holding tanks or the dewatering box. Based on sludge levels and concentrations, the operator determines when the sludge should be pumped and manually activates P-125. The pump is a pneumatic double-diaphragm pump.

There is no redundancy provided for the sludge pump. However, alternative pumping can be established in an emergency.

Figure 10.11: Sludge Pump P-125

10.9.13 Clarifier Accepts Tanks and Pumps

pH Neutralization Tank (T-145) and Pump P-145

pH adjustment now occurs in the mix chambers of clarifiers T-125 and T-140. Therefore, pH Neutralization Tank T-145 no longer functions as a tank for pH adjustment. Clarified water simply passes through this tank enroute to the bag filters and the clarified water storage tanks. Accepts from both clarifiers, T-125 and T-140, flow by gravity to T-145. Pump P-145 evacuates the Neutralization tank based on level sensors in the tank. Valves are downstream of P-145 for selecting whether or not flow will pass through the bag filters and selecting which clarified water storage tank to fill, T-170 or T-175.

Figure 10.12: pH Neutralization Tank T-145

Tank 142 and Pump 142

Accepts from clarifiers T-125 or T-140 can flow by gravity to tank T-142. They are then pumped by pump P-142 to the Clarified Water Storage Tanks, T-170 and T-175. Pump P-142 is controlled by level sensors in tank T-142. Valves are just downstream of P-142 for selecting which clarified water storage tank to fill.

Figure 10.13: IPC T-140 Accepts Tank T-142 and Pump P-142

10.9.14 pH Neutralization System

The Berth 7 IWTP incorporates a pH neutralization system capable of adjusting the wastewater from an influent range of pH 3 to 12 to an effluent range acceptable for discharge according to the Permit. The system consists of a number of separate components and pieces of equipment that are used to adjust pH of influent at the flocculation chambers of clarifiers T-125 and T-140. Each piece of equipment is described below.

pH Sensors and Analyzer/Controllers

The IPCs have pH sensors located in their flocculation chambers. Each pH sensor transmits the pH of the mixing chamber to a separate Analyzer/Controller with a 4-20 milliamp (mA) signal. The Analyzer/Controllers, in turn, send signals to acid and caustic chemical metering pumps (described below) to automatically adjust pH and keep it within a prescribed range that can be set in the Analyzer/Controllers for each clarifier. The Analyzer/Controllers are mounted on the pH Neutralization Tank (T-145).

Figure 10.14: pH Sensor and Analyzer/Controller

Sodium Hydroxide Tank (T-146) and Pumps (P-146A, P-146B)

Sodium hydroxide (or its equivalent) is stored in a 55-gallon drum (T-146) and is pumped with chemical metering pumps to the mixing tanks of clarifiers T-125 and T-140, where it is mixed to adjust the pH of the influent. Generally, the pumping speeds of the pumps are automatically controlled by the pH Analyzer/Controllers.

If needed, sodium hydroxide can be pumped straight from another 55-gallon drum. The pumps can easily be swapped with other metering pumps with similar capacities in an emergency.

Sulfuric Acid Tank (T-147) and Pumps (P-147A, P-147B)

This system is similar to the Sodium Hydroxide system, with the acid stored in another drum (T-147). See above.

10.9.15 Bag Filtration System (Pump P-145 and Filters F-105 A/B and F-110 A/B)

The Berth 7 bag filtration system is used intermittently to provide additional solids removal before discharge. Effluent from the IPCs is pumped through a bag filter to remove any residual solids. The filtration system includes the filter feed pump (P-145), a stainless steel, end-suction, centrifugal pump that pumps effluent from the “neutralization tank,” T-145, through the bag filters and to the clarified water storage tanks. There is no redundancy for the filter feed pump.

The piping system for the duplex bag filters (F-105 A/B, F-110 A/B) is configured to allow flow through each unit individually, in parallel, or in series. Each duplex unit is provided with a differential pressure indicator and a differential pressure switch for automatic shutdown when the filters have reached maximum solids loading. Bag filters are usually changed when there is a15 psi pressure differential. The filters use 25-micron polyester bags.

The configuration provides redundancy for the bag filters.

Figure 10.15: Bag Filtration System

10.9.16 Effluent Pump P-190

The effluent pump is a stainless steel, end-suction, centrifugal pump that pumps water from the clarified water storage tanks. Based on the configuration of manual valves, P-190 can either

pump treated effluent to Outfall 004 for discharge or return it to the inlet tanks for reprocessing. Effluent pump operation is independent of the process treatment operation. Control of the effluent pump is by the PLC, which monitors the level switches in the selected clarified water storage tank. The effluent pump shuts down upon reaching a low level in the selected storage tank.

The effluent pump is a critical piece of equipment without any redundancy. However, discharge can be done via gravity, although gravity discharge may be too slow to keep pace with wastewater treatment.

Figure 10.16: Effluent Pump P-190

10.9.17 Clarified Water Storage Tanks T-170 and T-175

Two 15,500-gallon, poly, sloped bottom tanks collect treated water from the Berth 7 IWTP. Both tanks are constructed of HDPE.

Figure 10.17: Clarified Water Storage Tanks T-170 and T-175

10.9.18 Flow Meter FQI-182

Flow meter FQI-182 is a Siemens MAG 3100 flow sensor combined with a MAG 5000 transmitter located “end of pipe” at Outfall 004. This meter is used to record total daily discharge to Outfall 004. This meter also sends a pulse signal to the auto-sampler for flow-proportional sampling of effluent discharge at Outfall 004. Note, the flow-proportional sampler is described in Appendix G in the *Sampler* section and specific wiring for this is discussed in a *Note to File* in Appendix G, Berth 7, in the Sampler tab, in addition to the equipment manuals found there.

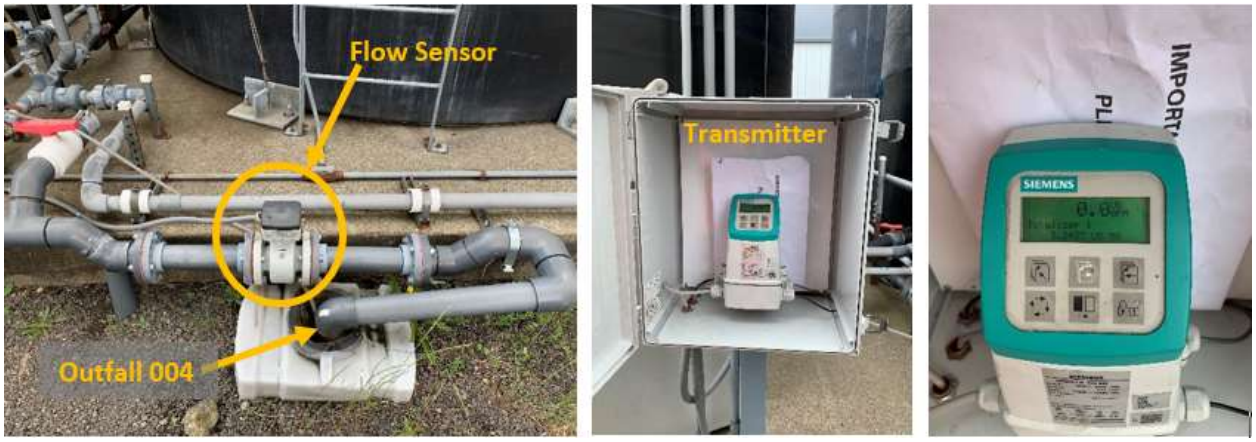

Figure 10.18: Discharge Flow Meter

10.9.19 Automatic Sampler

Program the automatic sampler to sample the discharge on a time-basis or flow-basis. Program instructions can be found in a quick-reference guide and manuals in Appendix G, Berth 7, in the Sampler tab.

See Section 3: Monitoring, for more details about sampling.

Send the sample to an analytical laboratory.

10.9.20 Sludge Handling System

Sludge holding tanks T-126 and T-141 are available for collection of processed sludge. They are both 3,000-gallon, conical-bottom, sludge holding tanks. They are fed by sludge pump P-125, which pumps sludge that has settled to the bottom of the clarifiers (IPCs T-125 and T-140). Sludge levels are observed through the translucent sludge tanks. There are no level controls on these tanks as the fill process is very slow and overfilling is very unlikely. Loadout for recycling or disposal by tanker trucks is arranged by Port staff, when needed. Alternatively, sludge is further dewatered by pumping to a dewatering box or sacks, possibly adding polymer enroute to flocculate the sludge and enhance drainage. This requires some set up of an air diaphragm sludge pump, hosing, polymer pump(s), and chemical lines and injection points. Since the installation of the storage pond in 2015, sludge dewatering at the sludge handling system has not been necessary because solids loading to the clarifiers is so low.

Figure 10.19: Sludge Holding Tanks

10.9.21 Building Sump Pump P-160

The building sump contains a free-standing, submersible pump which discharges to any of the five inlet tanks. The pump is turned on/off automatically by a level switch in the sump. A high-level switch in the sump initiates a shutdown of the treatment process. Bypass pumping for small leaks can be provided in an emergency.

10.9.22 Air Compressor K-300

The air compressor is a 15 hp unit with a 200-gallon receiver. The air compressor serves the pneumatic double-diaphragm sludge pump P-125. In the event of compressor failure, a portable compressor can be utilized temporarily.

Figure 10.20: Air Compressor K-300

10.9.23 Automatic Operation

A treatment train is the specific components of plant equipment (tanks, pumps, clarifiers) that are utilized to clarify wastewater, in the order they are used. Treatment trains can be configured at the HMI (human-machine interface) located in the PLC cabinet by selecting what plant equipment will be utilized. There are two windows in the HMI for creating treatment trains; one for each settling clarifier. It is possible to run two separate treatment trains (one for each settling clarifier) simultaneously in automatic. A treatment train at Berth 7 Effluent can be represented in the following manner:

Figure 10.21: Treatment Train Representation

Below is a picture of a treatment train display in the HMI. It is TT1, or treatment train 1, and is associated with the large clarifier, T-125. Potential process equipment selections are represented by equipment numbers in blue boxes. Various equipment combinations can be chosen to create a treatment train. Green outlines around boxes indicate which pieces of equipment are selected.

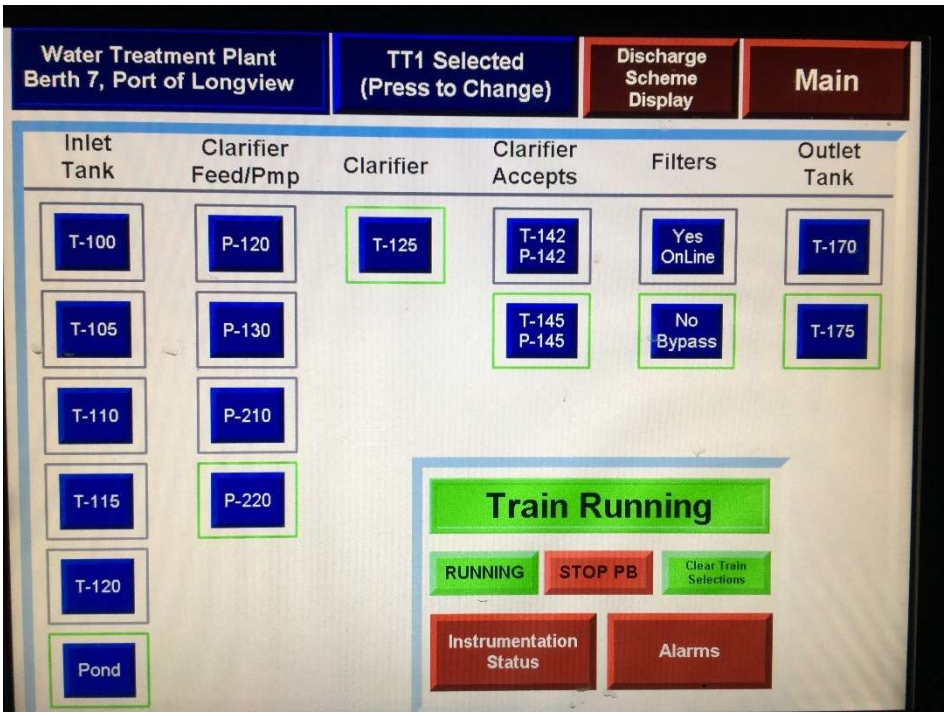

Figure 10.22: HMI Display of Treatment Train

At Beth 7 Effluent, running in automatic means utilizing level indicators for alarms and status indicators that allow equipment to be shut down when levels indicate upset conditions. An example is shutting down pumps based on a hi-hi tank alarm. Running in manual means pumps keep pumping, regardless of level indicator readings, which can lead to overflowing tanks and clarifiers.

There is no automatic control of valves at Berth 7 Effluent. It is important to confirm that all valves are in the proper open/closed position when configuring a treatment train or discharge scheme.

10.9.23.1 Inlet Tank Selection and Valve Configuration

As mentioned previously, industrial wastewater and incidental stormwater is collected at Berth 5, Berth 7, a portion of Berth 6, and Gear Locker B for treatment at the Berth 7 IWTP. Before pumping water from one of these berths to the IWTP, the operator must manually select which of the five inlet tanks or pond will receive the water prior to treatment by properly configuring valves. Sections 10.4 and 10.7.9.1. discuss from what areas the tanks and pond receive influent. When selecting the inlet tank or pond for processing, the operator will take into consideration the present contents of the tank to avoid unwanted mixing with other wastewater streams.

Berth sump pumps' Hand/Off/Auto switches should be set in the "Auto" position during general operations, allowing them to pump out of the sump based on sump level.

10.9.23.2 Clarifier Feed Pump and Accepts Tank Selection and Valve Configuration

The operator must use the HMI to select a clarifier feed and a clarifier accepts tank for the treatment train. The HMI screen displays options but will not let the operator select a pump or tank that is already associated with the other treatment train. Selection of a pump and tank activates interlocks between the feed pump and level switches associated with the influent tank, clarifier, and effluent accept tank to prevent overfilling or operation of a pump to dry suction.

10.9.23.3 Outlet Tank Selection and Valve Configuration

The operator must use the HMI to designate an outlet tank to receive treated effluent before initiating treatment. Tank T-170 and/or T-175 can be used to receive treated effluent. Selection of an outlet tank activates interlocks between the appropriate pumps and the level switches on the tanks to prevent overfilling of outlet tanks.

10.9.23.4 Configuration of Process Valving

After a treatment process and outlet tank are selected in the HMI, the operator must manually configure process valves to ensure the correct flow path through the treatment system. Valve positions are not displayed in the HMI or monitored by the PLC. Prior to starting a treatment train, the operator must visually inspect the desired flow path to make sure valves are appropriately opened and closed.

10.9.23.5 Preparation of Process Chemicals

Before initiating treatment, the operator must inspect the chemical tanks to ensure that adequate polymer and pH adjustment chemicals are available. If necessary, chemical tanks must be manually refilled. Because the polymer mixture may be specific to the wastewater type and quality being treated, the operator should ensure that the mixture and dosage is appropriate. The polymer mixture must also be agitated prior to initiation of treatment using manually operated agitators M-121 and M-131 for at least five minutes prior to initiation of treatment and continuously during polymer make-up operations.

10.9.23.6 Initiation of Treatment

Once all necessary treatment train selections have been made at the HMI, the valves have been adjusted and chemicals are in place, the operator can initiate process treatment via the HMI by pushing the “Run PB” button on the screen. Equipment is then energized and operated according to the PLC logic. The operator should walk the flow path again after starting the process to ensure valves are in correct positions and equipment is functioning properly.

Flow rate is controlled by valve adjustment at the discharge of the pond pumps, or by adjusting valves at the inlets to the clarifiers.

10.9.23.7 Treatment

If the PLC detects a low level in the inlet tank, or a high level in the clarifier, or a high level in the outlet tank, it will shut down the clarifier feed pump and the coagulant and polymer pumps. This

prevents running the inlet tank and clarifier feed pump dry; clarifier and outlet tank overflows; and continuous pumping of chemical when wastewater is no longer flowing.

The pH controller will regulate acid and caustic pumps for automatic pH adjustment. The PLC will shut the treatment train down if the pH is out of range for too long. This range and time are programmed into the logic and are based on permit limits for pH.

If the PLC detects a high differential pressure in the bag filters, it will shut the treatment train down. This avoids plugging the bag filters, which would restrict flow too much and cause level to climb and possible overflow tank T-145.

10.9.23.8 Monitoring of Treatment

While much of the treatment process is controlled automatically by the PLC, the operator must monitor some aspects of the treatment process to ensure proper operation. These include:

- Verifying that polymer is flowing to the IPC units by observing discharge in metering pump tubing.
- Verifying that pH adjustment chemicals are flowing by observing discharge in metering pump tubing.
- Visually checking for adequate removal of solids in the IPCs.
- Checking bag filter differential pressure and preparing to switch to other units or change filters when the pressure differential approaches 15 psi (if bag filtration is used).
- Monitoring pumps and tanks to observe if flow and tank draw-down rates are appropriate for valve settings and system configuration. Flow rates are not automatically controlled. They are controlled by setting valve positions by hand.
- Observing or testing sludge buildup in the IPCs and operating pump P-125 to transfer sludge, as needed.

10.9.24 Effluent Testing and Discharge

When discharging, the operator must evaluate the treated effluent stored in effluent tank T-170 or T-175 by testing its pH and visually observing it for the presence of particulates at least once a day. The operator must also collect a sample for analysis by a certified analytical laboratory for Permit compliance. This is generally performed twice a month. The operator also collects samples for laboratory analysis whenever discharge quality has changed or is suspected of having changed significantly compared to the previous compliance sample, even if this means sampling more than twice in a month. If there is concern regarding meeting Permit parameters, the operator can sample a tank and have it analyzed by a laboratory prior to discharge. During the sampling and analysis period, effluent may be received in the other outlet tank. Monitoring results must be recorded in the Port's record form *Wastewater Discharge Volumes and Analytical Results*, an e-file located on the Port's Environmental Network Drive.

If water quality is acceptable based on pH and particulate content and there is no reason to suspect that other parameters may be out of compliance, the operator will initiate pumping of the water from the tank to Outfall 004. If water quality is not acceptable for discharge, the

effluent tank contents can be transferred back into one of the inlet tanks or the storage pond for reprocessing.

Discharging from the outlet tanks is initiated by the operator independently of process treatment operation. Therefore, it is possible to pump effluent out of T-170 or T-175 whether a treatment train is processing or not. After configuring the outlet tank valving, the operator selects the outlet tank via a discharge scheme page in the HMI. The operator also sets a timer for how many minutes the discharge pump P-190 will run. The operator can then select the "Run PB" button and pump P-190 is then controlled by the PLC, which monitors the level switches in the selected outlet tank. Effluent pump P-190 shuts down upon reaching a low level in the selected effluent tank or when the timer counts down to zero, whichever occurs first.

Plant discharge flowmeter, FQI-182, is an electronic flowmeter located "at end-of-pipe". The operator must record the totals before and after each day of discharge. This is the flow data used to demonstrate permit compliance with discharge volume limits.

The operator must record daily discharge volumes in the daily log sheet. This data must be transferred to the Port's record form, *Wastewater Discharge Volumes and Analytical Results*.

See Section 3 of this manual for further instructions regarding monitoring and sampling.

10.9.25 General Plant Operation

General plant functions include:

- Building sump operation
- Air compressor operation
- Building ventilation operation.

The building sump contains a free-standing pump which operates between a low sump level to within approximately 6 inches of the top of the sump. The pump capacity is 30 gpm at 25 feet total dynamic head (TDH). The sump pump discharges to any selected inlet tank by operator selection of either valve BV-100B, BV-105B, BV-110B, or BV-115B. The sump also contains a high level switch above normal sump high level, which provides an input to the PLC for process treatment shutdown. Operation of this switch is indicative of a catastrophic piping or tank failure within the building, since small leaks would normally be within the capacity of the sump pump.

The air compressor is a 15 hp unit with a 200-gallon integrally-mounted receiver. The compressor cycling is adjustable with pressure switches. The air discharge is filtered for free water, lubricated, and regulated to approximately 50 pounds per square inch gauge (psig). The air compressor serves the sludge pump P-125, and the inlet/outlet tank area for piping blowout freeze protection purposes.

The building ventilation fan is rated at 1,500 cubic feet per minute (cfm) at 0.3-inch water gauge static pressure. The fan is mounted on the upper section of the eastern plant wall. The ventilation louver is mounted on the lower section of the western plant wall and is manually adjustable. The ventilation path is, therefore, diagonally across the plant from east to west. The

operator runs the ventilation fan manually upon detection of excessive heat or organic vapor buildup within the plant. Timer controls in the electrical panel also allow for on/off cycling of the fan.

10.9.26 Process Control Description

The process control system consists of the PLC, control system logic, input/output (I/O) modules, level switches, pH meters, differential pressure switches, E-stop switches, equipment specific controllers (provided by some equipment vendors), HMI, and associated wiring and hardware. An understanding of this equipment and how it is integrated to control the process is important for system operation and troubleshooting. This section provides a description of the system integration, as well as how the process is controlled. For detailed control logic diagrams and pictures of HMI screens, see Appendix H. PLC program code is backed up in the Port Electrician's computer.

The HMI is a Panel View Plus 7 and allows an operator to program up to two independent treatment trains and monitor process levels and process/motor/valve status. The HMI is programmed with Factory Talk View Machine Edition (FTView ME) software.

FTView ME software allows project development and configuration of displays. A runtime application is created which is downloaded to the HMI. The HMI will then show alarms on the screen in the event of high/low states of level switches or other undesired states of the process.

The processor, power supply and Input/output modules are mounted on a din rail and protected by fuses/circuit breakers.

PLC and associated equipment are checked annually (unless otherwise specified by manufacturer) for proper operation and calibration.

10.9.26.1 Programmable Logic Controller (PLC)

The overall system process control is provided by an Allen-Bradley 1769-L36ERM Compact Logix Controller, programmed with RSLogix5000 software. RSLogix5000 is the programming software developed by Rockwell Software that allows the PLC to be programmed, monitored, or modified in ladder-logic programming language for this application.

10.9.26.2 Control System Logic

Control system logic is based on the concept of selecting components of the system to form a treatment train. A treatment train is the specific components of plant equipment (tanks, pumps, clarifiers) that are utilized to clarify wastewater, in the order they are used. Treatment trains can be configured at the HMI located in the PLC cabinet by selecting what plant equipment will be utilized. It is possible to run two treatment trains independently and simultaneously. These treatment train concepts allow flexibility in tank and equipment selection, as well as segregation of wastewater types, if necessary. The logic governing operation is shown in the control logic diagrams provided in Appendix H. These diagrams graphically depict the control logic, sequential process activities, and required operator interfaces.

The process control system requires selection of a treatment train and its components before process equipment is energized. This is performed by the operator via the HMI, described below.

10.9.26.3 Human-Machine Interface (HMI)

The HMI module is a Panelview Plus 7. This touchscreen terminal allows operator input such as screen selection, treatment train selection, equipment selection, discharge scheme selection, alarm acknowledgement, and reset. The terminal also displays system status information such as mode status, alarm conditions, inputs status, equipment status, and equipment run times.

There are seven screens in the HMI that the operator utilizes to operate the IWTP. They are described below, and pictures of the screens are provided in Appendix H.

Main Menu: The main menu screen displays auto/manual/stopped status for pumps and mixers and buttons to access screens for treatment trains, discharge schemes, instrumentation status, and alarms.

Treatment Train 1: Select equipment for treatment train; start/stop treatment train; running/stopped status display for the treatment train.

Treatment Train 2: Select equipment for treatment train; start/stop treatment train; running/stopped status display for the treatment train.

Discharge Scheme 1: Select equipment for discharge scheme; set timer for discharge scheme; run/stop discharge scheme; running/stopped status display for the discharge scheme.

Discharge Scheme 2: Select equipment for discharge scheme; set timer for discharge scheme; run/stop discharge scheme; running/stopped status display for the discharge scheme.

Instrumentation Status (Inputs): Level switch status; filter pressure status; E-Stop status; building sump level switch status.

Alarms: Alarm history display; alarm Silence and Acknowledge buttons; clear history button.

10.9.26.4 Ethernet Communication

There is a Rockwell Automation Stratix ethernet switch in the control panel to which the PLC and HMI are connected. A spare port allows the connection of a programming terminals (such as Electrician's computer) on which run the HMI programming software and PLC programming software.

There are spare ethernet ports on the switch in the event that expansion of the I/O system is required in the future.

10.9.26.5 Input/Output Modules

The I/O system consists of 5 x 16-point 120VAC input and 3 x 16-point 120VAC output cards. The CPU (central processing unit) contains the PLC programming logic for operating the

process treatment system. The I/O modules receive inputs from instruments, equipment, or other controllers (i.e., the pH neutralization system controllers) and produce outputs which operate relay coils which close contacts and energize equipment. The isolated relay output module produces the permissives that allow equipment, such as pumps, to operate.

10.9.26.6 Level Switches

Level switches are provided in select process vessels. Level switches are 120-VAC units, wired as normally closed for high-high level and high level functions and as normally open for low level function. This configuration provides a fail-safe mechanism in case of wiring or wiring connection failure. Thus, loss of a 120-VAC signal from a high-high or high level switch precludes upstream pump operation, since a full tank is indicated by an open high-high or high level switch condition. When tank level is above a low level switch, the switch is closed. Thus, loss of 120-VAC signal from a low level switch precludes operation of a downstream pump.

Influent/inlet tank and treated effluent/outlet tank level switches have been replaced with pressure transmitters. They convert the head pressure from wastewater level in a tank into a 4-20 mA output signal which is transmitted to the PLC and used for logic control.

Table 10.6 provides a list of tanks. It is stated if a pressure transmitter is utilized. If level switches are utilized, then conditions, corresponding level switch senses, operation descriptions, and failure mode indications are listed.

Table 10.6: Normal and Off-Normal Operating Signals for Tank Level Switches

Tank	Switch Designation	Sense	Operation Description	Failure Mode Indication
T-100	Pressure transmitter			
T-105	Pressure transmitter			
T-110	Pressure transmitter			
T-115	Pressure transmitter			
T-120	Pressure transmitter			
T-125	LSL-125	NO	Closes when switch floats	Empty tank
“	LSH-125	NC	Opens when switch floats	Full tank
“	LSHH-125	NC	Opens when switch floats	Full tank
T-135	LSL-135	NO	Closes when switch floats	Empty tank
“	LSH-135	NC	Opens when switch floats	Full tank
“	LSHH-135	NC	Opens when switch floats	Full tank
T-136	LSHH-136	NC	Opens when switch floats	Full tank
T-140	LSL-140	NO	Closes when switch floats	Empty tank
“	LSH-140	NC	Opens when switch floats	Full tank
“	LSHH-140	NC	Opens when switch floats	Full tank
T-145	LSL-145	NO	Closes when switch floats	Empty tank
“	LSH-145	NC	Opens when switch floats	Full tank

Tank	Switch Designation	Sense	Operation Description	Failure Mode Indication
“	LSHH-145	NC	Opens when switch floats	Full tank
T-160	LSHH-160	NC	Opens when switch floats	Full tank
T-170	Pressure transmitter			
T-175	Pressure transmitter			

Abbreviations:

NC Normally Closed
NO Normally Open

10.9.26.7 pH Meters

The pH meters are 4-20 mA current loop units, powered locally by the 120-VAC pH neutralization system control panel. The pH meters transmit the pH from the pH meters located in the mixing tanks of the two IPCs. The pH range has adjustable relay setpoints which are normally closed within the range of pH 6 to 9. Upon exceeding this range for over 5 minutes, the pH controller initiates relay opening which is sensed as an input at the PLC.

10.9.26.8 Bag Filter Differential Pressure Switches

The differential pressure switches provided for the bag filters are 120-VAC units, wired as normally closed for differential pressures below the 15 psi differential setting. This provides a fail-safe mechanism in case of wiring or connection failure. Thus, loss of a 120-VAC signal from a differential pressure switch precludes upstream pump operation since a high differential pressure is indicated by an open differential switch condition.

10.9.26.9 Emergency Stop (E-stop) Switches

Four E-stop switches are provided in the IWTP for emergency shutdown of process control equipment. Switches are located at the clarifier T-125 control panel, clarifier T-140 control panel, PLC cabinet, and the HMI has an E-stop button on the screen. The E-stop switches are normally closed, snap-action, push-button switches, wired as normally closed in series. This provides a fail-safe mechanism in case of wiring or connection failure. Thus, loss of a 120-VAC signal from the E-stop switches precludes system operation since an E-stop signal is indicated by an open E-stop switch condition. The opening of any E-stop switch terminates operation of all process equipment.

Note that the E-stop function is implemented via the PLC system controller and is only active when the equipment is in the “Auto” mode as determined by the equipment hand switch. **If equipment is in “Manual” mode and running under operator supervision, invoking the E-stop will NOT stop the equipment.**

10.9.26.10 Associated Wiring and Hardware

All control system wiring is #14 thermoplastic high heat-resistant nylon-coated (THHN). PLC and control system power is provided through a 20-amp (A) breaker from Panel P2. Terminal strips are fused for each instrument and output function. 120-VAC output functions are provided by relays, with the coils operated by PLC outputs.

10.9.27 Electrical System Description

Electrical power for the Berth ITWP is provided via a single power feed from the local electric utility company. The incoming feed is 480-VAC and is metered at the entry point to the facility building. The electrical power feed is routed directly to the MCC, then out to the end-use devices. The MCC has a 400 A main breaker, which acts as the shutoff breaker for the entire building and also provides overcurrent protection. The 480-VAC, 600 A main bus is 50% oversized to allow for future expansion.

End-use devices (pumps and motors) that require a motor starter are powered directly from the MCC. These devices include the air compressor (K-300) and pumps P-120, P-130, P-142, P-145, P-190, P-210, and P-220. Each device has a hand/off/auto (HOA) switch on the front face of the MCC for operator control.

Distribution panel P1 is a 480-VAC, 3-phase, 30-circuit panel that is powered from the MCC. The CAF panel, the two IPC panels, the pH neutralization system panel (which requires both 480-VAC and 120-VAC), building lighting, and distribution panel P2 are all powered from panel P1. There are four spare 3-phase circuits for future use.

Distribution panel P2 is a 120-VAC, single phase, 12-circuit panel that is powered from panel P1 via a 15 kilovolt-amp (kVA), 480/120-VAC, single phase transformer. Panel P2 provides power to P-121, P-131, M-121, M-131, the pH neutralization system panel (which requires both 480-VAC and 120-VAC), the heating, ventilation, and air conditioning (HVAC) louvers, and the PLC cabinet. There are five spare circuits for future use.

The PLC cabinet is powered from panel P2 and supports the majority of the control functions within the facility. The instrument signals are typically 120-VAC, with low current demand, and are powered by the PLC cards. Circuit loops that demand greater current than the PLC cords can provide intermediate relays. All instrument circuits are fused in the terminal blocks.

Major equipment panels (i.e., the CAF, IPC, and pH neutralization system panels) were provided by the equipment manufacturers and modified, as required.

10.9.28 Startup and Shutdown Procedures

The Berth 7 IWTP relies exclusively on physical/chemical treatment and is designed to be operated intermittently. Therefore, no special procedures are needed for startup and shutdown. During a temporary shutdown, sufficient storage is included onsite in the inlet tanks and storage pond to contain wastewater at the IWTP site until treatment is restored.

10.10 Maintenance

The operator should inspect the following when operating the Berth 7 IWTP:

- Read and record all elapsed time meters (ETMs)
- Confirm Berth 5 sump pumps are working
- Confirm Berth 7 sump pumps are working (sump at Transit Shed 6)

- Confirm Berth 7 IWTP sump pumps are working
- Confirm Berth backup areas' systems are draining (Berth 7 C&D, Truck Loadout)
- Confirm dewater box station by Warehouse 8 is draining
- Check all sumps for sludge buildup.

Maintenance of major IWTP equipment (including daily, weekly, and monthly/semi-annual maintenance activities) is performed according to the schedule shown in Table 10.7. Operators responsible for equipment maintenance must log all maintenance activities performed using the *Berth 7 IWTP (Outfall 004) Mo./Qtr/Semi/Ann Inspection & Maintenance* and *Berth 7 IWTP (Outfall 004) Maintenance Record* forms.

Table 10.7: Maintenance Schedule for Key Equipment Associated with Berth 7 IWTP

Daily During Process Treatment Operation	
Equipment Designation	Maintenance Procedure
All tanks	Check for signs of leakage; schedule repair if necessary
All process pumps	Check for signs of leakage or excessive vibration; schedule repair if necessary
All process piping and hoses	Check for signs of leakage; schedule repair if necessary
Flocculant/polymer supply tanks (T-121, T-131)	Check for flocculant/polymer supply to ensure that the fluid levels are above metering pump suction hoses; replace polymer solution if aged beyond 1 week
pH adjustment chemical supply tanks (T-146, T-147)	Check for pH chemical supply to ensure that the fluid levels are above metering pump suction hoses; replace 55-gallon drum if necessary
Bag filters (F-105A/B, F110A/B)	Check for proper differential pressure (Dp) on bag filters; switch over to the other set and replace if necessary
Sump pump (P-160)	Check for proper building sump water level; if level is high, test float trips by hand
Compressor and associated equipment (K-300/T-300/L-300)	Manually bleed condensate; check for auto-drain operability, check for adequate lubricant supply, and add if necessary
Weekly	
Bag filters (F-105A/B, F110A/B)	Check for adequate supply of filter bags; order if necessary
Flocculant/polymer supply tanks (T-121, T-131)	Check for adequate supply of raw chemicals; order if necessary
pH adjustment chemical supply tanks (T-146, T-147)	Check for adequate supply of raw chemicals; order if necessary
pH probes (pHT-145, pHT-146)	Retest pH probe calibration with standard pH 4, pH 7, and pH 10 solutions; adjust if necessary

Monthly or Semi-Annually	
Inlet tank level high-high sensors (LSHH-100, LSHH-105, LSHH-110, LSHH-115)	Test for shutdown of berth pumps during pumping operation by lifting wire at PLC output card permissive contacts; troubleshoot or repair if necessary
Air vacuum valves (AV-120, AV-130)	Check for proper operation of air-vacuum valves; replace if necessary
IPCs and CAF unit (T-125, T140)	Check for smooth operation of level switches; clean shafts if required
Flocculators (M-126, M-141)	Check oil level in gear reducer case; add oil if necessary
Bag filter differential pressure switches (PDSH-105, PDSH-110)	Check for 15 psi Dp switch trip point on bag filter using pressure calibrator; reset if necessary
Bag filter differential pressure indicators (PDI-105, PDI-110)	Check for accurate operation of differential pressure switch indicator using pressure calibrator, replace if necessary
Mixers and agitators (M-121, M-131, M-125, M-130, M-140, M-145, M-146)	Check for tightness of mixer mounting clamps; retighten if necessary
Storage pond	Quarterly visual inspection for erosion, integrity of lining, etc.; schedule maintenance if needed
Sump high-high level switch (LSHH-160)	Check for proper operation of sump high-high level switch during process treatment operation; repair if necessary
pH neutralization system transmitters (pHT-145, pHT-146)	Test out-of-range pH relays by temporarily resetting alarm setpoint during process treatment operation; repair if necessary
PLC	Test E-stop switches (four locations) during process treatment operation; repair if necessary.
Annually	
Facility condition assessment	Complete the IWTP equipment assessment and ranking based on criteria of performance goals, risk factors, and condition of the equipment to prioritize and budget for maintenance or improvements to the IWTP.

Operators should refer to the manufacturer's equipment manuals for detailed descriptions of maintenance requirements and for suggested lubricants, quantities, and procedures.

It is assumed that the manufacturer's recommended frequency of routine maintenance will be revised to reflect the frequency of equipment use. Daily maintenance may not be required for equipment that is used only once or twice per month. More frequent maintenance may be required for equipment which operates continuously. When a piece of equipment has been idle for an extended time, recommended maintenance procedures should be followed prior to use. Equipment that requires periodic maintenance or maintenance "as needed" should be

addressed annually at a minimum. Questions concerning specific equipment maintenance procedures or frequency should be addressed to the manufacturer.

10.10.1 Other Maintenance, Cleaning Activity, or Other Tasks

Maintenance staff cleaning or maintaining other equipment or performing other tasks within the collection systems should coordinate with the Berth 7 IWTP operators prior to conducting activities that have the potential to impact the wastewater system, such as draining a tank. Chemicals used for treatment within the IWTP have the potential to impact the treatment process if introduced in quantities other than those required for treatment; therefore, these tanks must not be drained to the IWTP sumps, the wastewater collection system, or the sanitary sewer.

The Berth 7 IWTP system does not include a stationary engine or other fixed equipment that has the potential to impact the wastewater system. During maintenance of vehicles or mobile equipment within the IWTP collection system, fuel, oil, grease, hydraulic oils, and other fluids must not be drained to the wastewater collection system.

10.11 Spare Parts Inventory, Supplier Information, Warranties, and Catalogues

10.11.1 Excess Storage and System Redundancy

The design of the Berth 7 IWTP provides protection against treatment failure due to equipment problems by virtue of its excess storage capacity and inherent redundancy. The five inlet tanks and 1.5 MG storage pond provide storage in excess of typical wastewater flows. Therefore, if a temporary plant shutdown is required, wastewater can be contained onsite until treatment is restored.

The Berth 7 IWTP also includes two parallel treatment trains, each consisting of a chemical dosing system and IPC. The bag filter system, which is used infrequently, also includes two parallel filtration units. This redundancy provides additional protection in the event of equipment problems.

10.11.2 Supplier Information

Local suppliers are available for service or replacement of much of the equipment in use at the Berth 7 ITWP. A list of equipment and available vendor contact information is provided in Appendix F.

10.11.3 Warranty Information

The Berth 7 IWTP was constructed in 1999, and all major process equipment was purchased and installed at that time. Therefore, this equipment is generally no longer covered by warranty.

10.11.4 Catalogues

Brochures, manuals, and catalogues for selected process equipment are provided in Appendix G.