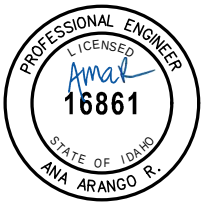
BASIS OF DESIGN REPORT / 10% DESIGN

FOR

Crescent City RBC Capital Upgrade and Biosolids/Digester Optimization Project

SUBMITTED:
January 6, 2026

Jacobs Challenging today. Reinventing tomorrow.



01/07/2026

Jacobs

RBC Capital Upgrade and Biosolids/Digester Optimization Project
Basis of Design Report / 10% Design

Client name:	City of Crescent City		
Project name:	RBC Capital Upgrade and Biosolids/Digester Optimization Project		
Document no:	250911112115_57ee610a	**Project manager:**	Barbara Andrade
Version:	Final	**Prepared by:**	Sheila Nilsen, Ana Arango, Massimo Romano, Christopher Lunsford, Michael Molinari, Jason Hise, Anthony Fasano, Michele McHenry, Mark Twede, Nick Okudugha, Nate Ebbs, Scott Cowden
Date:	January 2026	**Client representatives:**	Eric Weir, David Yeager, Andrew Leighton, Martha Rice, Linda Leaver

Document History and Status

Version	Date	Author	Reviewed	Approved
00	9/23/2025	Sheila Nilsen, Ana Arango, Massimo Romano, Christopher Lunsford	Barbara Andrade	Jasmine Diaz
01	11/03/2025	Jasmine Diaz, Barbara Andrade, Carl Koester, Ryujiro Tsuchihashi, Michelle Melkonians, Sheila Nilsen, Ana Arango, Massimo Romano, Christopher Lunsford, Michael Molinari, Jason Hise, Anthony Fasano, Michele McHenry, Mark Twede, Nick Okudugha	Jasmine Diaz, Barbara Andrade, Doug Barber, Tom Johnson, Scott Levesque, Nate Ebbs	Barbara Andrade
02	1/6/2026	Jasmine Diaz, Barbara Andrade, Carl Koester, Ryujiro Tsuchihashi, Michelle Melkonians, Sheila Nilsen, Ana Arango, Massimo Romano, Christopher Lunsford, Michael Molinari, Jason Hise, Anthony Fasano, Michele McHenry, Mark Twede, Nick Okudugha, Nate Ebbs, Scott Cowden	Sheila Nilsen, Olivia Kalb, Kim Andretta	Barbara Andrade

Jacobs Engineering Group Inc.

2525 Airpark Drive
Redding, CA 96001-2443
United States

T +1.530.229.3225
F +1.530.243.1654
www.jacobs.com

© Copyright 2026 Jacobs Engineering Group Inc.. All rights reserved. The content and information contained in this document are the property of the Jacobs group of companies ("Jacobs Group"). Publication, distribution, or reproduction of this document in whole or in part without the written permission of Jacobs Group constitutes an infringement of copyright. Jacobs, the Jacobs logo, and all other Jacobs Group trademarks are the property of Jacobs Group.

NOTICE: This document has been prepared exclusively for the use and benefit of Jacobs Group client. Jacobs Group accepts no liability or responsibility for any use or reliance upon this document by any third party.

Contents

Acronyms and Abbreviations ..... **i**

1. Introduction **1-1**

1.1 Project Description 1-1

1.1.1 Project Funding 1-2

1.1.2 Previous Reports 1-2

1.1.3 Project History 1-2

1.2 Project Location 1-4

1.2.1 Relevant Hydrological, Geologic, and Topographic Features 1-5

1.2.2 Tsunami Code Application 1-6

1.3 Existing Treatment Facilities 1-9

1.3.1 National Pollutant Discharge Elimination System Permit Information 1-11

1.4 Project Schedule Update 1-15

1.4.1 Construction Sequencing 1-16

1.4.2 Class 4: Conceptual Estimate 1-18

1.4.3 Environmental Considerations 1-18

2. Flows and Loading Design Criteria **2-1**

2.1 Historical Flows and Loads 2-1

2.2 Wastewater Flows 2-1

2.2.1 Wastewater Treatment Facility Flow Analysis 2-1

2.3 Service Area 2-2

2.3.1 Service Area Growth Projections 2-2

2.4 Design Flows and Loads 2-4

2.5 Plant Performance Evaluation 2-5

2.6 Hydraulics 2-6

3. Liquid Stream Improvements **3-1**

3.1 Membrane Bioreactor 3-3

3.1.1 Background 3-3

3.1.2 Process Description 3-3

3.1.3 Design Criteria 3-4

3.1.4 Structural Improvements 3-11

3.1.5 Instrumentation and Controls 3-11

3.2 Attached Growth Treatment Facility 3-11

3.2.1 Background 3-11

3.2.2 Design Criteria 3-11

3.2.3 Process Description 3-12
3.2.4 Structural Improvements 3-13
3.2.5 Instrumentation and Controls 3-13
3.3 Cloth Media Filtration 3-13
3.3.1 Background 3-13
3.3.2 Process Description 3-14
3.3.3 Design Criteria 3-14
3.3.4 Structural Improvements 3-17
3.3.5 Instrumentation and Controls 3-18
4. Solids Handling Improvements 4-1
4.1 Waste Activated Sludge and Digested Sludge Storage and Pump Gallery 4-3
4.1.1 Process Description 4-5
4.1.2 Design Criteria 4-5
4.1.3 Alternatives Discussion 4-7
4.1.4 Instrumentation and Controls 4-11
4.1.5 Pump Gallery HVAC and Odor Control 4-11
4.1.6 Structural Improvements 4-12
4.1.7 Corrosion Control 4-12
4.2 Gravity Thickener 4-13
4.2.1 Background 4-13
4.2.2 Design Criteria 4-13
4.2.3 Rehabilitation Description 4-13
4.2.4 Instrumentation and Controls 4-14
4.2.5 Corrosion 4-14
4.3 Anaerobic Digestion 4-14
4.3.1 Background 4-14
4.3.2 Design Criteria 4-15
4.3.3 Process Description 4-15
4.3.4 Digester Rehabilitation 4-15
4.3.5 Instrumentation and Controls 4-18
4.3.6 Corrosion 4-18
5. Additional Improvements 5-1
5.1 Primary Clarifiers 5-1
5.1.1 Process Description 5-1
5.1.2 Design Criteria 5-1
5.1.3 Process Description 5-1

5.1.4 Structural and Architectural Improvements 5-2
5.2 Grit Removal 5-2
5.2.1 Process Description 5-2
5.2.2 Design Criteria 5-2
5.3 Yard Piping and Valving 5-3
5.3.1 Digested Solids Transfer Yard Piping 5-3
5.3.2 Process Valving 5-4
5.4 Area Classification 5-4
5.5 Heating, Ventilation, and Air Conditioning 5-4
5.6 Supervisory Control and Data Acquisition Improvements 5-6
5.6.1 Equipment and Tag Numbering Convention 5-6
5.7 Communication Block Diagram 5-7
5.7.2 Preferred Instrumentation 5-8
5.8 Electrical Improvements 5-8
5.8.1 Motor Control Center for new Membrane Bioreactor Facility 5-9
5.8.2 Motor Control Center for Attached Growth Facility, Filter Facility, and Waste Activated Sludge and Digested Sludge Storage Equipment 5-10
5.8.3 Outstanding Issues 5-11
5.9 Odor Control 5-12
5.9.1 Odor Source Descriptions 5-12
5.9.2 Odor Control System Sizing 5-14
5.9.3 Triggers Prompting Future Re-Evaluation of Odor Control 5-15
5.10 Corrosion Control and Mitigation 5-15
5.10.1 Atmospheric Conditions 5-16
5.10.2 Immersion Exposure 5-18
5.10.3 Buried Exposure 5-19
5.10.4 Painting and Protective Coatings 5-24
6. References 6-1

Tables

Table 1-1. Facility Improvements Summary 1-1
Table 1-2. Historical Improvements Summary 1-2
Table 1-3. Summary of Tsunami Analysis Results at the Site 1-7
Table 1-4. National Pollutant Discharge Elimination System R1-2023-0039 Effluent Limitations 1-12
Table 1-5. North Coast Regional Water Quality Control Board Order Number R1-2017-0002 Effluent Limitations 1-13

Table 1-6. City of Crescent City Wastewater Treatment Facility Disinfection Violations from 2020 to 2023 1-14
Table 1-7. Anticipated Project Schedule 1-15
Table 1-8. Construction Sequencing Constraints 1-16
Table 1-9. Possible Construction Activity Months 1-17
Table 2-1. Crescent City Wastewater Treatment Facility Dry Weather Season Influent Wastewater Characteristics 2-1
Table 2-2. Crescent City Wastewater Treatment Facility Wet Weather Season Influent Wastewater Characteristics 2-2
Table 2-3. 2022 to 2030 City of Crescent City Housing Element Update – 2010 to 2019 Population Growth 2-4
Table 2-4. 2020 to 2025 Population Estimates for Crescent City 2-4
Table 2-5. Crescent City Wastewater Treatment Facility Upgrade Project Design Flows and Loads 2-4
Table 2-6. Wastewater Treatment Facility Peaking Factors 2-5
Table 2-7. Plant Performance Evaluation 2-5
Table 3-1. Membrane Bioreactor Train Capacities 3-4
Table 3-2. Proposed Membrane Bioreactor Train 2 Additional Facility and Yard Piping Needs 3-5
Table 3-3. Proposed Fine Screen Design Criteria 3-5
Table 3-4. Proposed Bioreactor Design Criteria 3-6
Table 3-5. Process Aeration System Design Criteria 3-7
Table 3-6. Mixed Liquor Pump Station Design Criteria 3-8
Table 3-7. Transfer Pump Design Criteria 3-9
Table 3-8. Proposed Membrane Design Criteria 3-9
Table 3-9. Filtrate Pump Design Criteria 3-10
Table 3-10. Air Scour Blower Operating Requirements 3-10
Table 3-11. Attached Growth Facility Design Criteria 3-12
Table 3-12. Approximate Additional Piping 3-13
Table 3-13. Pump Station Design Criteria 3-16
Table 3-14. Filter Influent Pump Station Piping 3-16
Table 3-15. Cloth Filter Design Criteria 3-16
Table 3-16. Additional Piping Requirements for Filter Facility 3-17
Table 4-1. Waste Activated Sludge Storage Facility Design Conditions 4-6
Table 4-2. Digested Sludge Storage Design Criteria 4-6
Table 4-3. Digested Sludge Pump Station Design Conditions 4-7
Table 4-4. Stored Solids Pump Station Design Conditions 4-7
Table 4-5. Waste Activated Sludge Storage Combination Mixing and Aeration Alternatives 4-9
Table 4-6. Jet Aerator Design Criteria 4-10

Table 4-7. Digested Sludge Storage Mixing Alternatives 4-11
Table 4-8. Hydraulic Sludge Mixer Design Criteria 4-11
Table 4-9. Gravity Thickener Facility Design Conditions 4-13
Table 4-10. Gravity Thickener Mechanism Design Criteria 4-13
Table 4-11. Anaerobic Digester Facility Design Conditions 4-15
Table 4-12. Cover and Gas Appurtenance Design Criteria 4-16
Table 5-1. Grit Removal Design Criteria 5-2
Table 5-2. Digested Sludge Transfer 5-3
Table 5-3. General Valve Selection by Flow Stream 5-4
Table 5-4. HVAC – New Facilities 5-5
Table 5-5. HVAC Improvements – Existing Facilities 5-6
Table 5-6. Motor Control Center 4002B 5-10
Table 5-7. Motor Control Centers 7201 and 7201A 5-11
Table 5-8. Liquids Processes Odor Sources 5-12
Table 5-9. Solids Process Odor Sources 5-13
Table 5-10. Atmospheric Corrosion Classification 5-16
Table 5-11. Corrosion Rates, for the First Year of Exposure for the Different Corrosivity Categories 5-17
Table 5-12. Soil Resistivity Correlation with Corrosivity Levels 5-19
Table 5-13. Corrosion Parameters 5-20
Table 5-14. Effects Or Environmental Factors on Corrosion Of Steel In Soil 5-21
Table 5-15. Protective Coating Systems 5-24

Figures

Figure 1-1. City of Crescent City Location 1-4
Figure 1-2. Project Location 1-5
Figure 1-3. Tsunami Design Zone Impacting the City of Crescent City Wastewater Treatment Facility 1-6
Figure 1-4. Flood Insurance Rate Map for the Area Around the Wastewater Treatment Facility 1-8
Figure 1-5. U.S. Army Corps of Engineers Technical Report H-78-26 Numerical Tsunami Modeling Results 1-9
Figure 1-6. City of Crescent City Wastewater Treatment Facility Site Plan 1-10
Figure 1-7. City of Crescent City Wastewater Treatment Facility Existing Process Flow Diagram 1-10
Figure 2-1. Wastewater Treatment Facility Service Area 2-3
Figure 2-2. Hydraulic Profile for Proposed Process Flow 2-7
Figure 3-1. Liquid Stream Yard Piping Plan, Including Operational Flow Patterns 3-1
Figure 3-2. Proposed Liquid Process Flow Diagram 3-2

Figure 3-3. Membrane Bioreactor Train 2 Arrangement 3-3
Figure 3-4. Proposed Membrane Bioreactor Train 2 Process Piping Routes 3-4
Figure 3-5. Proposed Membrane Bioreactor Blower Arrangement 3-8
Figure 3-6. Filtrate Pumps for Membrane Bioreactor Train 2 Proposed Location 3-10
Figure 3-7. Attached Growth Facility Arrangement 3-12
Figure 3-8. Cloth Filter Facility Layout 3-14
Figure 3-9. Filter Influent Pump Station Plan 3-15
Figure 3-10. Filter Influent Pump Station Section 3-15
Figure 3-11. Section of Cloth Filter Facility 3-17
Figure 4-1. Proposed Solids Process Flow Diagram 4-2
Figure 4-2. Waste Activated Sludge and Digested Sludge Storage Facilities 4-4
Figure 4-3. Digester Gas Foam Separator Location 4-16
Figure 5-1. Proposed Digested Sludge Transfer Pipe Route 5-3
Figure 5-2. Electrical One-Line Diagram 5-9
Figure 5-3. Motor Control Center 4002B Plan and Elevation 5-9
Figure 5-4. Motor Control Centers 7201A Elevation 5-10

Appendices

Appendix A. National Pollutant Discharge Elimination System Permit R1-2023-0039
Appendix B. Time Schedule Order
Appendix C. Administrative Civil Liability Claim
Appendix D. Hydraulic Calculations
Appendix E. Equipment Cut Sheets
Appendix F. Heating, Ventilation, and Air Conditioning Replacement Markups
Appendix G. Half Size One-Line Diagrams and Motor Control Center Plan and Elevations
Appendix H. National Fire Protection Association 820 Area Classification

Acronyms and Abbreviations

µm/a	micrometer(s) per year
Ω-cm	ohm-centimeter(s)
°C	degree(s) Celsius
°F	degree(s) Fahrenheit
µg/L	microgram(s) per liter
µm	micrometer(s)
A	ampere(s)
ACH	air change(s) per hour
ACI	American Concrete Institute
ACL	Administrative Civil Liability Complaint
ADDW	average day dry weather
ADWF	average dry weather flow
AFC	adjustable frequency controller
AGE	attached growth effluent
ASCE	American Society of Civil Engineers
ASTM	ASTM International
AWWA	American Water Works Association
AWWF	average wet weather flow
BFP	belt filter press
BOD	biochemical oxygen demand
BODR	basis of design report / 10% design
Btu	British thermal unit(s)
Btu/hour	British thermal unit(s) per hour
CB	coarse bubble
CBC	California Building Code
CEBC	California Existing Building Code
CFU	colony forming unit(s)

CIP	clean in place
City	City of Crescent City
CP	cathodic protection
CRC	corrosion-resistant coating
CSA	County Service Area
DAC	disadvantaged community
DFA	Division of Financial Assistance
DIP	ductile iron pipe
DO	dissolved oxygen
DOF	Department of Finance
DX	direct exchange
EPA	U.S. Environmental Protection Agency
EtherNetIP	Ethernet/Internet Protocol
FEMA	Federal Emergency Management Agency's
FRP	fiberglass-reinforced plastic
ft^2/gal	square foot (feet) per gallon
ft/s	foot (feet) per second
ft^2	square foot (feet)
ft^3	cubic foot (feet)
ft^3/h	cubic foot (feet) per hour
$g/(m^2 \cdot a)$	gram(s) per square meter per year
gpd	gallon(s) per day
gpm	gallon(s) per minute
GT	gravity thickener
HDPE	high-density polyethylene
HMI	human-machine interface
hp	horsepower
HVAC	heating, ventilation, and air conditioning
I/O	input/output

lb/day	pound(s) per day
ISO	International Standard Organization
lb O_2/h	pound(s) of oxygen per hour
LCP	local control panel
MBR	membrane bioreactor
MCC	motor control center
MCP	master control panel
MDFT	minimum dry film thickness
MMADWW	maximum month average day wet weather
MMDWF	maximum month dry weather flow
MMWWF	maximum month wet weather flow
MDWWF	maximum day wet weather flow
mg/kg	milligram(s) per kilogram
mg/L	milligram(s) per liter
MGD	million gallon(s) per day
ML	mixed liquor
mL/L	milliliter(s) per liter
mm/year	millimeter(s) per year
MMP	minimum monthly penalty
MPN	Most Probable Number
mV	millivolt(s)
N/A	not applicable
NAVD88	North American Vertical Datum of 1988
NCUAQMD	North Coast Unified Air Quality Management District
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NGVD29	National Geodetic Vertical Datum of 1929
NOAA	National Oceanic and Atmospheric Administration

NPDES	National Pollutant Discharge Elimination System
NTU	Nephelometric turbidity unit(s)
PHF	peak hour flow
PDWW	peak day wet weather
PLC	programmable logic controller
ppm	part(s) per million
PS	pump station
psi	pound(s) per square inch
PWDWF	peak week dry weather flow
PWWWF	peak week wet weather flow
RAS	return activated sludge
RBC	rotating biological contactor
r_{corr}	corrosion rate
RDT	rotary drum thickener
RWQCB	North Coast Regional Water Quality Control Board
S/m	siemen(s) per meter
sBOD	soluble biochemical oxygen demand
SCADA	supervisory control and data acquisition
scfm	standard cubic foot (feet) per minute
SOTR	standard oxygen transfer rate
SRF	State Revolving Fund Program
SS	stored solids
SST	stainless steel
SU	standard unit(s)
SRT	solids retention time
SWRCB	State Water Resources Control Board
TCDD	2,3,7,8-tetrachlorodibenzodioxin
TDH	total dynamic head
TSO	Time Schedule Order

TSS	total suspended solid
TWAS	thickened waste activated sludge
USACE	U.S. Army Corp of Engineers
UV	ultraviolet
V	volt(s)
WAS	waste activated sludge
WC	water column
WEF	Water Environment Federation
WSE	water surface elevation
WWTF	wastewater treatment facility

1. Introduction

Jacobs has prepared this Basis of Design Report /10% Design (BODR) on behalf of the City of Crescent City (City) for the preliminary design of the Wastewater Treatment Facility (WWTF) Upgrade Project.

1.1 Project Description

The City intends to design, construct, and operate the WWTF in compliance with the North Coast Regional Water Quality Control Board (RWQCB) Order Number R1-2017-0002, Waste Discharge Requirements. Specifically, the project aims to achieve the following objectives:

- Provide membrane bioreactor (MBR) redundancy.
- Improve alternate secondary treatment process to achieve effluent limit compliance.
- Add storage volume to the solids handling process to allow for operational flexibility.
- Improve or replace failing equipment related to existing processes.

Table 1-1 summarizes the project improvements.

Table 1-1. Facility Improvements Summary

Facility	Description of Work
Primary Clarifiers	Replace failing mechanical equipment. Resurface and recoat the basin interior walls and floors.
Grit Removal	Replace grit cyclone(s), grit classifier, and grit piping.
MBRs	Add redundant train.
RBCs	Demolish mechanical equipment and retrofit basin with a modular attached growth process.
Secondary Clarifiers	Demolish mechanical equipment and retrofit existing basins to contain the following facilities: ▪ Redundant MBR train ▪ Cloth filters to treat effluent from the attached growth process ▪ Storage and pumping facilities for waste activated and digested sludge
MBR Building	Add equipment to support new MBR facility.
GT	Replace entire mechanism and supporting mechanical equipment, recoat interior concrete, and add cover to facility.
Anaerobic Digesters	Replace floating covers with fixed covers and install associated gas collection and safety equipment and replace boiler.
HVAC	Install new HVAC equipment in the pump gallery (6 ACH). Replace or upgrade HVAC equipment in: ▪ Administration building (complete replacement) ▪ MBR building chemical room (replace corroded ductwork and fan with 316 SST) ▪ Digester building (replace fan only, 12 ACH) ▪ Dewatering building (replace fan and ductwork, 6 ACH)
SCADA and Electrical	Complete general improvements to support upgraded facilities.

ACH = air change(s) per hour
GT = gravity thickener
HVAC = heating, ventilation, and air conditioning
RBC = rotating biological contactor
SCADA = supervisory control and data acquisition
SST = stainless steel

1.1.1 Project Funding

The proposed upgrade project will be fully grant funded from the California State Revolving Fund Program (SRF) by applying principal forgiveness, as administered through the State Water Resources Control Board's (SWRCB's) Division of Financial Assistance (DFA). The WWTF's service area is considered a disadvantaged community (DAC). The SWRCB DFA places a high priority on funding improvements designed to alleviate financial burdens for DACs while improving the overall water quality in the State of California.

1.1.2 Previous Reports

This BODR develops the preliminary design of the selected alternative from the Project Report (Jacobs 2025) in preparation for final design and construction, pending project funding acquisition.

The Project Report (Jacobs 2025) considered alternatives to install a redundant MBR train and replace the aging RBC facility. The limited capacity and failing infrastructure of these two facilities contribute to the WWTF's reoccurring effluent violations for fecal coliform and enterococci. The selected alternative was to convert the secondary clarifier basins to a redundant MBR train, cloth filtration, and solids storage. The RBC facility will be converted to an attached growth biological treatment facility. No new structures will be constructed with this upgrade project; only existing structures will be modified to contain the new facilities.

The Project Report (Jacobs 2025) also referenced previous assessment work Jacobs conducted at the WWTF, including a site visit conducted on August 17, 2022, and a condition assessment conducted in May 2023. These reports detailed the condition of various plant appurtenances, including the aging and failing infrastructure related to the wooden facilities at the primary clarifiers, the failing floating covers on the anaerobic digesters, the corroded GT, and the failing HVAC systems at numerous locations around the plant. This BODR defines these upgrade/replacement recommendations, along with the major liquid process overhaul selected in the alternatives analysis.

1.1.3 Project History

The WWTF was constructed in the early 1950s, and there were three major upgrade projects in 1973, 1977, and from 2008 to 2011. Table 1-2 summarizes the improvements for each project and the approximate facility plan expansion.

Table 1-2. Historical Improvements Summary

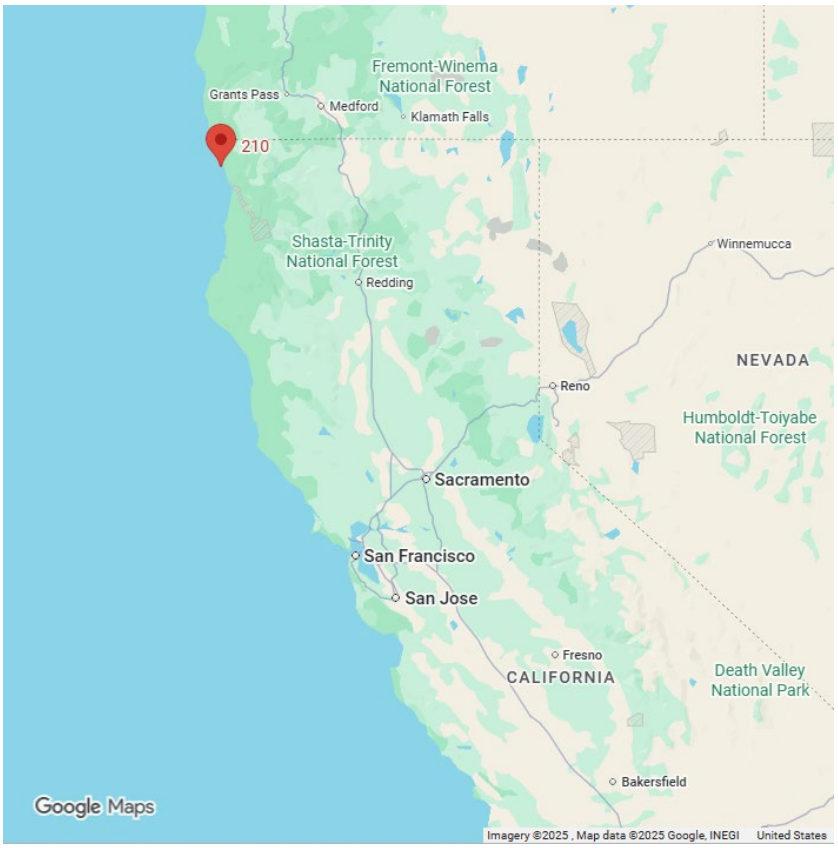
Project Construction Year	Improvements Summary	Approximate WWTF Footprint
1950	Original Construction: ▪ Influent pump house and wet well ▪ Clarigester ▪ Waste gas burner	4,000 ft^2

Project Construction Year	Improvements Summary	Approximate WWTF Footprint
1973	Constructed: ▪ Control building ▪ Two primary clarifiers with pre-aeration basins ▪ Chlorine contact basin ▪ GT ▪ Associated sludge pumping facilities Converted: ▪ Existing clarigester to a digester Improved: ▪ Influent pump house ▪ Outfall	35,000 ft^2
1977	Constructed: ▪ Three RBC trains ▪ Two secondary clarifier trains ▪ New chlorine contact basin ▪ Primary digester Converted: ▪ Chlorine contact basin to seawater storage basin ▪ Existing digester to secondary digester Replaced/Relocated: ▪ Waste gas burner Improved: ▪ outfall	60,000 ft^2
2005	Constructed: ▪ 24-inch outfall	60,000 ft^2
2008 to 2011	Constructed: ▪ One MBR train ▪ MBR equipment building ▪ Dewatering belt filter press facility ▪ Odor control facility Improved/Expanded: ▪ Control building ▪ Headworks and influent pump station Relocated: ▪ Secondary containment chemical facility	66,000 ft^2

Because the age of the existing equipment predates the 2008 to 2011 project, the WWTF requires extensive rehabilitation to maintain continuous operation. Additionally, effluent limits imposed by the National Pollutant Discharge Elimination System (NPDES) Order Number R1-2023-0039 adopted on December 12, 2023, require a secondary treatment facilities upgrade because the existing treatment process does not reliably meet effluent criteria. This BODR defines the recommended improvements to address these concerns and develops the preliminary design of the liquid stream improvements alternative that was selected for the secondary treatment process upgrade in the 2025 Project Report (Jacobs 2025). These improvements have been selected to be permittable, considering current building code provisions for tsunami design.

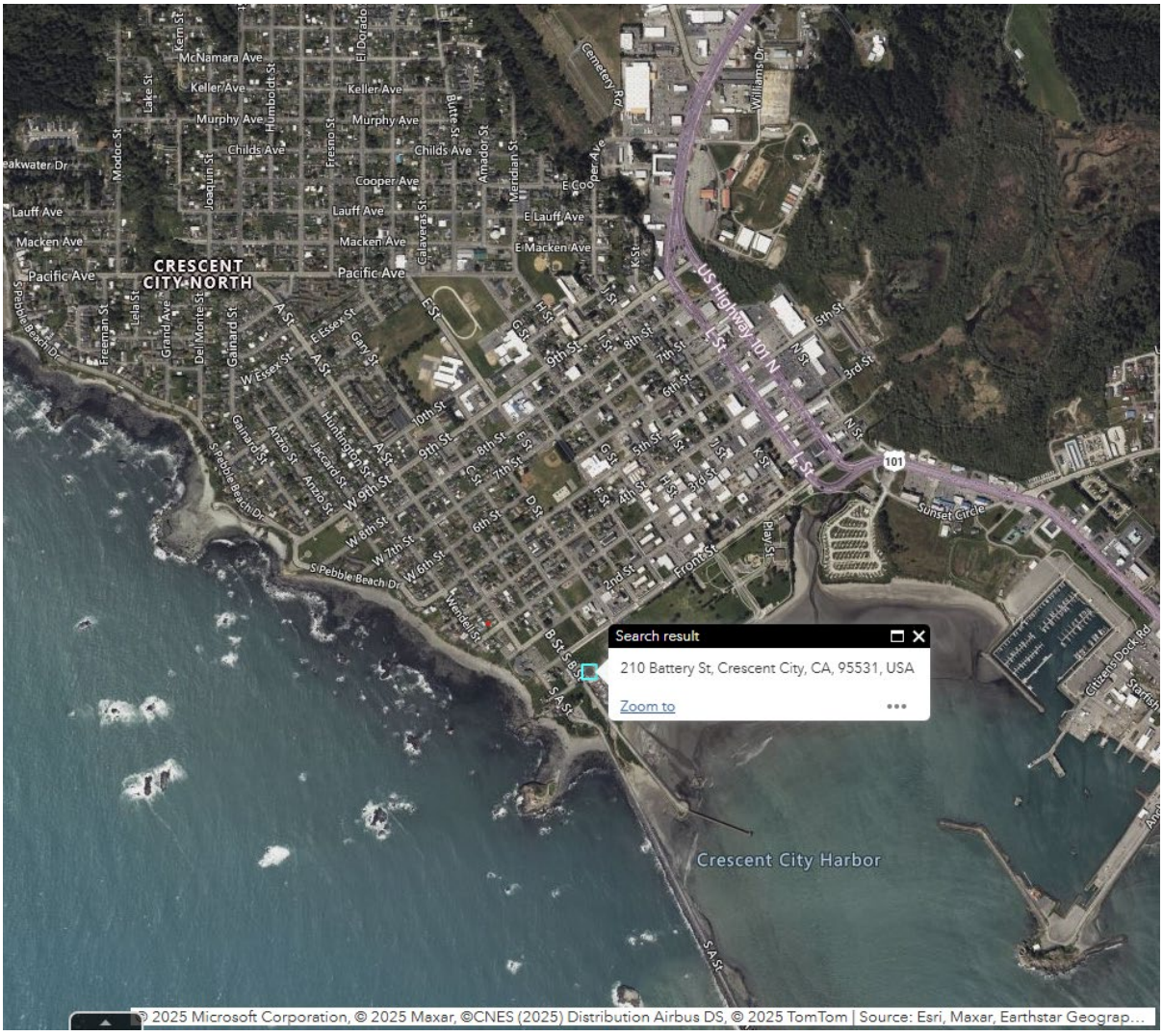
1.2 Project Location

The City is on the Northern California coast, 15 miles south of the Oregon border in Del Norte County, as pictured on Figure 1-1. The project's location, as shown on Figure 1-2, directly on the coast is susceptible to tsunami events following large earthquake events occurring in the Pacific Ocean. In addition, the project is underlain by loose, saturated alluvial sand and uncontrolled artificial fill materials. The loose sand may liquefy in the event of a large earthquake. One of the consequences of liquefaction is potential settlement between 3 to 6 inches (GeoVision 2004). The uncontrolled fill materials are subject to excessive total and differential settlement under new foundation loads. Because of these site conditions, existing foundations will be used to support proposed upgrade improvements to avoid a need for extensive subsurface preparation, deep foundation support, or tsunami protections.



Source: Google 2025

Figure 1-1. City of Crescent City Location



Microsoft product screenshot(s) reprinted with permission from Microsoft Corporation.

Figure 1-2. Project Location

1.2.1 Relevant Hydrological, Geologic, and Topographic Features

The service area is on the Smith River Plain bordered by the Pacific Ocean to the west and the base of the Coast Mountain Range to the east. The topography within 2 miles of the City is essentially flat and slopes gently south toward the harbor and east toward Elk Creek. The City has a maximum elevation change of 66 feet and an average elevation above sea level of 19 feet. The area within 2 miles of the City is covered by herbaceous vegetation (35%), water (34%), and artificial surfaces (24%).

The local geology beneath the WWTF was observed in soil borings performed by GeoVision in 2004. The subsurface materials consisted of artificial fill material, alluvium or terrace deposits, and rock of late Pleistocene Battery Formation (Delattre and Rosinski 2012). The artificial fill contained wood debris, concrete rubble, low density material, and organics that indicated the fill was not engineered or placed in controlled, compacted lifts. The alluvium consisted of loose to medium dense fine sand. Terrace deposits consisted of silt, organics, and clay. The Battery Formation consisted of very soft to soft siltstone and sandstone.

The potential for settlement should be evaluated where new loads are placed on existing shallow footings. Settlement may be estimated by design charts for footings on sand (Peck et al. 1974) based on blow counts and the load pressure. If existing foundations are supported on deep foundations that penetrate the Battery Formation, the estimated settlement would be negligible unless the stress within the pile material exceeds the strength of the pile.

Groundwater was encountered in field exploration borings within a foot of the ground surface. Groundwater should be considered to be at the ground surface for design purposes.

1.2.2 Tsunami Code Application

As shown on Figure 1-3, the WWTF lies within a Tsunami Design Zone, where the design of new structures may be required to consider tsunami effects. Structures are assigned Tsunami Risk Categories determined in accordance with American Society of Civil Engineers (ASCE) 7-22, Minimum Design Loads and Associated Criteria for Buildings and Other Structures, as referenced from the 2025 California Building Code (CBC). Typically, the Tsunami Risk Category is the same as the Risk Category assigned by the CBC for seismic and wind loads. Risk Category IV (the highest category, including other critical structures, such as hospitals) is assigned to public wastewater treatment plants. For design for tsunamis, however, ASCE 7-22 and Section 1604.5 of the CBC allow the Tsunami Risk Category to be dropped to Category III by federal, state, local, or tribal governments for treatment plants. Therefore, Tsunami Risk Category III will be considered for this site.

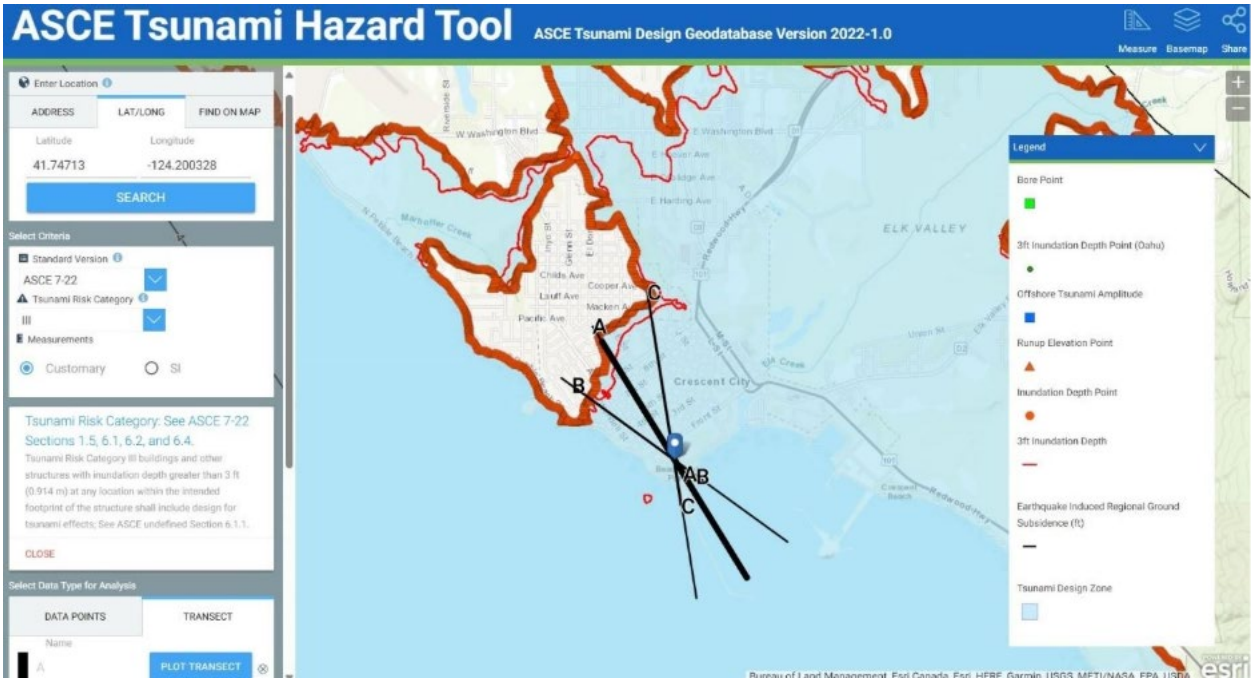


Figure 1-3. Tsunami Design Zone Impacting the City of Crescent City Wastewater Treatment Facility
Source: ASCE n.d.

Design for the impacts of tsunamis is mandated under the CBC for all Tsunami Risk Category IV structures. It is not required for Tsunami Risk Category III structures where the inundation depth at the structure does not exceed 3 feet above existing grade level at the center of the structure in question.

Preliminary energy grade line analyses were conducted for the site using ASCE's Tsunami Hazard Tool (asce7tsunami.online) on the six transept lines ("A" through "C") that are shown on Figure 1-3 that cover the range of flow directions required to be considered in determining the inundation depth. Table 1-3 summarizes the results of the energy grade line analyses. Ground level at the plant is higher than the surrounding areas. However, the site is still inundated by the Maximum Considered Tsunami with a 2,475-year return period, which the code requires be considered. The 33.90-foot depth of inundation over the typical finish grade elevation at the site as calculated well exceeds the 3-foot limit to avoid tsunami design for structures in Tsunami Risk Category III.

Table 1-3. Summary of Tsunami Analysis Results at the Site

Transept	Inundation Depth	Ground Elevation at Point Considered	Tsunami Flow Velocity
A (perpendicular to shoreline)	33.82 feet	Elevation 19.70 (NAVD88)	41.13 ft/s
B (22.5 degrees counterclockwise from transept A)	28.55 feet	Elevation 19.70 (NAVD88)	36.81 ft/s
C (22.5 degrees clockwise from transept A)	33.90 feet	Elevation 19.70 (NAVD88)	39.08 ft/s

ft/s = foot (feet) per second
NAVD88 = North American Vertical Datum of 1988

With an inundation depth greater than 3 feet, ASCE 7-22 requires debris impact loads to be considered. For inundation depths greater than 16 feet, "extraordinary debris impacts" on structures involving the largest ships and barges with ballasted drafts less than the inundation depth that can be dispersed from nearby ports, harbors, or shipping container yards must be considered (ASCE 7-22, Section 6.11.7). Such impacts can occur at this site for tsunamis that happen more frequently.

For existing structures, the 2025 California Existing Building Code (CEBC) does not explicitly require consideration of tsunami loads. However, repairs, alterations, and additions to existing structures that constitute substantial improvements are typically not allowed in flood hazard areas without following the provisions for new building designs. Floods with a 1% probability of exceedance in any given year (100-year return period) are used to determine the flood hazard area.

Federal Emergency Management Agency's (FEMA's) Flood Insurance Rate Map for the area on Figure 1-4 shows 100-year water levels offshore associated with "VE" zones related to storm waves. In the area of those zones, the FEMA Flood Insurance Study for Del Norte County, California, and Incorporated Areas (2017) indicates the following:

"The coastal analysis indicated the eroded beach profile was either not overtopped by the 1% total water level (TWL), or the overtopping splash zone did not extend beyond the landward limit of the primary frontal dune (PFD) for most transects. In that case, the mapping was limited to a VE zone extending from map datum (0 ft NAVD88) to the landward limit of the PFD."

Therefore, the "VE" zones do not indicate 100-year water levels overtopping the WWTF site that would require application of design for flooding under the CEBC.

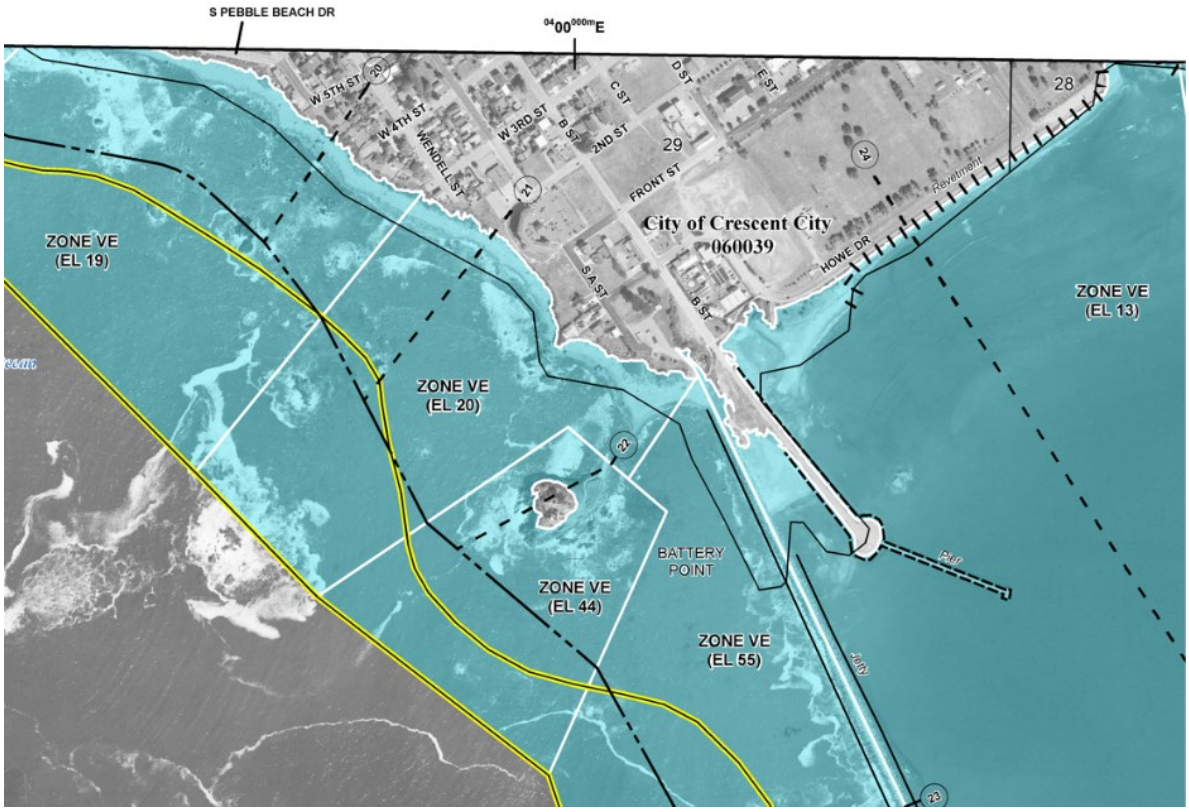


Figure 1-4. Flood Insurance Rate Map for the Area Around the Wastewater Treatment Facility
Source: FEMA 2017

The Flood Insurance Study (FEMA 2017) products do not include non-regulatory information about tsunami runup elevations. The U.S. Army Corps of Engineers (USACE) published Technical Report H-78-26 (USACE 1978), which provided elevations for the 100- and 500-year return period tsunamis along the west coast of the United States. Figure 1-5 shows the results of the numerical modeling from that study, which do not include adjustments for sea level rise and seismic ground subsidence. The 100-year runup elevation was found to be 13.9 feet (National Geodetic Vertical Datum of 1929 [NGVD29]), while the 500-year runup elevation was determined to be 24.9 feet (NGVD29). By comparison, the technical report (USACE 1978) results using a probabilistic evaluation of historical data were 14.5 and 25.5 feet (NGVD29) for the 100- and 500-year tsunami events, respectively. Converting to the NAVD88 datum with a 2.05-foot future sea level rise over 50 years in accordance with the National Oceanic and Atmospheric Administration's (NOAA's) Sea Level Calculator, the 100-year tsunami event would have a runup elevation of 16.94 feet.

Runup elevations are approximately equal to the tsunami flood elevation at the shoreline (with a difference of 1.3 feet in the energy grade line analyses for the 2,475-year tsunami). Given that neither the storm wave nor tsunami historical data indicate the WWTF site is inundated at a 1% probability of exceedance, the site is not considered to fall within a flood hazard area. Substantial improvements can be made to existing structures without meeting the requirements of ASCE 7-22 for flood design.

Given the high costs inherent in protecting new structures from over 30 feet of water and ship impacts, the project is designed to modify and use the existing structures at the site to house the new treatment processes. With the site sitting above the 100-year flood elevation, no modifications to the existing foundations are required using that approach to protect against erosion occurring during tsunami runup and drawdown conditions.

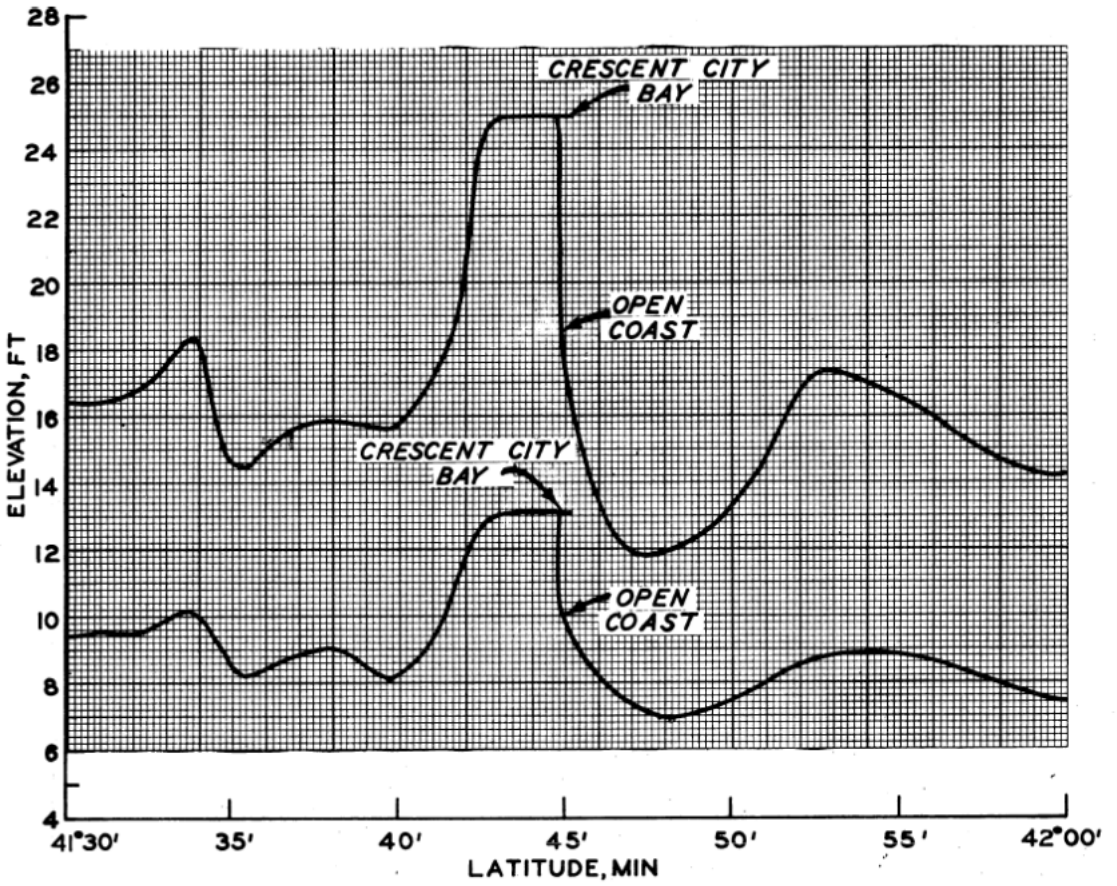


Figure 1-5. U.S. Army Corps of Engineers Technical Report H-78-26 Numerical Tsunami Modeling Results
Source: USACE 1978

For new Risk Category IV buildings in a Tsunami Design Zone, nonstructural components needed for the facility to function would have to be either protected from tsunami inundation effects or positioned in the structure above the inundation elevation of the Maximum Considered Tsunami. That requirement is not modified by placing the structures in Tsunami Risk Category III. Design of the project under the CEBC using existing structures also precludes the need to provide those protections for new equipment.

1.3 Existing Treatment Facilities

The WWTF treatment process consists of physical, mechanical, biological, and chemical methods that combine to treat sewage from the incorporated Crescent City area. The influent raw waste consists of primarily domestic sewage with some commercial contributions. The WWTF is permitted to treat and discharge an annual average daily flow of 1.86 million gallons per day (MGD) and a peak day flow of 6.12 MGD, and it primarily discharges tertiary treated effluent through an ocean outfall. Figure 1-6 shows a plan view of the existing treatment facilities. Figure 1-7 shows the existing process flow diagram.

Microsoft product screenshot(s) reprinted with permission from Microsoft Corporation.

Figure 1-6. City of Crescent City Wastewater Treatment Facility Site Plan

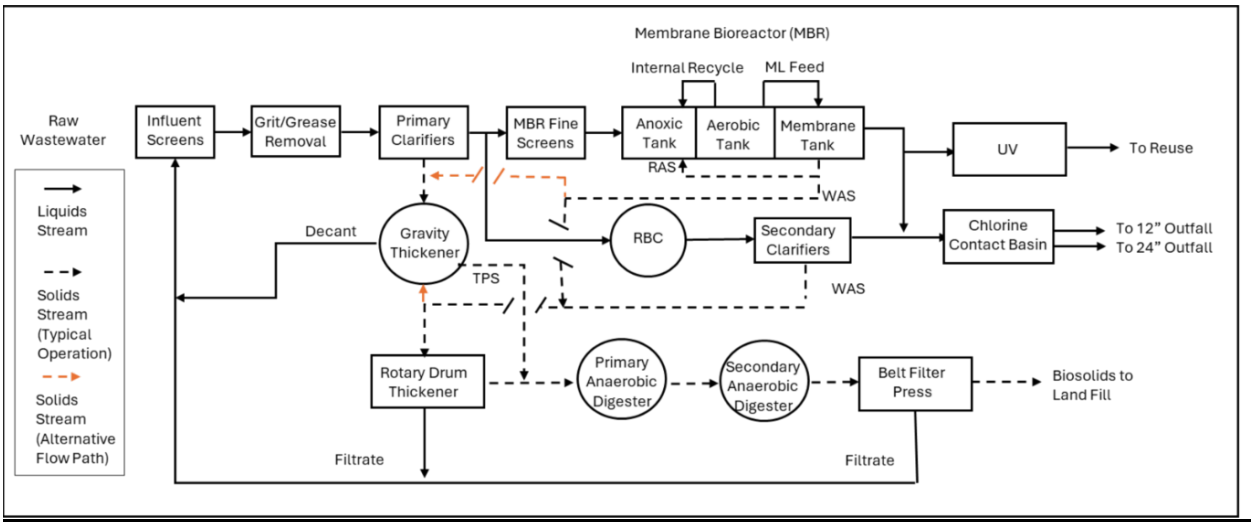


Figure 1-7. City of Crescent City Wastewater Treatment Facility Existing Process Flow Diagram

The WWTF liquid treatment stream consists of preliminary, primary, secondary, and disinfection treatment. The preliminary process consists of screening and aerated grit removal, which are ultimately disposed of in a landfill. The primary treatment process removes particulate settleable solids by gravity and allows the soluble biodegradable liquid stream to flow through to the downstream processes. The particulate settled solids are sent to the solids stream treatment process for further treatment. The secondary treatment process consists of two separate treatment streams, with one being an RBC and the other stream being an MBR process. The RBC effluent flow is sent to a secondary clarifier for gravity settling of solids, and the effluent is combined with the MBR permeate for downstream disinfection. One goal of both secondary treatment processes is to convert the soluble readily biodegradable carbon or soluble biochemical oxygen demand (sBOD) to biological cells, which are ultimately removed in the solids treatment stream. The other goal in treatment is removal of nitrogen in the MBR process through anoxic and aerobic biological reactions. Disinfection of the combined secondary effluents are accomplished by dosing sodium hypochlorite to achieve a chlorine residual near 3 milligrams per liter (mg/L). Dechlorination is then completed by adding sodium bisulfite after post chlorine contact chamber. The final effluent is then discharged to the ocean on the south side of Battery Point Lighthouse.

In the solid process stream, primary sludge is pumped into the GT. GT sludge is thickened and fed to the anaerobic digester. Waste activated sludge (WAS) from the MBRs is pumped to the rotary drum thickener (RDT). The thickened waste activated sludge (TWAS) is then fed directly to the anaerobic digester. Digested sludge is dewatered using a belt filter press (BFP), and BFP cake is then transported to the landfill.

The WWTF's primary treatment system consists of two aerated grit removal tanks followed by two rectangular primary clarifiers. Primary sludge is pumped to the GT. Floatable scum and grease are mechanically skimmed and pumped to the GT.

Secondary treatment is provided by operating the RBC and MBR in parallel. The RBC system consists of three trains of four-stage RBCs with a combined surface area of 1.2 million ft^2. Flow from the RBCs reach three rectangular secondary clarifiers, where the biological solids settle. The solids are drawn to hoppers at the inlet end of the tanks, where the solids are removed and pumped to the RDT, with an option to be pumped to the GT.

The existing RBC facility has been experiencing recurring mechanical issues. As of March 2025, 4 of 12 RBC units were offline for mechanical issues, and the remaining RBC units are not up to the expected treatment performance, resulting in high suspended solids in the clarified effluent.

The MBR treatment system uses a similar population of bacteria and identical biochemical pathways to those found in other aerated biological processes to convert soluble and particulate biochemical oxygen demand (BOD). Bacteria are concentrated and supplied with oxygen in the aeration basin. The bacteria consume BOD and convert it to carbon dioxide and water as they metabolize and reproduce.

1.3.1 National Pollutant Discharge Elimination System Permit Information

The WWTF operates under the NPDES Order Number R1-2023-0039. This order was adopted by the RWQCB on December 12, 2023, became effective on February 1, 2024, and expires on January 31, 2029. Appendix A includes the permit. Table 1-4 summarizes the effluent limitations.

Table 1-4. National Pollutant Discharge Elimination System R1-2023-0039 Effluent Limitations

Parameter	Units	Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum	6-Month Median
BOD_5 at 20°C	mg/L	30	45	N/A	N/A	N/A	N/A
TSS	mg/L	30	45	N/A	N/A	N/A	N/A
pH	SU	N/A	N/A	N/A	6.0	9.0	N/A
Oil and Grease	mg/L	25	40	N/A	N/A	75	N/A
Ammonia Nitrogen, Total (as N)	mg/L	N/A	N/A	72	N/A	180	18
Settleable Solids	mL/L	1.0	1.5	N/A	N/A	3.0	N/A
Turbidity	NTU	75	100	N/A	N/A	225	N/A
Copper, Total Recoverable	µg/L	N/A	N/A	300	N/A	840	32
Silver, Total Recoverable	µg/L	N/A	N/A	79	N/A	200	16
Endosulfan	µg/L	N/A	N/A	0.54	N/A	0.81	0.27
Endrin	µg/L	N/A	N/A	0.12	N/A	0.18	0.060
Total Residual Chlorine	µg/L	N/A	N/A	240	N/A	1,800	60
DDT	µg/L	0.0051	N/A	N/A	N/A	N/A	N/A
Heptachlor	µg/L	0.0015	N/A	N/A	N/A	N/A	N/A
Dieldrin	µg/L	0.0012	N/A	N/A	N/A	N/A	N/A

°C = degree(s) Celsius
µg/L = microgram(s) per liter
BOD_5 = biological oxygen demand 5-day
DDT = dichlorodiphenyltrichloroethane
mL/L = milliliter(s) per liter
N/A = not applicable
NTU = Nephelometric turbidity unit(s)
SU = standard unit(s)
TSS = total suspended solids

1.3.1.1 Additional Requirements

- **Facility Permitted Flow**
  - Average dry weather flow (ADWF) through the WWTF must not exceed 1.86 MGD, measured daily and averaged over a calendar month.

- Average wet weather flow through the WWTF must not exceed 6.12 MGD, measured daily and averaged over a calendar month.

- **Disinfection Requirements**
  - Enterococci: The 6-week rolling geometric mean must not exceed 30 colony forming units (CFU) per 100 milliliters, and no sample must exceed a CFU of 110 per 100 milliliters.
  - Total Coliform Organisms: The median value of total coliform bacteria must not exceed a Most Probable Number (MPN) of 70 per 100 milliliters in a calendar month, and not more than 10% of the samples collected in a calendar month can exceed an MPN of 230 per 100 milliliters.
  - Fecal Coliform: The 30-day geometric mean of fecal coliform density must not exceed 200 per 100 milliliters.

1.3.1.2 Previous Permit Cycle

The permit cycle preceding NPDES Order Number R1-2023-0039 was RWQCB Order Number R1-2017-0002. This permit was adopted on February 2, 2017, was effective on April 1, 2017, and expired on March 31, 2022. Table 1-5 summarizes the effluent limitations from this previous permit cycle.

Table 1-5. North Coast Regional Water Quality Control Board Order Number R1-2017-0002 Effluent Limitations

Parameter	Units	Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum	6-Month Median
BOD_5 at 20°C	mg/L	30	45	N/A	N/A	N/A	N/A
	lb/day	465	700	N/A	N/A	N/A	N/A
TSS	mg/L	30	45	N/A	N/A	N/A	N/A
	lb/day	465	700	N/A	N/A	N/A	N/A
pH	SU	N/A	N/A	N/A	6.0	9.0	N/A
Oil and Grease	mg/L	25	40	N/A	N/A	75	N/A
Ammonia Nitrogen, Total (as N)	mg/L	N/A	N/A	72	N/A	180	18
Settleable Solids	mL/L	1.0	1.5	N/A	N/A	3.0	N/A
Turbidity	NTU	75	100	N/A	N/A	225	N/A
Copper, Total Recoverable	µg/L	N/A	N/A	300	N/A	840	32
Nickel, Total Recoverable	µg/L	N/A	N/A	600	N/A	1,500	150
Total Residual Chlorine	µg/L	N/A	N/A	240	N/A	1,800	60

Parameter	Units	Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum	6-Month Median
Dieldrin	µg/L	0.0012	N/A	N/A	N/A	N/A	N/A
TCDD Equivalents	µg/L	$1.2 \times 10^{(-7)}$	N/A	N/A	N/A	N/A	N/A

lb/day = pound(s) per day
TCDD = 2,3,7,8-tetrachlorodibenzodioxin

1.3.1.3 Disinfection Requirements

- Fecal Coliform: The median value of fecal coliform bacteria must not exceed a MPN of 14 per 100 milliliters in a calendar month, no more than 10% of samples collected in a calendar month can exceed an MPN of 43 per 100 milliliters, and no single sample can exceed an MPN of 400 per 100 milliliters.

1.3.1.4 Historical Discharge Violations

Under RWQCB Order Number R1-2017-0002, the WWTF experienced disinfection-related permit limit exceedances for total residual chlorine and fecal coliform. Under NPDES Order Number R1-2023-0039, the WWTF experienced permit limit exceedances for total residual chlorine, fecal coliform, total coliform, and enterococcus. Table 1-6 lists the number of Crescent City WWTF's reported effluent quality disinfection-related violations in accordance with California Integrated Water Quality System Facility Identification 216106 for calendar years 2020 to 2024.

Table 1-6. City of Crescent City Wastewater Treatment Facility Disinfection Violations from 2020 to 2023

Year	Total Chlorine Residual	Fecal Coliform	Total Coliform	Enterococcus	Total per Year
2020	8	3	N/A	N/A	11
2021	2	2	N/A	N/A	4
2022	1	2	N/A	N/A	3
2023	1	2	N/A	N/A	3
2024	1	2	18	21	42
Total per Constituent	13	11	18	21	N/A

The data show the WWTF had difficulty meeting the existing disinfection limits for total chlorine residual and fecal coliform. The WWTF experienced significantly more frequent violations related to the new, more stringent total coliform and enterococcus effluent limits.

The City WWTF received a Time Schedule Order (TSO) (R1-2025-0015) from the California Regional Water Quality Control Board, North Coast Region, adopted June 6, 2025, which provided time schedules to comply with the effluent limitations for enterococci and total coliform bacteria, established under NPDES Order Number R1-2023-0039. Appendix B provides the TSO.

The liquid stream upgrades proposed in this BODR were selected in the Project Report (Jacobs 2025) as improvements that would allow the WWTF to achieve discharge compliance with NPDES Order Number R1-2023-0039 under design influent flow and loading conditions.

1.3.1.5 Administrative Civil Liability Complaint

The City received an Administrative Civil Liability Complaint (ACL) from the RWQCB for violation of effluent limitations contained in RWQCB Order Number R1-2017-0002 and NPDES Order Number R1-2023-0039. The violations include the previously cited violations and additional violations totaling 76 chronic violations. The additional violations not shown in Table 1-6 include one settleable solids violation and three ammonia, total as N, violations. Appendix C includes the ACL claim. The RWQCB is required to assess minimum monthly penalties (MMP) of $3,000 for each serious violation, not counting the first three violations. The City WWTF was assessed an MMP of $228,000 for the effluent limitation exceedances.

1.4 Project Schedule Update

Table 1-7 includes an update to the project schedule presented in the Project Report (Jacobs 2025). This table lists the milestones required to apply for principal forgiveness with the SRF as administered through the SWRCB's DFA for project implementation through construction. The proposed schedule is subject to the following conditions and requirements:

1. Grant application review and approval by DFA
2. Grant agreement preparation and approval by DFA
3. Environmental review from participating agencies
4. Other constraints and durations that are out of the control of the City or Jacobs

The schedule assumes the City will place a public Request for Proposals for the final design of the upgrade project once funding has been secured. It is recommended that the selected engineering consultant complete the final design based on this BODR and provide bidding assistance and engineering services during construction. The final design period is estimated at 2 years, and the construction period is estimated at 5 years. The project is expected to be completed by late 2035.

Table 1-7. Anticipated Project Schedule

Project Milestones	Approximate Schedule/Timeline
SWRCB DFA Funding Approval	November 30, 2023
Clean Water SRF Application	
General Information Package	October 2023 to March 2026
Technical Package:	October 2023 to March 2026
Project Report (Jacobs 2025)	October 2023 to July 2025
BODR	June 2025 to December 2025
Class 4 Cost Estimate	December 2025 to January 2026
Environmental Package	October 2025 to March 2026
Financial Security Package	October 2025 to March 2026
DFA Funding Application Review Period and Funding Agreement Development	March 2026 to March 2028
Request for Proposals for Final Design	March 2028 to May 2028
Final Design	June 2028 to June 2030
Construction Bidding and Award	July 2030 to September 2035
Construction Duration	October 2030 to October 2035

1.4.1 Construction Sequencing

Construction sequencing is essential for managing projects effectively and ensuring continued WWTF operation during construction activities, considering influent flow patterns and fluctuations. Table 1-8 lists the construction sequencing constraints. The flow periods associated with the peak flows stated in Table1-8 are listed in Table 1-9.

Table 1-8. Construction Sequencing Constraints

Facility	Description of Work	Sequencing Constraints
Primary Clarifiers	Replace failing mechanical equipment. Resurface and recoat the basin interior walls and floors.	Maintain one primary clarifier online at all times. Complete during dry season.[a]
Grit Removal	Replace grit cyclone(s), grit classifier, and grit piping.	N/A.
MBRs	Add redundant train.	N/A.
RBCs	Demolish mechanical equipment and retrofit basin with a modular attached growth process.	RBC demolition and attached growth facility construction to occur during one dry season[a] when influent flows are less than 1.8 MGD. Construction coincide with cloth filter facility construction. OR Demolition and construction activities commence after MBR Train 2 is brought online and during one dry season[a] when influent flows are less than 3.6 MGD.
Secondary Clarifiers	Demolish mechanical equipment and retrofit existing basins to contain the following facilities: ▪ Redundant MBR train ▪ Cloth filters to treat effluent from the attached growth process ▪ Storage and pumping facilities for waste activated and digested sludge	Must maintain minimum of two secondary clarifier trains online outside of allowed shutdown periods described as follows. Secondary clarifier demolition and new facility construction to occur during one dry season[a] when influent flows are less than 1.8 MGD. Cloth filter facility construction coincide with attached growth facility construction. OR Demolition and construction activities commence after MBR Train 2 is brought online and during one dry season when influent flows are less than 3.6 MGD.
MBR Building	Add equipment to support new MBR facility.	N/A.

Facility	Description of Work	Sequencing Constraints
GT	Replace entire mechanism and supporting mechanical equipment, recoat interior concrete, and add cover to facility.	N/A.
Anaerobic Digesters	Replace floating covers with fixed covers and install associated gas collection and safety equipment. Replace boiler	One anaerobic digester will remain operational at all times. Construction of digester roofs to occur after digested sludge storage basin is complete.
HVAC	Install new HVAC equipment in the pump gallery (6 ACH). Replace or upgrade HVAC equipment in: ▪ Administration building (complete replacement) ▪ MBR building chemical room (replace corroded ductwork and fan with 316 SST) ▪ Digester building (replace fan only, 12 ACH) ▪ Dewatering building (replace fan and ductwork, 6 ACH)	N/A.
SCADA and Electrical	Complete general improvements to support upgraded facilities.	N/A.

[a] Refer to Table 1-9 for "dry season" definition.

Table 1-9. Possible Construction Activity Months

Construction Constraint Activity	Flow Condition	Possible Construction Months
Primary Clarifier Rehabilitation	Dry season operation	May to October
RBC Demolition Secondary Clarifier Demolition	Maximum 3.6 MGD with two MBR trains online OR Maximum 1.8 MGD with one MBR train online	April to November July to September

1.4.2 Class 4: Conceptual Estimate

A Class 4 Estimate of Construction Cost will be prepared in accordance with American Association of Cost Engineers, International guidelines and based on the 15% concept design. A Class 4 estimate has a -20% to +30% accuracy range and is used to provide preliminary budgeting and economic feasibility. The Class 4 estimate is compiled using semi-detailed, parametric, and analogous estimating supported by historical cost data and project-specific budgetary cost data, if obtained. Jacobs has a dedicated cost estimating team that will review the information presented in this report and use it as the basis to produce a Class 4 estimate. The estimate of construction cost will be provided under a separate cover to the client within 4 weeks of the final report completion.

1.4.3 Environmental Considerations

The following information is provided to inform the environmental review associated with this project.

1.4.3.1 Ground-Disturbing Construction Activities

The project will be designed to not construct any new foundations. Therefore, no excessive excavation is expected.

Minor excavation will be required to install buried yard piping, conduit runs, and other utilities. However, because this piping is being installed in an already congested plant site, it is assumed the yard piping excavations will be fairly shallow (less than 5 feet deep, with exception for crossings). Excavation will be performed using typical construction backhoe equipment. Where excavations are less than 5 feet deep, shoring is not required.

There may be minor work outside the fence line of the WWTF to support the construction activities, such as concrete truck and crane access or parking. There is limited room within the plant property for equipment access, so it is anticipated that the construction laydown area, for parking of large equipment, will need to be outside the fence line to conduct construction activities.

1.4.3.2 Visual Impacts

The project includes the demolition of the above-grade RBC equipment. This demolition will improve the sight lines through the plant at this location.

The project includes the construction of a redundant MBR system, which will include an overhead crane. This system and crane equipment will be adjacent to and likely resemble the size and height of the existing equipment. No major visual impacts are expected from this facility because the facility is adjacent to a taller existing building.

The project includes modifications to the existing anaerobic digesters and GT facilities. The work will change the above-grade equipment, and therefore visual appearance, but will not majorly impact the existing view. One digester roof will be raised by 2 feet, but the overall height of this facility will be reduced because the current facility includes guide rails for the floating cover that extend multiple feet into the air. The GT will be covered, but the intent is to provide at-grade covers, so this improvement will also not impact the existing view.

All other improvements will be contained within existing buildings or structures.

1.4.3.3 Construction Duration and Sequencing

The assumed construction schedule includes a 5-year duration, with typical Monday through Friday work days and 7:30 a.m. to 4:30 p.m. work hours, including all required breaks. No overtime or night work is expected for this project.

The WWTF must remain operational during the entire construction project. Therefore, the contractor must present a construction schedule that allows for proper sequencing of construction activities to allow the WWTF to remain functional and produce effluent that at least meets the previous effluent quality conditions. Additionally, the contraction must provide a schedule that allows for adequate treatment capacity to be online during the wet season because this is when the WWTF experiences disinfection-related violations. The wet season will be defined in the construction documents.

1.4.3.4 Construction Equipment Assumptions

This project does not anticipate any deep excavations or pile driving activities. The assumed construction equipment required to complete the work includes the following:

- Overhead cranes
- Concrete trucks and consolidation equipment
- Mini excavator/backhoe
- Asphalt-laying equipment
- Other typical handheld construction equipment to complete the work

1.4.3.5 Stormwater Pollution and Prevention Plan

The stormwater pollution and prevention plan and maintenance of onsite best management practices in accordance with the plan will be the responsibility of the contractor.

2. Flows and Loading Design Criteria

This section describes the flows and loading design criteria.

2.1 Historical Flows and Loads

The analysis of historical flow and load data forms the basis of developing wastewater flow projections. The following assessment of current and historic flow conditions for the WWTF is based on operating data from January 2021 through September 2025.

2.2 Wastewater Flows

Because wastewater flows vary seasonally and in response to precipitation, several different flow conditions are important in sizing and evaluating wastewater treatment plants.

The flow rate and related parameters discussed in this section are defined as follows:

- *Average Dry Weather Flow (ADWF).* The average of daily flows over the 6-month dry weather season (May 1 through October 31).
- *Average Wet Weather Flow (AWWF).* The average flow at the plant during the wet weather season (November 1 through April 30) during a year with average rainfall.
- *Maximum Month Dry Weather Flow (MMDWF).* The monthly average flow corresponding to the wettest dry weather month.
- *Maximum Month Wet Weather Flow (MMWWF).* The anticipated monthly average flow corresponding to the wettest wet weather month.
- *Peak Hour Flow (PHF).* The peak flow sustained for 1-hour during a consecutive 24-hours

2.2.1 Wastewater Treatment Facility Flow Analysis

Table 2-1 and Table 2-2 summarize the dry weather and wet weather flows and pollutant characteristics data for the period from January 2021 through September 2025, respectively. Table 2-1 and Table 2-2 presents influent flow, in pound per day, in MGD, BOD, and TSS loading.

The average and maximum month TSS influent load is trending upward during the dry and wet weather conditions, but the BOD influent loading is relatively steady. The cause of this increase is currently unknown, and further evaluation is required.

Table 2-1. Crescent City Wastewater Treatment Facility Dry Weather Season Influent Wastewater Characteristics

	Flow, MGD		TSS, lb/day		BOD, lb/day		Ammonia, lb/day	
Year	ADWF	MMDWF	ADWF	MMDWF	ADWF	MMDWF	ADWF	MMDWF
2021	1.03	1.27	2,777	3,182	2,893	3,191	271	329
2022	1.14	1.58	2,320	2,578	2,747	3,292	277	313
2023	0.95	2.19	2,125	2,999	2,377	2,849	277	347
2024	1.22	1.54	1,941	2,337	2,382	2,698	288	421
2025	0.96	1.95	3,537	4,258	2,922	3,569	256	292
Summary	**1.02**	**1.71**	**2,540**	**3,071**	**2,664**	**3,120**	**274**	**341**

Table 2-2. Crescent City Wastewater Treatment Facility Wet Weather Season Influent Wastewater Characteristics

Year	Flow, MGD		TSS, lb/day		BOD, lb/day		Ammonia, lb/day	
	AWWF	MMWWF	AWWF	MMWWF	AWWF	MMWWF	AWWF	MMWWF
2021	1.43	2.70	2,776	3,366	2,838	3,191	243	294
2022	1.23	1.97	2,246	2,578	2,729	3,292	278	303
2023	1.50	2.95	2,299	3,215	2,506	3,025	271	311
2024	2.27	3.79	2,527	3,358	2,815	3,576	230	269
2025	2.23	3.05	3,556	4,175	3,117	3,379	250	283
Summary	**1.51**	**3.79**	**2,456**	**3,366**	**2,705**	**3,576**	**254**	**311**

2.3 Service Area

The WWTF's service area includes the City limits and the surrounding Del Norte County Service Area (CSA). The CSA consists of the following two subareas:

- CSA District #1: Bertsch Ocean View Area to the east
- CSA District #2: Northeast area (North of the City)

Figure 2-1 shows a map of the service area.

The service area location and growth assumptions are discussed in the next section.

2.3.1 Service Area Growth Projections

Since 2010, the City's population has been in decline, as presented in Table 2-3. The population growth of Del Norte County is also included in this analysis because it includes the population of Crecent City. The *2022-2030 Housing Element Update* (City 2023) states that the State of California's Department of Finance (DOF) provides population projections for the state and all counties through 2060. Long-term population projections for the City were not available. Table 2-4 projections indicate a steady decline is set to continue in the overall population of the County. The City's population trends will likely mirror that of the County.

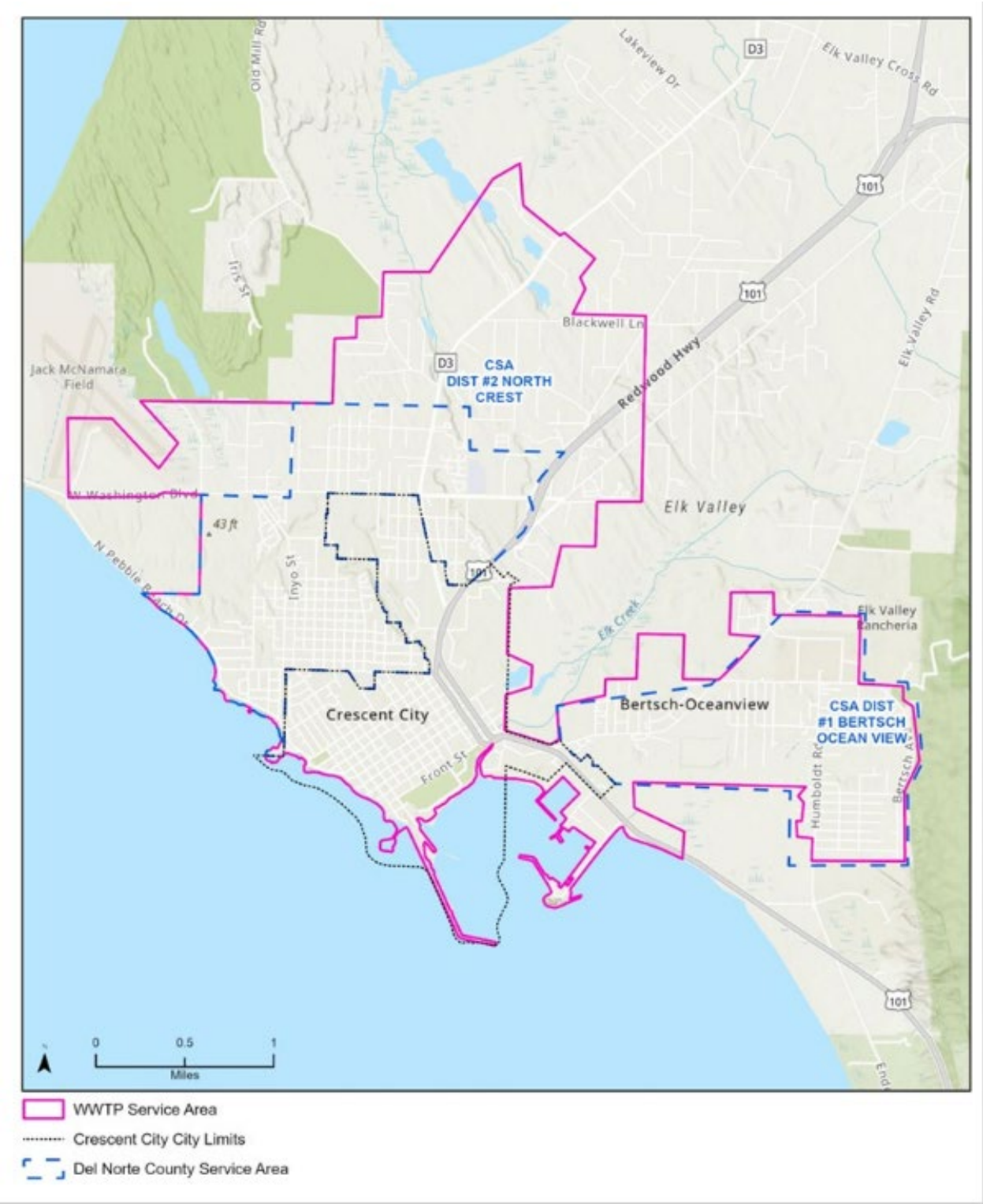


Figure 2-1. Wastewater Treatment Facility Service Area

Table 2-3. 2022 to 2030 City of Crescent City Housing Element Update – 2010 to 2019 Population Growth

Jurisdiction	2010 Population	2015 Population	Growth Rate (2010 to 2015)	2019 Population	Growth Rate (2015 to 2019)
Crescent City	7,676	7,120	-7.25	6,676	-6.25
Del Norte County	28,471	27,788	-2.4%	27,495	-1.1%

Source: U.S. Census Bureau n.d.

Table 2-4 presents the DOF's population estimates for Del Norte County from 2020 to 2025.

Table 2-4. 2020 to 2025 Population Estimates for Crescent City

Year	2020	2030	2040	2050	2060	Annual Growth 2020 to 2060
Del Norte County Population	27,193	26,750	26,498	25,975	25,720	-0.14%

Source: California Department of finance. Demographic Research Unit. Report P-2A. Total Population Projections, California Counties, 2010-2060 (Baseline 2019 Population Projections; Vintage 2020 Release). Sacramento: California. July 2021.

Based on the City's declining growth rate experienced between 2010 and 2019 and the DOF's declining population estimates for the County from 2020 to 2025, the WWTF service area is expected to maintain a stable population for the duration of the 20-year planning period. The projected growth of the City is still within the population projections threshold established in the 2001 General Plan (City 2001), which matches the flows in the existing NPDES permit.

2.4 Design Flows and Loads

The WWTF has been designed and permitted to accept and treat flows of 1.86 MGD at ADWF conditions and 6.12 MGD at average wet weather conditions. These flows are used as the design base for the improvements discussed in this report. To determine projected average day dry weather BOD_5, TSS, and ammonia loadings at the design flows, BOD_5, TSS, and ammonia concentrations at current conditions were multiplied by projected ADWF. All other projected flow and loads were developed by multiplying the peaking factor presented in Table 2-5 by the design ADW flows and loads. Table 2-6 summarizes the design influent flows and loads.

Table 2-5. Crescent City Wastewater Treatment Facility Upgrade Project Design Flows and Loads

Parameter	Flow	BOD_5 Loading	BOD_5 Concentration	TSS Loading	TSS Concentration	Ammonia Loading	Ammonia Concentration
Units	MGD	lb/day	mg/L	lb/day	mg/L	lb/day	mg/L
ADWF	1.86	4,857	313	4,630	298	499	32.2
MMDWF	3.14	5,687	217	5,628	215	619	23.6
PWDWF	3.33	6,216	224	6,234	225	667	24.0
MMWWF	5.29	5,963	135	6,165	140	533	18.3
PWWWF	6.54	7,111	130	7,354	135	682	12.5
MDWWF	9.02	9,257	123	10,285	137	682	9.1
PHF	14.0	N/A	N/A	N/A	N/A	N/A	N/A

MDWWF = maximum day wet weather flow
PWDWF = peak week dry weather flow
PWWWF = peak week wet weather flow

Table 2-6. Wastewater Treatment Facility Peaking Factors

Peaking Factors	Flow	TSS load	BOD Load	Ammonia Load
MMADWW: ADDW	1.69	1.22	1.17	1.24
MMADDW: ADDW	2.85	1.33	1.23	1.07
PDWW: ADDW	4.85	2.22	1.91	1.37
PWWWF: ADDW	3.52	1.59	1.46	1.37
PWDWF: ADDW	1.79	1.35	1.28	1.34

ADDW = average day dry weather
MMADWW = maximum month average day wet weather
PDWW = peak day wet weather

2.5 Plant Performance Evaluation

A whole-plant biological process model developed for the Project Report (Jacobs 2025) was used to evaluate plant performance at the current conditions and design flows with the improvements proposed in this report.

The following treatment scenarios are evaluated using the flows and loads presented in Table 2-5:

- ADWF, with wastewater temperature 21°C
  - MBR trains treating primary effluent
  - MBR trains treating attached growth effluent (AGE)
- MMWWF, with wastewater temperature 15°C

The MBR trains will treat either primate effluent or AGE. During dry weather conditions, it is recommended to send the primary effluent to the attached growth facility before it goes to the MBR trains. This will reduce the load to the MBR trains, maximizing the bioreactors capacity. It will also help maintain the biofilm at the attached growth facility. During wet weather conditions, the MBR trains and the attached growth system will operate in parallel, both treating primary effluent. Primary effluent flows exceeding the combined MBR capacity will be directed to the attached growth system.

Table 2-7 summarizes the flow split between the MBR trains and the attached growth facility, along with the results for some key operational parameters for each of the scenarios evaluated.

Table 2-7. Plant Performance Evaluation

Parameter	MBR Train 1	MBR Train 2	Attached Growth
ADWF (MBR trains treating primary effluent)			
PE Flow, MGD	0.8	0.86	0.23
SRT, days	10	10	N/A
ML SS, mg/L	5,100	9,350	N/A
WAS, lb/day	671	696	N/A

Parameter	MBR Train 1	MBR Train 2	Attached Growth
ADWF (MBR trains treating AGE)			
PE Flow, MGD	N/A	N/A	1.86
AGE	0.9	0.98	N/A
SRT, days	10	10	N/A
MLSS, mg/L	3,800	7,500	300
WAS, lb/day	500	550	N/A
MMWWF			
PE Flow, MGD	1.55	1.52	2.3
SRT, days	13.5	13.5	N/A
MLSS, mg/L	5,000	9,050	185
WAS, lb/day	647	664	N/A

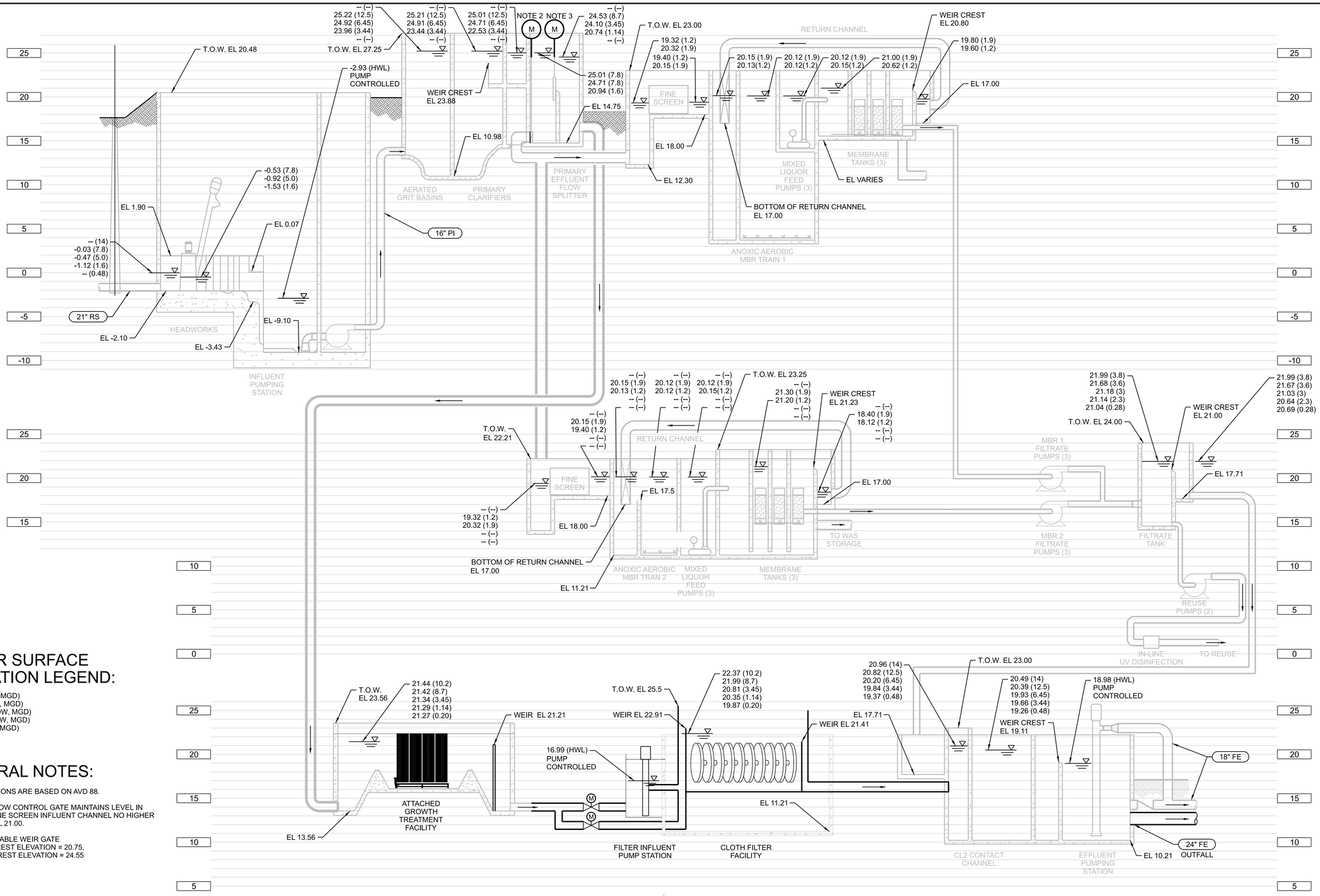
SRT = solids retention time

At the current dry weather average flows and loads, the plant can either use one or both MBR to treat all the influent, allowing the plant operator to take a MBR train offline for maintenance. Under design conditions, the new MBR is expected to provide approximately 1.0 MGD of treatment capacity. The existing MBR has a design capacity of 1.2 MGD ADWF. The combined MBR effluent are projected to have BOD_5 and TSS levels of less than 2 mg/L and less than 1 mg/L, respectively.

At the design flow ADWF condition, all influent flow can be treated by the two MBR trains. Under MMWWF conditions, approximately 2.3 MGD (daily average) will be directed to the attached growth and filtration system. The combined MBR effluent and filtered effluent flows are projected to have BOD_5 and TSS levels of less than 15 mg/L and 8 mg/L, respectively.

2.6 Hydraulics

The hydraulic calculations for the improved liquid flow stream were completed at the design flow conditions. Figure 2-2 presents the preliminary hydraulic profile, updated for the proposed improvements. There are multiple facility locations where 2 feet of freeboard is not achievable, given the existing wall heights. The final design will include extending the walls of the existing basins to maintain the minimum freeboard requirements. Appendix D includes hydraulic calculations.



WATER SURFACE ELEVATION LEGEND:

IPF (FLOW, MGD)
PHF (FLOW, MGD)
AWWF (FLOW, MGD)
ADWF (FLOW, MGD)
MF (FLOW, MGD)

GENERAL NOTES:

1. ELEVATIONS ARE BASED ON AVD 88.
2. MBR FLOW CONTROL GATE MAINTAINS LEVEL IN MBR FINE SCREEN INFLUENT CHANNEL NO HIGHER THAN EL 21.00.
3. ADJUSTABLE WEIR GATE
   LOW CREST ELEVATION = 20.75,
   HIGH CREST ELEVATION = 24.55

FIGURE
HYDRAULIC PROFILE
CRESCENT CITY WWTP
PHASE 1

JACOBS

FILENAME: ANSI_DR.dgn PLOT DATE: 31-OCT-2025 PLOT TIME: 22:36

3. Liquid Stream Improvements

The liquid treatment process improvements were selected to address the existing performance and operational challenges and to meet the treatment objectives outlined in Section 2. The proposed treatment process was identified in the Project Report (Jacobs 2025). The proposed liquid stream improvements include the following components:

- Adding a redundant MBR train
- Retrofitting the existing RBC with a new attached growth biological treatment process
- Adding cloth media filtration process for the attached growth process effluent before combination with the MBR effluent and chlorine disinfection
- Improving existing primary clarifiers

Figure 3-1 presents the liquid process yard piping plan and explains the operating scheme for various operational sequences depending on influent flow rates. Figure 3-2 presents the process flow diagram for the improved liquid stream process.

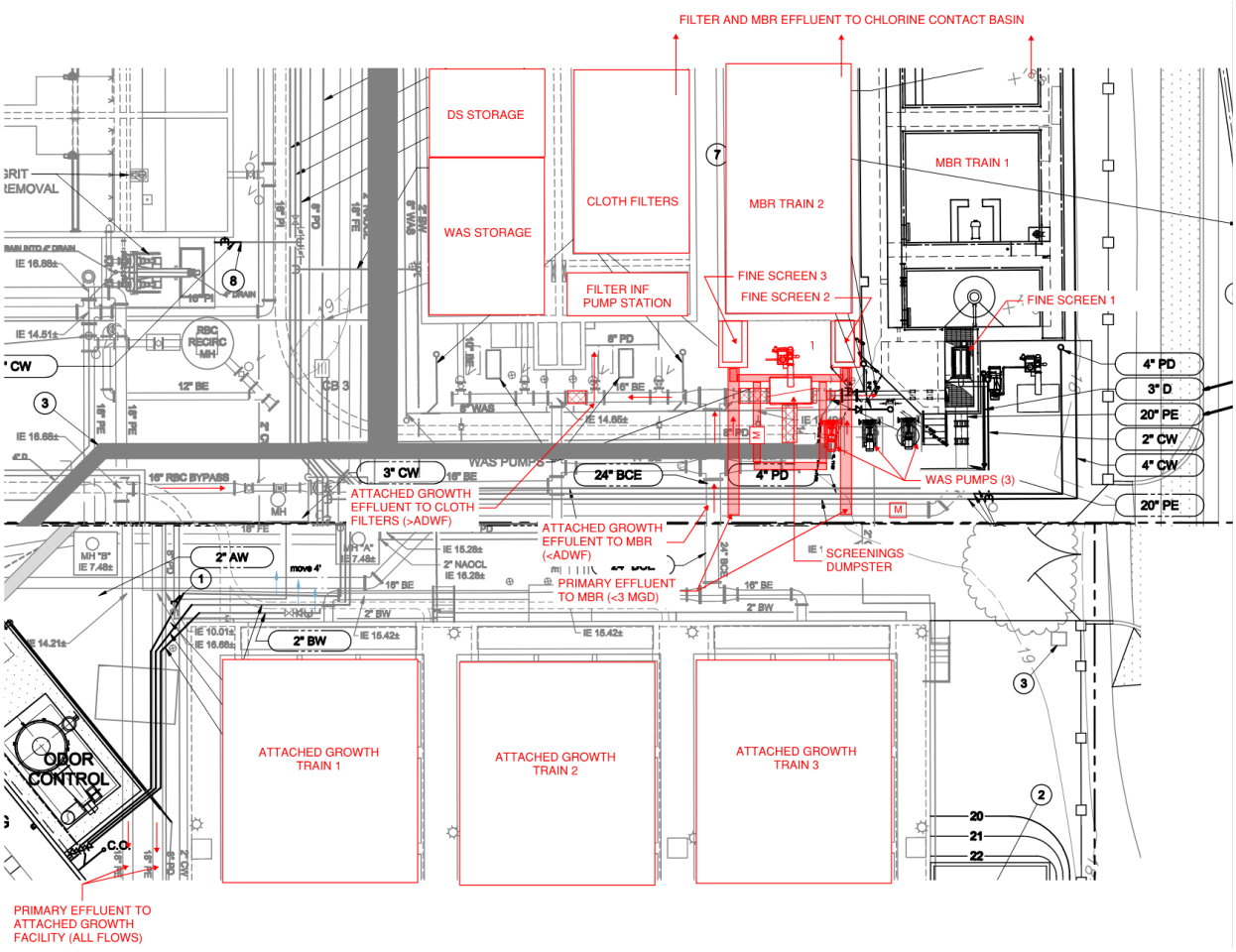
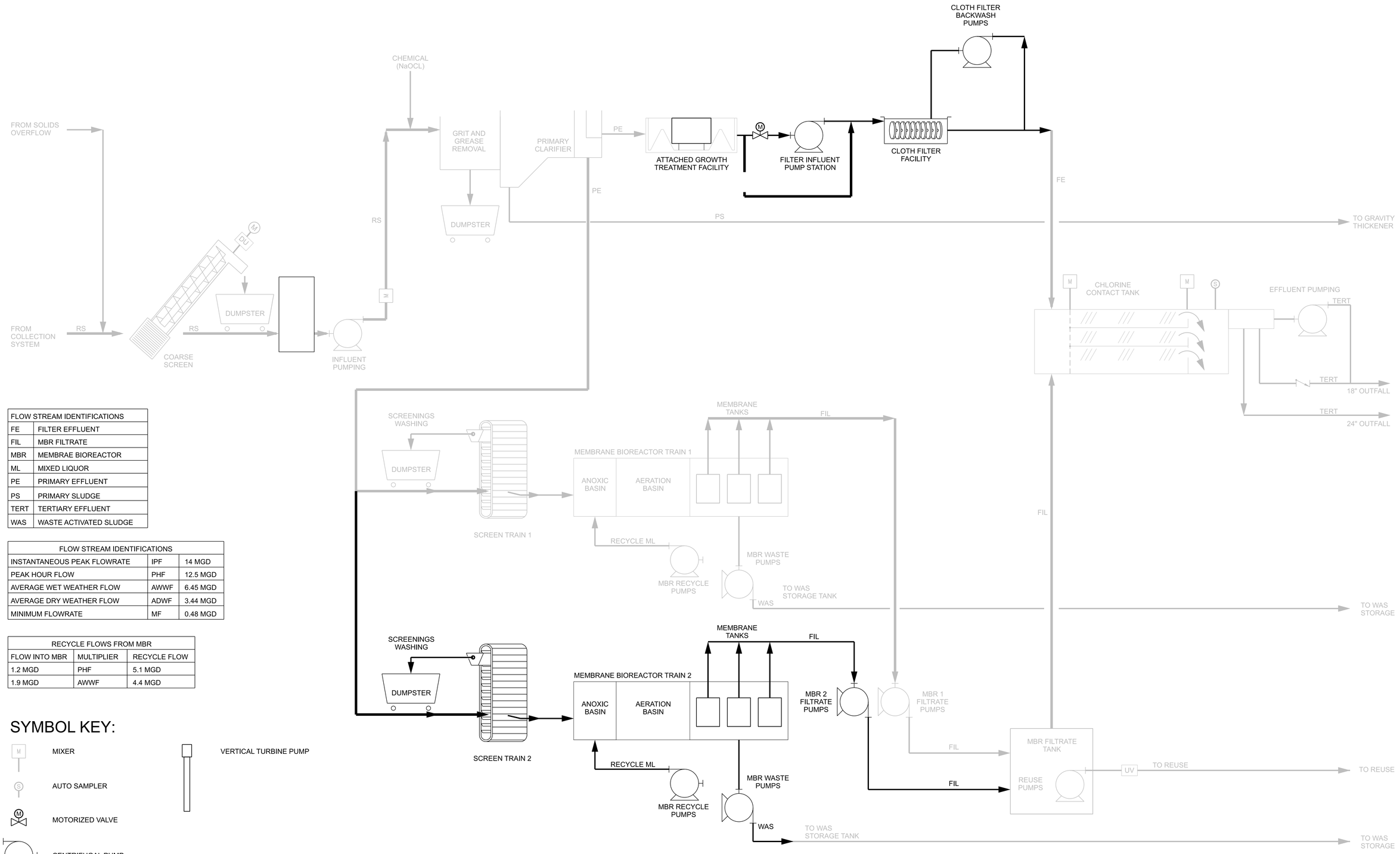


Figure 3-1. Liquid Stream Yard Piping Plan, Including Operational Flow Patterns



FLOW STREAM IDENTIFICATIONS	
FE	FILTER EFFLUENT
FIL	MBR FILTRATE
MBR	MEMBRAE BIOREACTOR
ML	MIXED LIQUOR
PE	PRIMARY EFFLUENT
PS	PRIMARY SLUDGE
TERT	TERTIARY EFFLUENT
WAS	WASTE ACTIVATED SLUDGE

FLOW STREAM IDENTIFICATIONS		
INSTANTANEOUS PEAK FLOWRATE	IPF	14 MGD
PEAK HOUR FLOW	PHF	12.5 MGD
AVERAGE WET WEATHER FLOW	AWWF	6.45 MGD
AVERAGE DRY WEATHER FLOW	ADWF	3.44 MGD
MINIMUM FLOWRATE	MF	0.48 MGD

RECYCLE FLOWS FROM MBR		
FLOW INTO MBR	MULTIPLIER	RECYCLE FLOW
1.2 MGD	PHF	5.1 MGD
1.9 MGD	AWWF	4.4 MGD

SYMBOL KEY:

- MIXER
- AUTO SAMPLER
- MOTORIZED VALVE
- CENTRIFUGAL PUMP
- VERTICAL TURBINE PUMP

FIGURE
LIQUIDS PROCESS FLOW DIAGRAM
CRESCENT CITY WWTP
PHASE 1

W8Y18700

FILENAME: ANSI_DR.dgn PLOT DATE: 31-OCT-2025 PLOT TIME: 21:15

3.1 Membrane Bioreactor

A redundant MBR train, MBR Train 2, will be constructed as part of the project. The second MBR train will be in the eastern most secondary clarifier basin. The basin will be divided into four sections to replicate the existing MBR layout: an anoxic zone, an aerobic zone, a mixed liquor (ML) pump station (PS), and membrane trains. Figure 3-3 presents the proposed layout of the proposed MBR facility.

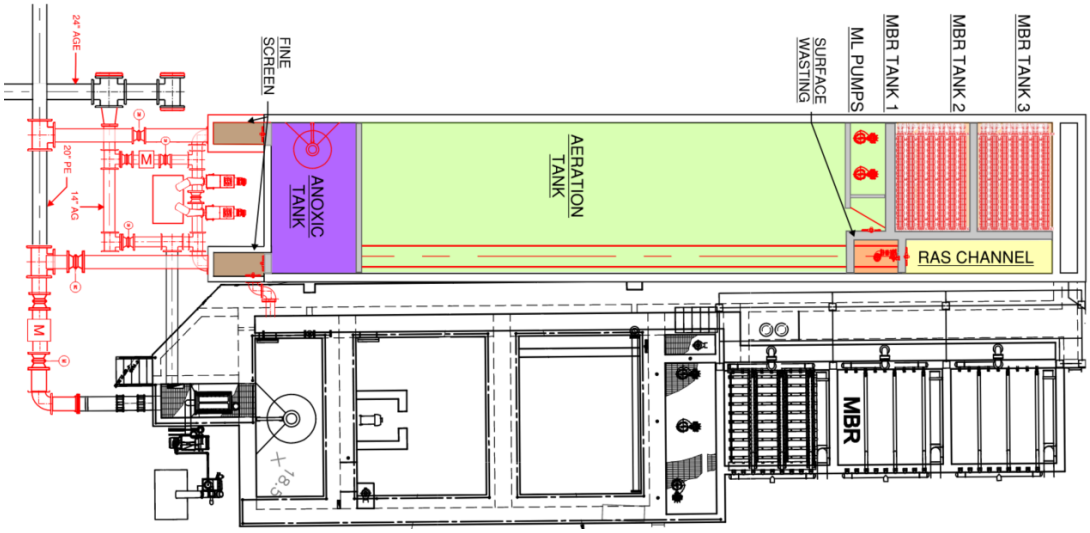


Figure 3-3. Membrane Bioreactor Train 2 Arrangement

3.1.1 Background

The primary goal of an MBR process is to reduce organic matter and nitrogen to levels that comply with the discharge requirements. The plant currently operates with a single MBR train and cannot fully take the system offline for required maintenance. The redundant MBR train will provide redundancy during ADWF conditions and will double the total MBR capacity during wet weather conditions. The additional MBR capacity will allow the plant to achieve effluent limit compliance during the wet weather and peak flow periods.

3.1.2 Process Description

The MBR trains will treat either primate effluent or AGE. During dry weather conditions, it is recommended to send the primary effluent to the attached growth facility before it goes to the MBR trains. This will reduce the load to the MBR trains, maximizing the bioreactors capacity. It will also help maintain the biofilm at the attached growth facility. During wet weather conditions, the MBRs will treat primary effluent. Primary effluent flows exceeding the combined MBRs capacity will be directed to the attached growth system.

Even flow splitting to the two MBR trains will be achieved by using flow control valves and flowmeters upstream of the inlet of MBRs, as shown on Figure 3-3. The MBR influent will go through a band screen installed in the existing clarifier influent channel. Collected screenings will be conveyed to wash presses.

The new MBR will match the configuration of the existing MBR train. This configuration includes a pre-anoxic zone followed by an aerobic zone. The membrane tanks downstream of the bioreactors are aerated to maintain membrane filtration capacity, which is not considered a stage. The aerobic zones accomplish BOD removal and nitrification. The oxygen required for this zone is provided by the aeration system, which consists of diffusers, air piping, flow meters, control valves, and blowers.

The biological reduction of nitrate to nitrogen gas occurs in the anoxic zones by denitrifying bacteria. The nitrate produced in the aerobic zones is recycled to the pre-anoxic zones in the return activated sludge (RAS).

ML is pump to the membrane tanks using two pumps at the end of the aerated zone and protected by a baffle wall. The mixed ML from the surface is directed to a surface/scum pump. Surface wasting is advantageous to maintaining good ML filterability, which leads to better membrane performance. The surface wasting is pumped to the WAS storage tank.

Filtrate is then pumped to a downstream disinfection process. RAS flows by gravity from both membrane tanks into a common RAS channel that is piped to the anoxic zone. A small portion of the ML is directed to the screen influent channel. Rescreening removes stringy solids that have agglomerated within the MBR process from particles originally small enough to pass the screens.

The membrane tanks are aerated during permeate production to maintain membrane productivity. An additional blower will be added to the existing air scouring system so it can provide the required air to both trains. The anoxic zone is mixed by a propeller mixer. Aerobic zones are aerated and mixed using fine bubble membrane disk diffusers.

3.1.3 Design Criteria

Table 3-1 presents the design criteria for the combined MBR process.

Table 3-1. Membrane Bioreactor Train Capacities

Design Condition	Train 1 (existing)	Train 2 (proposed)	Combined
ADWF	1.2 MGD	1.0 MGD	2.2 MGD
MDWWF	1.5 MGD	1.5 MGD	3.0 MGD
Peak Condition	1.9 MGD	1.9 MGD	3.8 MGD

MBR Train 2 will be constructed in the easternmost secondary clarifier. Figure 3-4 presents the proposed piping connections. Table 3-2 presents the additional facility and yard piping required for MBR Train 2.

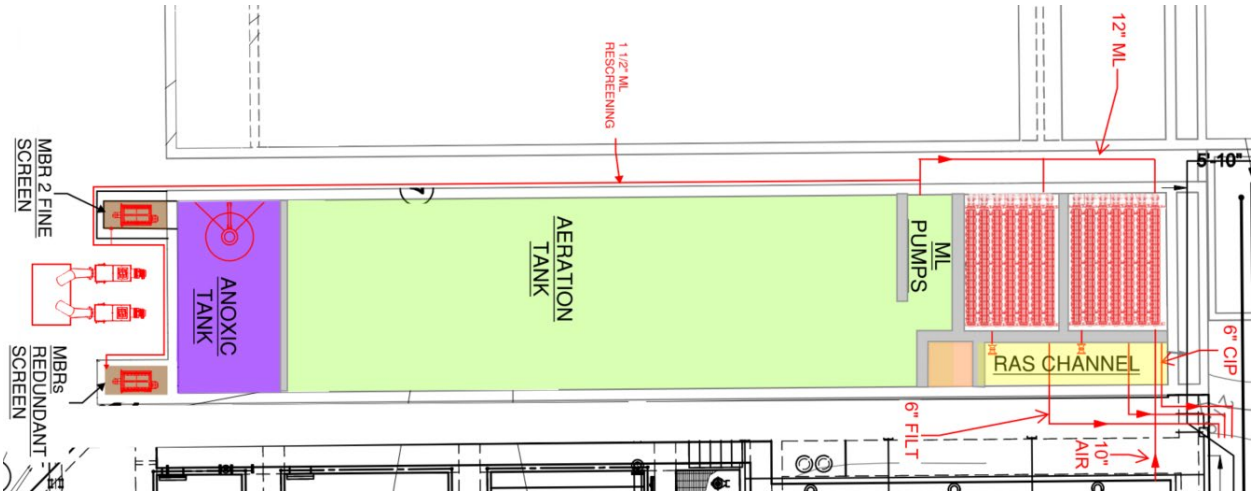


Figure 3-4. Proposed Membrane Bioreactor Train 2 Process Piping Routes

Table 3-2. Proposed Membrane Bioreactor Train 2 Additional Facility and Yard Piping Needs

Flow Stream	Material	Diameter (inches)	Approximate Length (feet)
Primary Effluent	DIP	20	20
ML	DIP	12	70
WAS	DIP	4	110
Filtrate	316 SST	6	250
CIP	316 SST	6	85

CIP = clean in place

3.1.3.1 Fine Screening

Fine screening is required upstream of an MBR process to protect the membranes. The proposed MBR Train 2 will use a band screen style fine screen with 2-millimeter perforations to match the existing Train 1 fine screen type. Two additional screens will be provided. One of screens will be dedicated to the new MBR train, while the second one will provide screen redundancy for both MBR trains. A new channel, similar to the secondary clarifier WAS box, will be built for the new MBR train screen, and the existing secondary clarifier WAS box will be modified to accommodate the redundant screen. The clarifier WAS box is in the southeastern corner of the structure, and the new channel will be in the southwestern corner of the structure. The screenings will be washed and compacted before being discharged into a ground level dumpster. Table 3-3 summarizes the design criteria for the fine screen.

Table 3-3. Proposed Fine Screen Design Criteria

Parameter	Value
Type	Band screen
Number of Screens	2 (1 duty, 1 standby)
Capacity	1.9 MGD
Aperture Size	2 millimeters
Dimensions	6.0 x 2.67 feet
Motor	2 hp (variable speed)
Washwater Supply Flow	2.5 gpm
Washwater Supply Pressure	40 psi
Recommended Products	Ovivo (formerly Eimco) CF100, JWC Band Screen Monster
Washer Compactor	
Type	Screw compactor
Number of Compactor	2 (1 duty, 1 standby)
Capacity	36 ft^3/h
Motor	2 hp

ft^3/h = cubic foot (feet) per hour
gpm = gallon(s) per minute
psi = pound(s) per square inch

3.1.3.2 Bioreactor

The bioreactor consists of two treatment zones: the anoxic zone and the aeration zone. The anoxic zone will be mixed by a propeller mixer mounted at the south end of the basin. The bottom of the clarifier will be leveled off in the aerated zone to facilitate the diffuser installation.

The aerobic zone will be in downstream of the anoxic zone. Aeration will be provided by 9-inch-diameter fine bubble diffusers installed approximately 1 foot above the floor of the tank. Airflow to the bioreactor will be controlled to maintain a dissolved oxygen (DO) setpoint.

The the surface wasting/scum removal consists of a scum baffle that extends across the water surface of the ML pump channel. This (with the aid of some strategically placed spray nozzles) directs ML/scum through a downward opening weir gate into the surface wasting box at the end of the aerated zone adjecent to the RAS channel, as shown on Figure 3-4. Scum/foam from the MBR tanks will also be collected in the surface wasting pump using a downward opening weir gate mounted in the wall shared with the RAS channel. The surface wasting also has a a submersible recirculating chopper pump, which will pump the WAS/scum to the WAS storage tank. If used strictly to remove scum, the weir is lowered intermittently by an operator, and the surface wasting box is emptied as needed to control the scum.

The plant has had a problem removing the foam that accumulated in the existing MBR train, and an operator at the plant reported that the existing scum pump cannot pump the thick foam. It is recommended to install a scum baffle in the aerobic zone to direct the foam to the scum sump and to replace the existing pump for a submersible recirculating chopper pump.

Table 3-4 summarizes the bioreactor design criteria.

Table 3-4. Proposed Bioreactor Design Criteria

Parameter	Value
Minimum 30-Day Average Process Temperature	15°C
Minimum SRT at Maximum Month Winter Loads	13.5 days
Maximum MLSS Entering Membrane Tanks at Maximum Month Loads	8,500 mg/L
SRT at Maximum Month Loads	9.5 to 13.5 days
MLSS Entering Membrane Tanks at Maximum Month Loads	8,000 mg/L
Number of Bioreactors	2 (one existing + one new)
New Bioreactor	
Bioreactor Tank Volume	107,000 gallons
Anoxic Zone Volume	18,850 gallons
Side Water Depth	10 feet
Anoxic Zone Dimensions (width x length)	18 x 14 feet
Anoxic Zone Mixer Type	Floating
Anoxic Zone Mixer Motor Size	5 hp
Aerobic Zone Volume	70,550 gallons
Aerobic Zone Dimensions (width x length)	18 x 58 feet
Bioreactor Tank Volume	24,600 gallons

Parameter	Value
Bioreactor Tank Length (width x length)	13.5 x 6.9 feet
Surface Wasting Pump	
Type	Submersible chopper recirculating
Number of Pumps	2 duty (one per MBR train)
Flowrate Each	100 gpm
TDH	30 feet
Motor Size	5 hp

TDH = total dynamic head

3.1.3.3 Aeration System

A process blower system will supply air to fine bubble membrane disk diffusers in the aerobic zones of the bioreactors. Two new positive displacement blowers will be installed in the existing MBR Building Blower Room to provide process air to the new MBR train, and one of the existing blowers will provide redundancy for both MBR trains. Air piping from the blower system leads to the bioreactors, where flow splits first to each bioreactor and then to multiple diffuser grids within the bioreactor. Airflow to the bioreactor is controlled to maintain a DO setpoint. Table 3-5 summarizes the aeration system design criteria, and Figure 3-5 presents the proposed blower installation arrangement.

Table 3-5. Process Aeration System Design Criteria

Parameter	Value
Number of New Blowers	2 duty (existing blowers will provide redundancy)
Type	Positive displacement
Capacity (each)	1,400 scfm
Discharge Pressure	5.5 psig
Motor Size	75 hp
Type of Diffusers	9-inch-diameter membrane disk
Number of Discs	750
Recommended Manufacturers	Xylem Sanitaire, Environmental Dynamics, Inc., or equal
Air Flow Range New Bioreactor	300 to 2,500 scfm
Air Flow Range per Diffuser	0.8 to 4 scfm

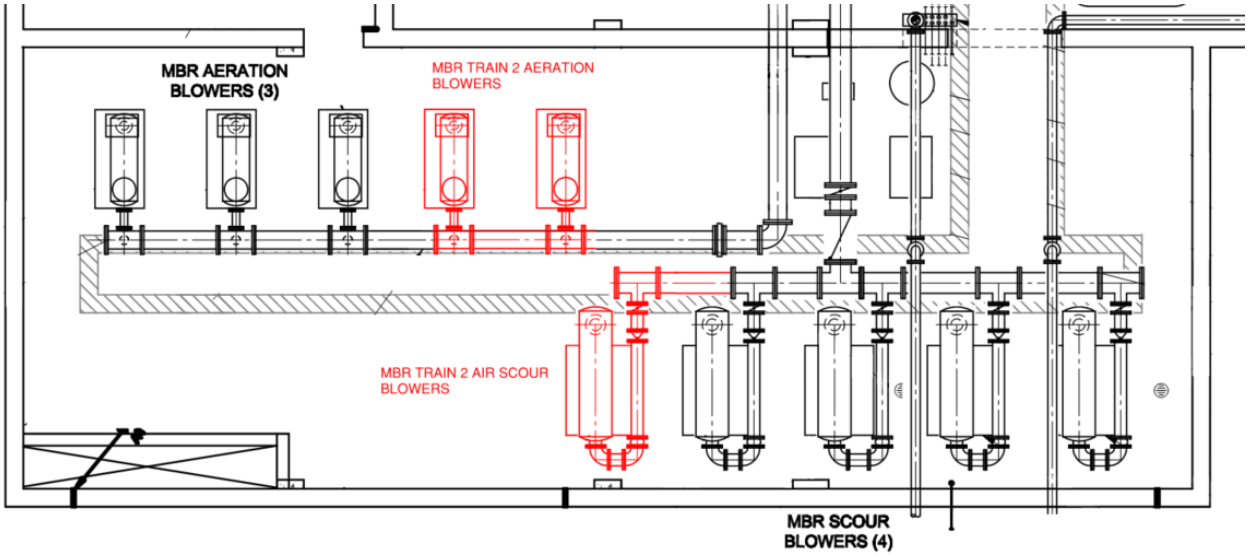


Figure 3-5. Proposed Membrane Bioreactor Blower Arrangement

3.1.3.4 Mixed Liquor Pumps

Two submersible ML pumps will transfer ML from the aeration basin to the membrane tanks for membrane filtration. The pumps will match the design of the existing ML pumps to maintain consistency between equipment manufacturers. The ML pumps will be installed at the end of the aerobic zone and be protected by a baffle wall. There will be two ML pumps, each dedicated to one of the three membrane tanks. Table 3-6 displays the design criteria for the ML PS. A small portion of the pumped ML will be directed to the screen channels for rescreening.

Table 3-6. Mixed Liquor Pump Station Design Criteria

Parameter	Value
Number of Pumps	2 duty
Type of Pump	Submersible
Flowrate Each	2,600 gpm
TDH	30 feet
Motor Size	30 hp
Discharge Diameter	8 inches
Rescreening Flow	23 gpm

3.1.3.5 Bioreactor Tank Transfer Pump

The two bioreactors for Train 1 and Train 2 will be interconnected with a transfer pump, which is intended to be used to transfer the contents of one train to the other when one train needs to be taken offline. The transfer pump can also be used to transfer ML from one train to the other during plant upsets. Table3-7 presents the transfer pump design criteria . The transfer flow path will be selected based on manually actuated valve positioning. The pump will be between the two MBR trains at the deck elevation.

Table 3-7. Transfer Pump Design Criteria

Parameter	Value
Number of Pumps	1
Type of Pump	Centrifugal, self-priming
Flowrate Each	300 gpm
TDH	20 feet
Motor Size	20 hp
Discharge Diameter	6 inches

3.1.3.6 Membrane Tanks

The new MBR train includes two independent membrane tanks, each with seven membrane racks within the membrane section of the basin. DuPont (Memcor) membrane equipment will be provided to remain consistent with the existing MBR equipment.

The DuPont membrane modules are assembled onto a rack, and multiple racks are installed into a tank. The racks are approximately 10 inches wide and designed for individual removal. The modular approach reduces the space requirement for the membrane maintenance and replacement. The head loss through the membranes ranges from 3 psi, which will have a minor impact on the hydraulic profile of the process.

The membrane system uses a CIP procedure that requires sodium hypochlorite and citric acid. The existing MBR uses the same CIP procedure and chemicals. MBR Train 2 will uses the existing CIP storage and pumps. No additional CIP tankage or equipment is required. Table 3-8 presents the proposed membrane design criteria.

Table 3-8. Proposed Membrane Design Criteria

Parameter	Value
Number of Membrane Tanks per Train	2
Racks per Tank	7
Modules per Rack	16
Surface Area per Module	538.2 ft^2
Dimensions, per Tank (length x width x diameter)	13.5 x 8.9 x 10.1 feet
Weight of Membrane Rack	3 tons

3.1.3.7 Filtrate Pump Station

Two filtrate pumps will be provided by DuPont to maintain consistency with existing equipment. The pumps will be 10-hp end suction centrifugal pumps. The pumps will be installed adjacent to the existing filtrate pumps in the MBR building. One pump will be dedicated to one membrane tank. The pump suction will tie into the eastern side of each membrane tank with 8-inch-diameter pipe, matching the design of the existing train. The two pump discharges will combine into the existing 10-inch-diameter discharge header, which ties into the filtrate tank. The filtrate tank overflows into the effluent channel, where effluent flows by gravity to the chlorine contact basin or is pumped to the onsite reuse system. Each filtrate pump will be monitored by a turbidimeter to report individual tank MBR effluent turbidity to SCADA. Table 3-9 presents the design criteria for the filtrate pumps. Figure 3-6 shows a schematic of the proposed piping installation.

Table 3-9. Filtrate Pump Design Criteria

Parameter	Value
Number of New Pumps	2 duty
Type of Pump	Centrifugal
Flowrate Each	694 gpm
TDH	29 feet
Motor Size	10 hp

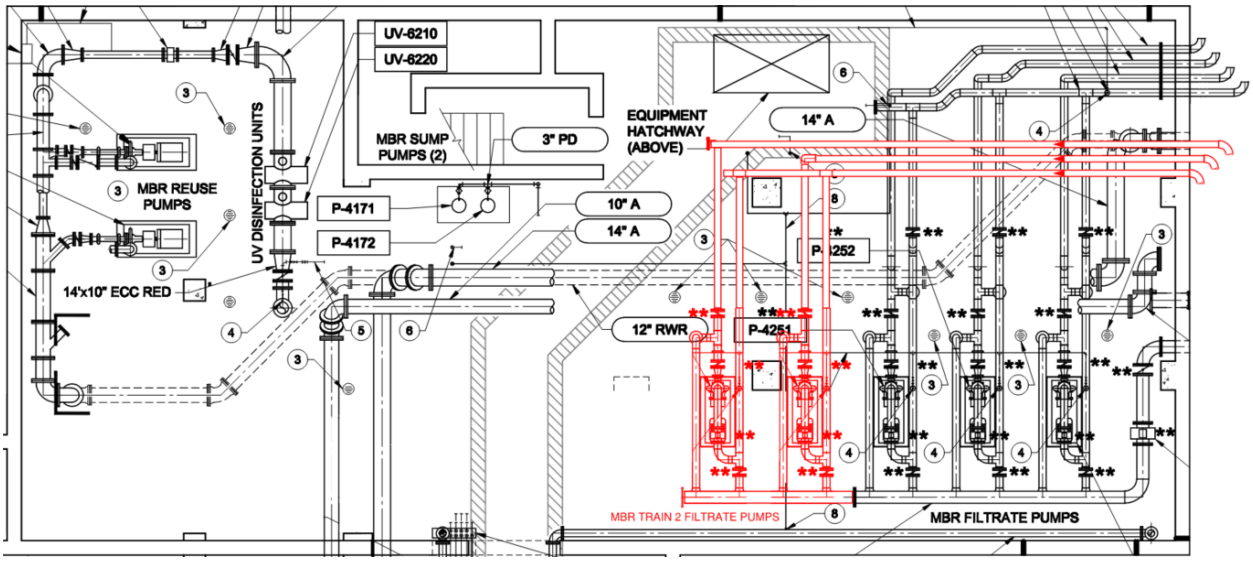


Figure 3-6. Filtrate Pumps for Membrane Bioreactor Train 2 Proposed Location

3.1.3.8 Air Scour Blowers

The membranes have an air scour system to clean the membranes between CIP procedures. There will be one additional blower required for the two membrane trains. This equipment will be provided by DuPont to match the existing. The new blower will be in the blower room of the MBR building and will be tied into the existing air piping (Figure 3-5). The air piping will branch off the existing line on the north side of the MBR facility and mirror the existing train. The new air scour blower will be a 40-hp positive displacement blower. Table 3-10 presents the operating requirements for the air scour blowers.

Table 3-10. Air Scour Blower Operating Requirements

Parameter	ADWF	Peak Hour
Total Demand Airflow Rate (scfm), Train 2	918	1,740
Air Demand per Basin, Airflow Rate (scfm)	153	290
Discharge Pressure (psig)	4.6	4.7
Power (hp)	40	

3.1.4 Structural Improvements

Existing wood-framed walkways and railings will be demolished. A new walkway will be constructed using aluminum framing, grating, and guardrail between the MBR and the cloth filters above the process piping.

New reinforced concrete walls and channels needed for the MBR basins will be designed. Because of the small amount of horizontal reinforcing in the existing walls, the connections for the new walls will be designed so as not to transfer axial forces into the new walls from differential fluid pressures on the existing walls to reduce the horizontal bending induced in those walls. The existing basin walls will be used to provide out-of-plane support to the new walls because of differential fluid pressures and hydrodynamic demands from seismic loading.

3.1.5 Instrumentation and Controls

Except for surface wasting, process controls will be designed to match the existing MBR design. Controls that coordinate multiple membrane tanks will be expanded to include MBR Train 2. Any obsolete PLC equipment associated with a master control panel (MCP) or local control panels (LCPs) will be upgraded by the supplier.

3.2 Attached Growth Treatment Facility

The biological treatment train of the combined MBR trains is inadequate to treat peak flows. Instead of installing additional MBR capacity to treat peak flows, a separate biological and filtration process will be provided to replace the capacity of the failing RBCs. The replacement process will be an attached growth system for biological treatment, followed by cloth media filtration.

To maintain the biological colonies during low flow periods, the influent flows will be diverted through the attached growth process before the MBR process. This will benefit the process by reducing the biological loading to the MBRs and allowing the attached growth facility to remain online during low flow periods.

3.2.1 Background

The existing RBC facility has recurring mechanical issues. As of March 2025, 4 of 12 RBC units were permanently offline because of mechanical issues. The remaining eight RBC units cannot provide the required treatment performance, resulting in high suspended solids in the clarified effluent. The Project Report (Jacobs 2025) recommended replacing the existing RBCs with an attached growth system provided by WavTex. This system uses a moving woven media fixed-film mounted within modular frames. The frames contain integrated aeration by fine bubble diffusers. WavTex modules are designed to be installed in an open channel with multiple units arranged in series. The footprint of the WavTex modules will fit within the existing available footprint within the RBC channels.

3.2.2 Design Criteria

Once the existing RBC mechanical equipment is demolished, the three existing RBC trains will be converted into three open channel attached growth trains outfitted with WavTex units by Entex. Table 3-11 presents the design criteria for the attached growth system.

Table 3-11. Attached Growth Facility Design Criteria

Parameter	Current Conditions	Ultimate Buildout
Number of Trains	2	3
Modules per Train	8	8
Total number of Modules	16	24
Total Treatment Capacity (MGD)	1.5	2.3
BOD treatment capacity (lb/day)	1,000	1,500
Solids Yield (lb/day)	337	N/A
Minimum Flowrate (MGD)	0.15	0.23
Media Area per Module (ft^2)	2,320	2,320
Airflow Requirement per Module (scfm)	134	134
Total Airflow Requirement (scfm)	2,144	3,216
Number of Blowers	2 (1 duty + 1 standby)	3 (2 duty + 1 standby)

3.2.3 Process Description

Under normal operating conditions, primary effluent flows exceeding the combined MBR capacity will be directed to the attached growth system. A minimum flow of 0.23 MGD through the system is required to support the biofilm in two channels. Existing yard piping from the primary clarifiers to the RBC facility will be used to transfer the desired flows. Figure 3-7 presents the WavTex arrangement and proposed air piping network. Red indicates current condition capacity, and blue is for ultimate buildout capacity. The process blowers will be installed at the dewatering building in the place of the old RBC blowers, as shown on Figure 3-7. New air header piping will connect the process blowers to the facility.

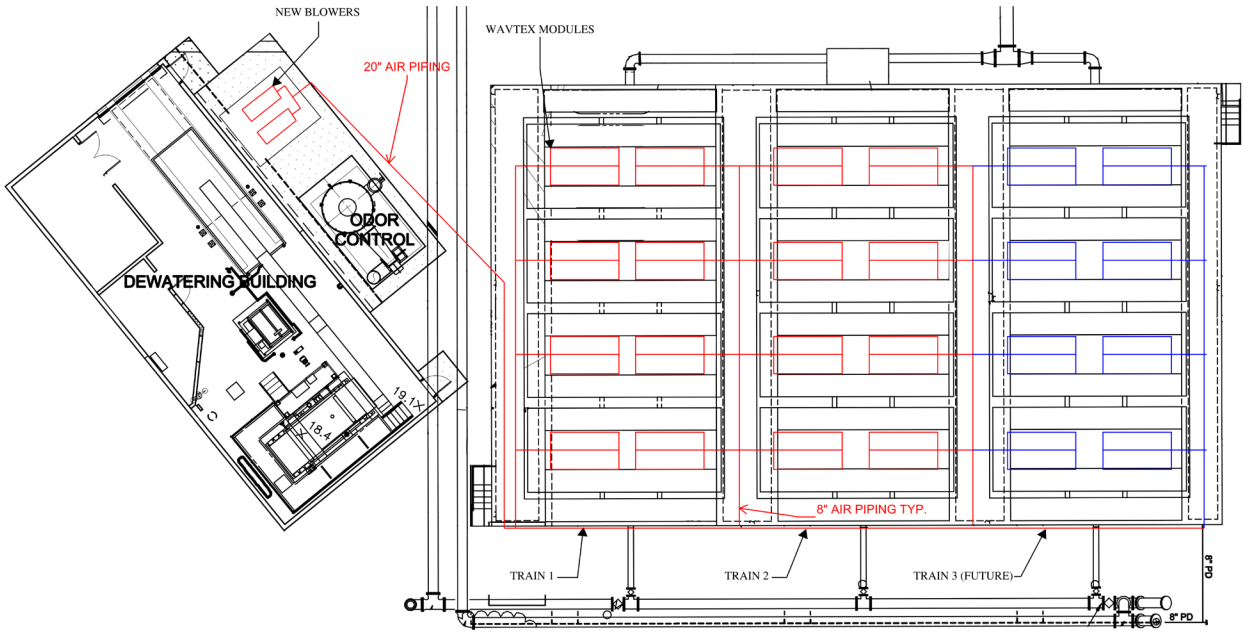


Figure 3-7. Attached Growth Facility Arrangement

The existing air piping will be replaced with larger diameter pipe to accommodate the higher air demands. Associated isolation valves and dampers will be provided in the design. Drain piping will be provided to flush condensate from the air piping.

Table 3-12. Approximate Additional Piping

System	Material	Diameter (inches)	Approximate Length (feet)
Air Supply from Blowers to Air Header	SST	20	180
Air Supply to WavTex Units from Air Header	SST	8	200

3.2.4 Structural Improvements

Demolition of existing RBC equipment will be performed, with concrete removal included where equipment pads are not reused. New equipment pads will be provided with sufficient thickness to anchor the equipment in accordance with the CBC under Risk Category IV.

New pipe supports will be designed to the requirements of Risk Category IV, with a component importance factor used to increase the seismic forces to produce essentially elastic performance under the maximum considered earthquake for the project site.

3.2.5 Instrumentation and Controls

The attached growth system air supply will be manually controlled, with remote operator controls provided through SCADA. A DO sensor per train will be provided to monitor the DO and manually adjust the blower operation. Loop control using DO sensors will not be provided because it is anticipated the air demand through the attached growth system will be relatively constant.

3.3 Cloth Media Filtration

AGE will be filtered through cloth disk filters before disinfection. However, effluent from the attached growth facility will be diverted to the MBR trains during ADWF flow periods.

3.3.1 Background

Cloth filtration will be used to reduce total suspended solids (TSS) concentrations from the AGE. The cloth disk filter process will be in the center existing secondary clarifier basin. This basin will be modified to accommodate a filter influent PS, two disk filter units, backwash pumps, and associated piping.
The backwash pumps will sit inside the basin, north of the effluent channel, and will be fed by the valve assembly under the disk filter arrangement. Figure3-8 shows the proposed layout of the filtration facility.

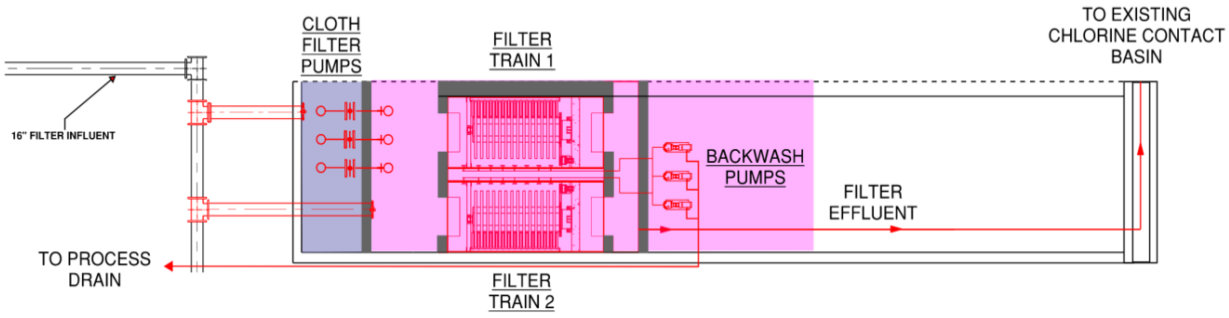


Figure 3-8. Cloth Filter Facility Layout

3.3.2 Process Description

Cloth media filters use a series of partly submerged, rotating, vertical disks that support the filter cloth. The vertical orientation allows for a large amount of filter area in a small footprint. AGE will flow by gravity into the filter influent PS wet well. Flows up to 2 MGD can be conveyed by gravity through the filtration system. During peak flow conditions, the flows will be boosted by the filter influent PS to feed the common influent header of the cloth disk channels. Flows will be equally split between the two filter trains if both trains are online. Filtered effluent will be combined in a shared effluent header and flow by gravity into the chlorine mixing chamber, where it will combine with the MBR effluent.

3.3.3 Design Criteria

The cloth filter facility includes a filter influent PS and two cloth disk filter trains. The facility will convey filtered effluent to the existing chlorine contact basin for disinfection.

3.3.3.1 Filter Influent Pump Station

The cloth disk filters will require an influent PS to convey flows during peak flow conditions. The PS will be in the middle secondary clarifier basin, upstream of the disk filters. A new wall will be constructed to create the wet well for the PS. The wet well will be fed by the existing pipe network. Figure 3-9 and Figure 3-10 show the proposed layout of the PS in plan and section, respectively.

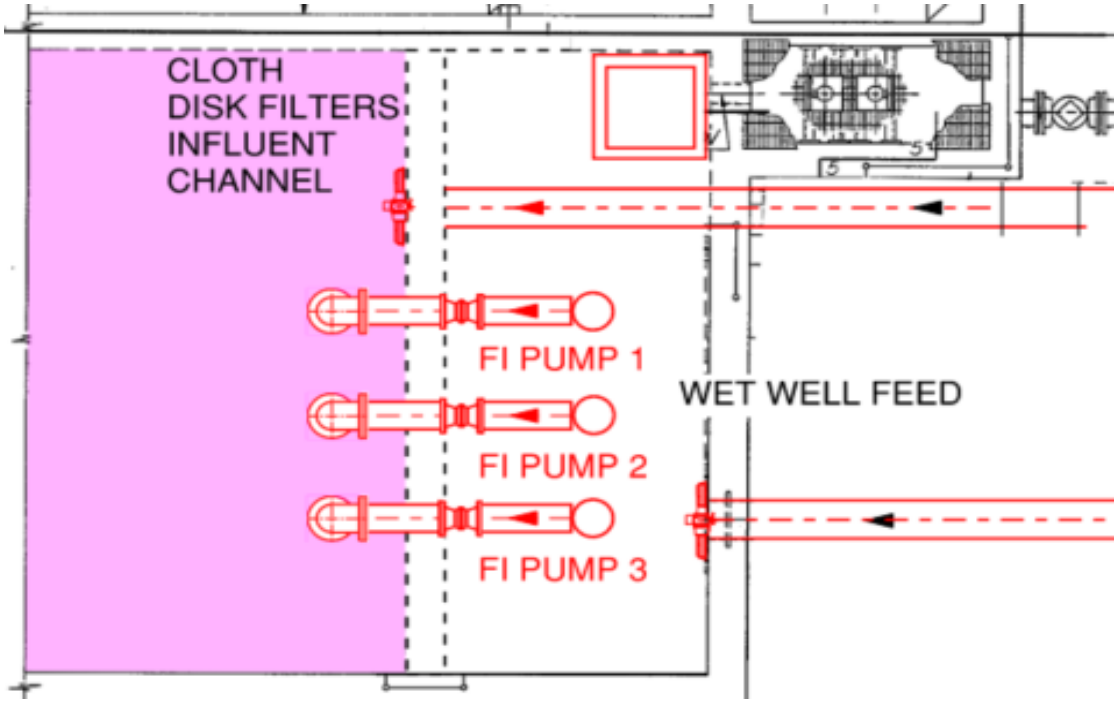


Figure 3-9. Filter Influent Pump Station Plan

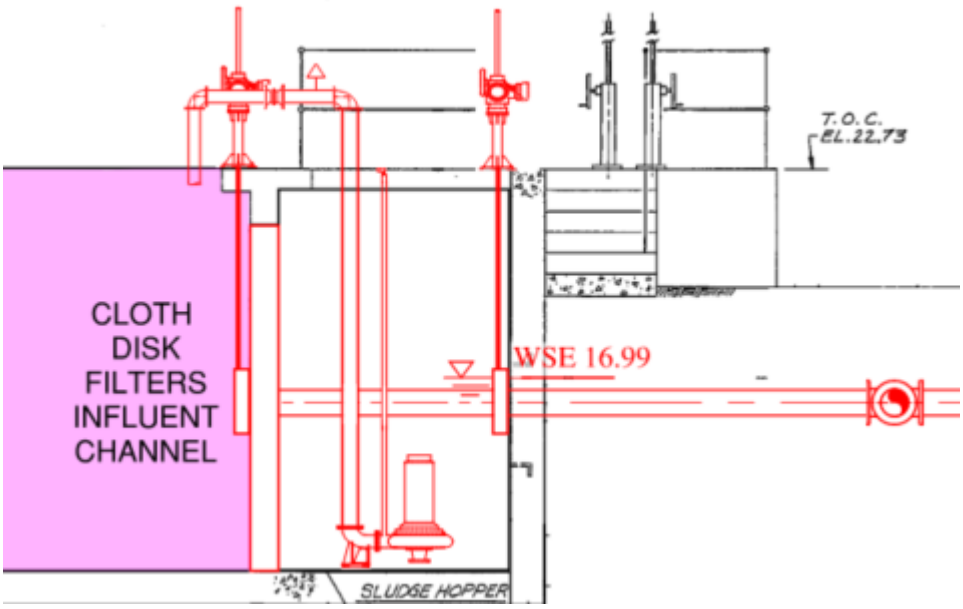


Figure 3-10. Filter Influent Pump Station Section

The pumps will be used when the flow to the filters reaches 2 MGD. Table 3-13 shows the design criteria of the pumps.

Table 3-13. Pump Station Design Criteria

Parameter	Value
Type	Submersible
Number of Screens	3 (2 duty, 1 standby)
Drive	Variable frequency
Primary Flowrate	3,000 gpm
Primary Dynamic Headloss	15 feet
Secondary Flowrate	1,390 gpm
Secondary Dynamic Headloss	5 feet

Table 3-14 presents the approximate pipe length to support the proposed facility.

Table 3-14. Filter Influent Pump Station Piping

System	Material	Diameter (inches)	Approximate Length (feet)
Pump Discharge	DIP	10	20
Filter Influent	DIP	20	35

3.3.3.2 Cloth Disk Filters

Cloth filters can be provided in two configurations: inside-out and outside-in. The outside-in configuration was selected for this project because of the low headloss across the system. Channel-mounted filters are recommended because of concerns with corrosion in the corrosive environment and material costs with the stainless-steel container design. The channel-mounted type would include constructing new walls within the clarifier, which will separate the trains and elevate the walls around the filters.

Table 3-15. Cloth Filter Design Criteria

Parameter	Value
Filter Type	Cloth media filters
Style	Channel mounted
Number of Filter Units/Disks per Unit	2 duty
Single Disk Area	36.6 ft^2
Filter Dimensions (length by width)	15.5 x 7.5 feet
Maximum Hydraulic Surface Loading	5.85 gpm/ft^2
Solids Loading Rate	2.32 lb TSS /day/ft^2
Target Effluent TSS	5 mg/L
Minimum Flow	0.2 MGD
Total Capacity	8.64 MGD
Maximum Head Loss	0.5 feet
Pore Size	5 µm
Filter Drive Motor	460 V/3-phase, 1 hp

Parameter	Value
Number of Backwash Pumps	3 (2 duty + 1 standby)
Maximum Backwash Flow per Pump	100 gpm
Backwash Pump Motor	460 V/3-phase 2 hp
Recommended Products	Beacon G-Disks, Aqua Aerobics Aqua Disks

µm = micrometer(s)
V = volt(s)

Figure 3-11 shows a section view of one filter train, including elevation data.

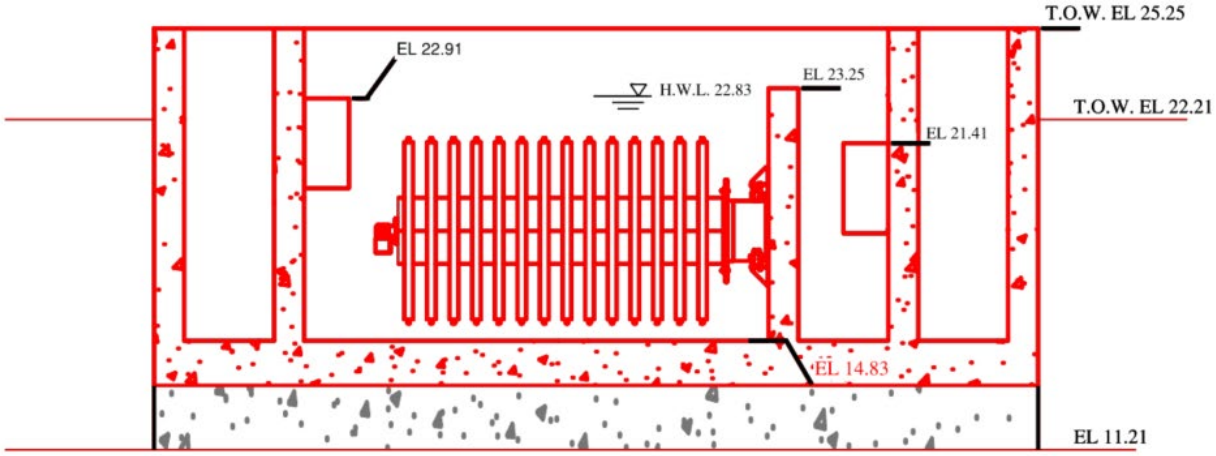


Figure 3-11. Section of Cloth Filter Facility

Each filter is equipped with level and vacuum instrumentation. The filter drive motor will rotate the disks. The backwash pump will pull a vacuum through the backwash piping, which will vacuum the deposited solids from the surface of the cloth media and transfer it to the plant drain system. Filter backwash is automatic and based on water level differential or a timer setpoint. The filter maintains continuous operation during backwash. Backwash flows are supplied by filtered effluent. Typical backwash recovery rates are 1 to 4 percent of filter throughput. Backwash waste from the filtration process, which is expected to contain less than 1,500 mg/L of solids, will be conveyed to the plant drain. Each filter train has an overflow weir that discharges to the effluent channel.

Table 3-16 presents the piping required to support the proposed facility.

Table 3-16. Additional Piping Requirements for Filter Facility

System	Material	Size (inches)	Approximate Length (feet)
Filter Effluent	Ductile iron	20	90

3.3.4 Structural Improvements

New reinforced concrete walls will be constructed for the cloth disk channels and the filter influent PS wet well. As with other structural work in the existing structure, connections of the new walls will be designed to limit high stresses from occurring in the existing walls where the original design provided minimal reinforcing for resistance. Additionally, the existing filtrate channel will be sealed off with a concrete wall.

Concrete framing will be added to support the cloth filters in the subdivided basin. The support systems will be designed to not overload the existing base slab and walls under operating and seismic load conditions.

3.3.5 Instrumentation and Controls

Each filter will be provided with a packaged local control panel that contains all necessary control and monitoring for the system. This includes operator interfaces, displays, relay logic, timers, alarms, and contacts for remote monitoring. Motor starters for the backwash pumps will be provided in each local panel.

The filter backwash is automatically initiated based on water level differential or a timer. Continuous filtration is maintained throughout the backwash process. The backwash discharge flow is monitored through SCADA.

4. Solids Handling Improvements

The biosolids treatment method at the City WWTF includes separate primary sludge and WAS thickening, combined anaerobic digestion, followed by dewatering then hauling to landfill disposal. The upgrade project includes several critical improvements to stabilize and enhance biosolids treatment performance, improve process control, and enable compliance with both current federal regulations and future state mandates. The upgrades are designed to preserve operational flexibility while improving volatile solids reduction, providing stable biosolids handling and disposal operations using the current biosolids handling process.

The proposed solids handling improvements consist of the addition of separate WAS and digested sludge (DS) storage and pumping facilities and rehabilitation of the existing GT and anaerobic digesters. Figure 4-1 shows the updated process flow diagram for the solids handling facilities.

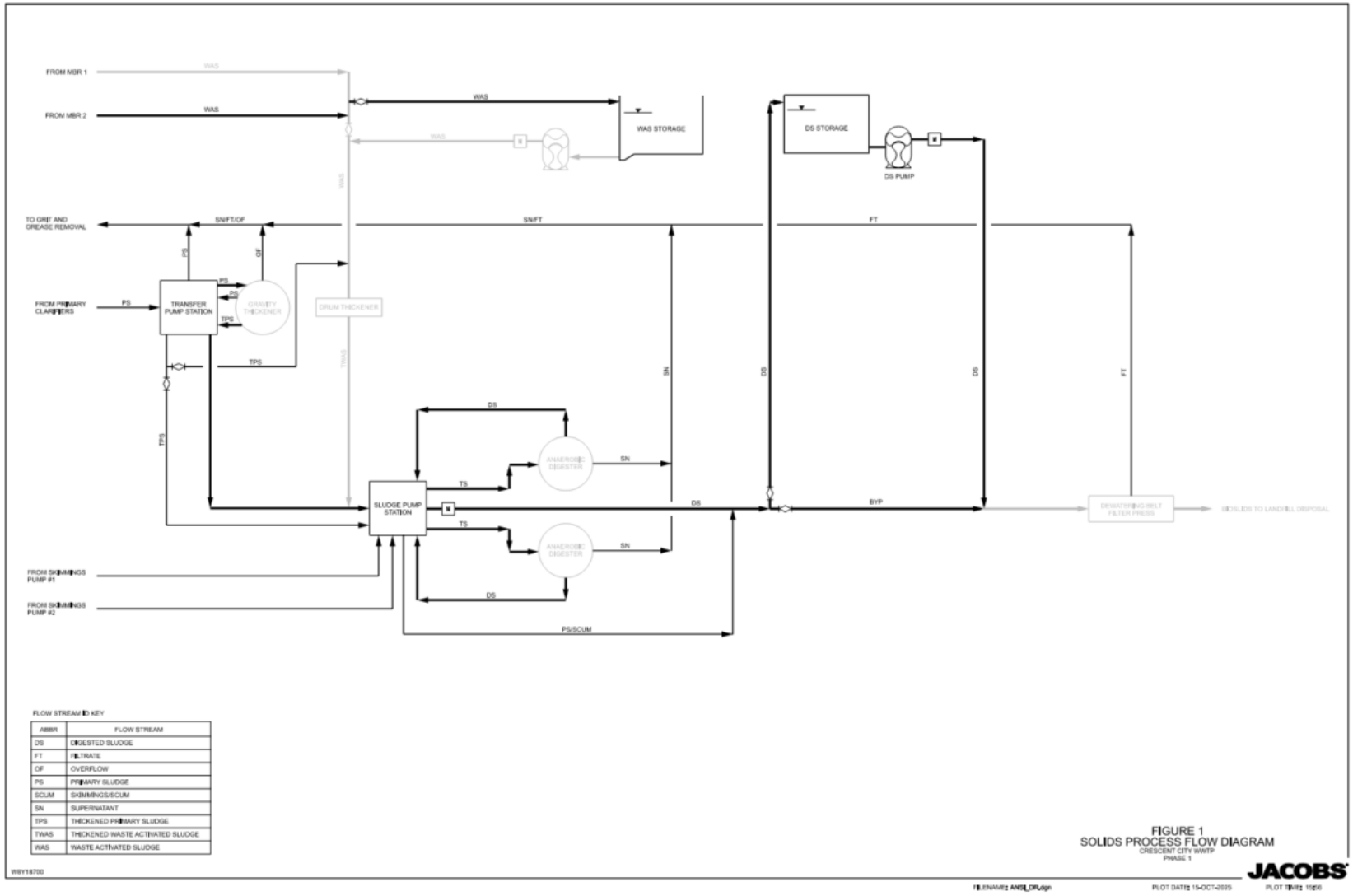


Figure 4-1. Proposed Solids Process Flow Diagram

4.1 Waste Activated Sludge and Digested Sludge Storage and Pump Gallery

WAS and DS storage will be provided to help attenuate peak loading to the RDT and improve the operational flexibility of the RDT, anaerobic digesters, and dewatering facility. The ideal operating condition for anaerobic digestion is for constant feed and withdrawal. WAS storage will allow for variable wasting from the MBRs while maintaining a constant feed rate to the RDT and the anaerobic digesters. The DS storage volume will provide a buffer for the dewatering activities to allow for constant withdrawal from the digester and a 5-day per week dewatering operation schedule.

The western secondary clarifier will be retrofitted into three independent sections, one open-aired basin for WAS storage, one covered basin for DS storage, and one covered section as a pump gallery, which will house the associated equipment.

Figure 4-2 presents a plan view of the proposed facilities.

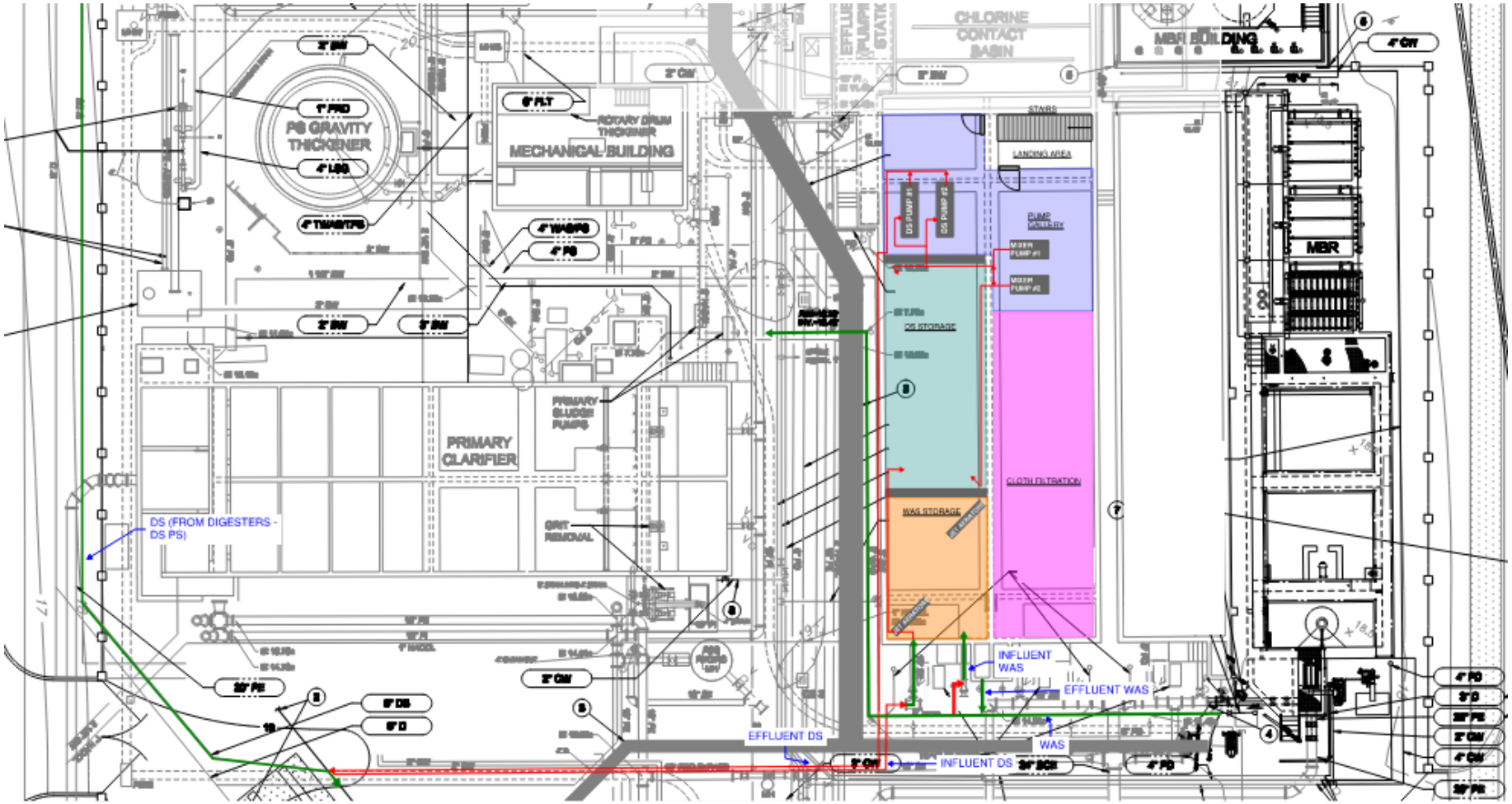


Figure 4-2. Waste Activated Sludge and Digested Sludge Storage Facilities

4.1.1 Process Description

This section describes the WAS and DS storage process.

4.1.1.1 Waste Activated Sludge Storage

WAS flows from the MBRs vary throughout the day because of the CIP maintenance activity of the membrane rack channels. It is recommended to have a WAS storage facility to provide a buffer from the fluctuating WAS flows to the feed flows to the RDT and therefore the anaerobic digesters to maintain a constant feed rate to the digesters.

WAS will be pumped to the storage facility using the existing MBR WAS pumps. Minor modifications will be made to the existing 8-inch-diameter WAS piping to connect to the existing 10-inch-diameter secondary clarifier influent header to the storage basin. WAS will be discharged by the existing secondary clarifier WAS pumps to rejoin the 8-inch-diameter WAS pipeline to the RDT.

The WAS storage basin will be open to atmosphere and aerated to prevent solids settlement from providing oxic conditions. The aeration target DO concentration is 1.0 mg/L, which will reduce odor-related issues.

4.1.1.2 Digested Sludge Storage

DS storage will provide operational flexibility for the dewatering operations. The dewatering schedule is dependent on the haul truck pickup times; a truck must be parked in the dewatering facility load-out bay for the dewatering facility to be operational. Additionally, operations schedule does not allow for weekend or holiday dewatering. To provide a constant feed and withdrawal rate from the digesters over weekend and holidays, the DS storage volume is sized for 3 days. Mixing will be provided to limit settling. The DS storage basin will be covered, which will limit odor wafting.

DS will be pumped to the storage basin by a new DS pump, which will be at the digester building. One of the three existing pumps will be replaced with a smaller pump that is solely dedicated to DS transfer because of the low flowrates necessary to maintain constant flows into and out of the digesters. Stored DS will be transferred to the dewatering facility by a new solids PS in the pump gallery.

4.1.2 Design Criteria

The design criteria for both basins and the pumping facilities are presented in the following subsections.

4.1.2.1 Waste Activated Sludge Storage

Table 4-1 presents the minimum dimensions, solids concentration, and retention time for the WAS storage facility.

Table 4-1. Waste Activated Sludge Storage Facility Design Conditions

Parameter	Value
Volume	25,000 gallons
Days of Storage	1
Dimensions (L x W x D)	25 x 18 x 11.5 feet
Minimum Freeboard	2 feet
Influent Solids Concentration	1%
Aeration or Mixing Required	Both, 1.0 mg/L DO minimum
Mixing Energy	0.04 hp/1,000 gallons[a] (1 hp)
Aeration Requirement	20 scfm/1,000 ft^3 (62 scfm)

[a] Based on standard from Water Environment Federation (WEF) Design of Water Resource Recovery Facilities, Manual of Practice 8, 7th Edition (2025).

ft^3 = cubic foot (feet)
hp = horsepower
scfm = standard cubic foot (feet) per minute

4.1.2.2 Digested Sludge Storage

Table 4-2 presents the minimum dimensions, solids concentration, and retention time for the DS storage basin.

Table 4-2. Digested Sludge Storage Design Criteria

Parameter	Value
Volume	38,000 gallons
Days of Storage	3
Dimensions (L x W x D)	40 x 18 x 11 feet
Minimum Freeboard	2 feet
Influent Solids Concentration	3%
Aeration or Mixing Required	Mixing only
Mixing Energy	0.04 hp/1,000 gallons[a] (1.5 hp)

[a] Based on standard from WEF *Design of Water Resource Recovery Facilities, Manual of Practice 8, 7th Edition* (2025).

4.1.2.3 Pumping Facilities

Two PSs require improvements for the DS storage facility. One is the existing DS PS at the digesters. The second PS will be in the pump gallery and will be called the stored solids (SS) PS.

Table 4-3 presents the design criteria for the DS PS. The pump discharge rate from the DS PS coupled with the new 4-inch-diameter pipe generates a velocity of 0.3 foot per second (ft/s). Low flowrates, below 2 ft/s, can lead to solids deposition in the pipe. Solids deposition causes increased energy consumption, and it increases the risk of pipe failure. It is recommended to install a flushing connection to the transfer piping to prevent clogging. The flushing will discharge into the DS storage, which will be further explained in Section 5.

Table 4-4 presents the design criteria for the SS PS station.

Table 4-3. Digested Sludge Pump Station Design Conditions

Parameter	Value
Flow Path	Anaerobic digester to DS storage basin
Daily Transfer Volume	12,015 gallons
Transfer Flow Rate[a]	8.5 gpm
TDH	<5 feet
Pump Type	Progressive cavity
Pipe Diameter	4 inches
Velocity	0.3 ft/s[a]

[a] 24 hours per day, 7 days per week operation for constant digester elevation

Table 4-4. Stored Solids Pump Station Design Conditions

Parameter	Value
Flow Path	DS storage basin to dewatering facility (BFP)
Hours of Operation	7 hours, 5 days per week
Flow Rate Conditions	Minimum Condition: Average daily drawdown of storage basin Peak Condition: Dewatering equipment capacity
Flow Rate Range	30 to 100 gpm
TDH	19 feet
Pump Type	Progressive cavity
Number of Pumps	1 duty, 1 standby
Horsepower	10 hp
Pipe Diameter	4 inches
Velocity	2.5 ft/s

4.1.3 Alternatives Discussion

The following subsections discuss the alternatives.

4.1.3.1 Waste Activated Sludge Mixing/Aeration Alternatives

The WAS storage will be aerated to prevent septic conditions. Mixing is recommended to prevent solids settling in the tank. Four combination mixing and aeration alternatives were considered for the WAS storage: surface aerators, hybrid mixing aerator, jet aerators, and coarse bubble (CB) diffusers. The four alternatives are further described as follows:

- **Alternative 1 – Surface Aerators:** Alternative 1 is to install either floating or wall-mounted surface aerators. Surface aerators work by splashing the surface liquid and making the liquid capture the air on its way down. This creates vertical circulation, which keeps solids suspended and provides uniform oxygen distribution throughout the storage area. Surface aerators can struggle with maintaining solids in suspension in deeper storage tanks. The aerators can also be equipped with mixers. This would be beneficial to reduce energy requirements if the system is mixing limited rather than aeration limited.
- **Alternative 2 – Hybrid Mixer Aerator:** These systems use both fine bubble aeration and an impeller or paddle to keep the system well mixed and aerated. These provide less aeration than surface aerators or jet mixers, but this is not much of a concern because the only reason for aerating is for odor control.
- **Alternative 3 – Jet Aerators:** Jet mixer aerators are installed at the bottom of the basin and use an external pump to draw in air and eject it at a high velocity into the WAS. This creates fine bubbles that both agitate and aerate the basin. Jet mixers excel with horizontal mixing. The pumps can either be in a dry area or be submersible. The pumps in a dry area are easier to maintain but may limit the amount of space left for the DS transfer pumps in the pump gallery. The submersible pumps would require davit cranes, or similar lifting devices, and an area for the operators to pull the pump out. The submersible pumps are recommended because of the limited space in the pump gallery.
- **Alternative 4 – Coarse Bubble Diffusers:** CB diffusers are installed at the bottom of the storage and release large air bubbles. The air bubbles create a strong vertical mix as they rise through the WAS, keeping the solids well mixed. CB diffusers require an external blower to provide energy for the system. These blowers are typically not submersible and would have to fit within the new pump gallery.
- Table 4-5 lists the benefits and limitations of each alternative.

Table 4-5. Waste Activated Sludge Storage Combination Mixing and Aeration Alternatives

	Alternative 1 – Surface Aerators	Alternative 2 – Hybrid Mixer Aerator	Alternative 3 – Jet Aerator	Alternative 4 – Coarse Bubble Diffusers
Benefits	▪ Effective and common technology for WAS aeration ▪ Easy operation and maintenance ▪ Low maintenance costs ▪ Do not require additional space because they fit directly into the basin, as opposed to the diffusers, which require space for the blowers ▪ Lowest capital costs	▪ Energy efficient ▪ Smaller footprint by combining two technologies together ▪ Do not require additional space because they fit directly into the basin ▪ Easy operation and maintenance	▪ Strong horizontal mixing ▪ Easy operation and maintenance ▪ Submersible or dry area pump	▪ Strong vertical mixing ▪ Low chance of clogging or fouling
Limitations	▪ Aerators/mixers may be less efficient or ineffective if the WSE varies too much ▪ Not as efficient in deep basins	▪ Higher capital cost than surface aerators ▪ Lowest oxygen transfer efficiency	▪ Potential clogging of nozzles ▪ Higher capital costs than surface aerators ▪ Decreased oxygen transfer efficiency in thickened sludges	▪ Require blowers to be in the pump gallery, which has limited space

WSE = water surface elevation

The recommended mixing and aeration solution is jet aerators. These aerators have a strong performance record for this application and will be able to provide the required air and mixing for the system. The decreased oxygen transfer efficiency is not a concern in this system because the sludge has not yet been thickened. Additionally, these aerators can be installed within the storage basin, freeing up space in the pump gallery, which is a significant advantage because of the space constraints within the clarifier. While the surface aerators are the cheapest alternatives, they require dropping the WSE by at least 3 feet to ensure solids suspension throughout the bottom portion of the basin. This adds complexity to the system, and if not done regularly ,then significant solids deposition may occur. Table 4-6 shows the design conditions of the jet aerators.

Table 4-6. Jet Aerator Design Criteria

Parameter	Value
Number	2 (1 duty, 1 standby)
Horsepower, each	15 hp
Nozzles, each	1
Aeration Depth	9.5 feet
SOTR	32 lb O_2/h
Recommended Manufacturers and Models	FLYGT Jet Aerator Model JA-117-3153

lb O_2/h = pound(s) of oxygen per hour
SOTR = standard oxygen transfer rate

4.1.3.2 2Digested Sludge Mixing

Two mixing alternatives were considered for the DS storage basin: hydraulic sludge mixers and mechanical mixers. The two alternatives are described as follows:

- **Alternative 1 – Hydraulic Sludge Mixers:** Alternative 1 is to use a recirculation pump with hydraulic sludge mixers to provide complete mixing in the DS storage. The recirculation pump pulls the sludge from the tank, pressurizes it, and then discharges it at a high velocity through jet nozzles. This creates momentum in the tank and thus mixes the sludge. The pump must be in a dry area outside of the tank. This makes it easier to maintain but means that a separate area must be provided. A pump gallery is recommended to provide a dry area for the hydraulic mixers' recirculation pump. This space can also be used to house any pumps needed for aeration and mixing in the WAS storage or for the DS transfer pumps.
- **Alternative 2 – Mechanical Mixers:** Alternative 2 is mounted mechanical mixers. The motor is mounted at the top, and the mixers can be attached to the side walls of the storage. There can be impellers added at multiple locations of the shaft, allowing for mixing throughout the vertical height of the basin.
- Table 4-7 lists the benefits and limitations of each alternative.

Table 4-7. Digested Sludge Storage Mixing Alternatives

	Alternative 1 – Hydraulic Sludge Mixers	Alternative 2 – Mechanical Mixers
Benefits	▪ No moving parts within the basin leads to less equipment maintenance ▪ Effective mixing across entire storage ▪ Common and proven technology ▪ Easy maintenance	▪ Simple system—low capital costs ▪ Effective mixing near impellers ▪ Mixing intensity is easily controlled ▪ Clogging is highly unlikely with proper functioning headworks ▪ All equipment can fit within the storage and does not require additional area
Limitations	▪ Additional dry area for recirculation pump ▪ Lowered performance with thicker solids (>2%) ▪ Potential abrasion of nozzles over time ▪ Higher capital costs	▪ Need multiple mixers to ensure entire basin is well mixed or else dead zones may occur ▪ Maintenance would be difficult because of accessibility ▪ Abrasion from high solids ▪ Providing an effective gas seal can be difficult

The recommended mixing system is the hydraulic sludge mixer. This is a proven sludge mixing technology that is easy to maintain and has low energy consumption. The adjacent pump gallery will house the pump equipment used for the mixing system. This area will be easy to access for maintenance compared to internally mounted mixing equipment in the DS storage basin. Table 4-8 shows the hydraulic mixer design criteria.

Table 4-8. Hydraulic Sludge Mixer Design Criteria

Parameter	Value
Number	2 (1 duty, 1 standby)
Pump Flow	686 gpm
Pump TDH	26 feet
Pump Horsepower	10 hp
Number of Nozzles, each	2
Manufacturer and Model	Hayward Gordon Hydromix System

4.1.4 Instrumentation and Controls

New instrumentation will be provided to monitor and control the process, including flow meters, level instruments, pressure, and others as needed. The jet aerators will be controlled by a DO sensor, which will maintain a minimum of 1.0 mg/L to prevent anoxic conditions.

4.1.5 Pump Gallery HVAC and Odor Control

Heating and ventilation direction for the pump gallery will be provided. Wall-mounted louvers with motorized dampers and fans with backdraft dampers will provide natural cooling and ventilation using ambient air. Unit heaters will be used for heating. Fans and associated ductwork will be sized for 6 ACH, in accordance with National Fire Protection Association (NFPA) 820 requirements. Louvers will also be sized for the requisite volume of air with an intake face velocity of no greater than 400 feet per minute based on free area of the louvers.

The storage facilities are not anticipated to have strong odor, but it is recommended to cover the DS storage facility and provide passive ventilation. There are many cover material options, including fiberglass-reinforced plastic (FRP), aluminum, or concrete. However, covering the DS storage will make it an enclosed space. A small corrosion-resistant louver (12 inches by 12 inches) will be installed to allow for air movement when the storage volume changes.

4.1.6 Structural Improvements

Two 12- to 16-inch walls must be constructed between the basins to separate the WAS storage and the DS storage and pump gallery. The structural details for this design will be detailed during final design.

The DS basin and the pump gallery will both be covered to prevent rainwater intrusion into the basins. Stairway access will be designed for the pump gallery because frequent operator access is expected. Two roof hatches will be sufficient for access into the DS storage basin because maintenance access is only anticipated for periodic cleanings. During these events, the space will be an OSHA-confined space, and additional air circulation will be required.

4.1.7 Corrosion Control

The recommended corrosion-resistant coating (CRC) for the DS storage basin interior concrete includes robust, high-build, immersion-capable epoxy formulations engineered to withstand the harsh conditions typical of these environments. The CRC system is detailed as follows:

- Primer: One coat of manufacturer's recommended moisture-resistant epoxy primer, 2 millimeters minimum dry film thickness (MDFT), as required by CRC manufacturer
- Surfacer/Filler: One coat of 100% solids, trowel applied epoxy surfacer, application rate as required to fill and level 100% of the concrete surface in preparation for coating, 1/16-inch nominal thickness
- Corrosion Barrier Lining: One coat of trowel grade, 100% solids, chemical-resistant amine-cured epoxy lining material, 125 MDFT
- Glaze Coat: Required for fiber-filled or aggregate-filled corrosion barrier lining products to provide a smooth surface; one coat of liquid applied, 100% solids, amine-cured chemical-resistant epoxy finish, 15 to 20 MDFT

For pipe interiors exposed to substantial headspace or elevated corrosion risk, epoxy ceramic linings are strongly recommended over cement linings to provide an additional protective barrier. In cases requiring high abrasion resistance or improved flow smoothness, glass linings are recommended.

Additional protective measures are generally unnecessary for the interior surfaces of 316 stainless steel because of its inherent corrosion resistance. However, the maximum safe chloride concentration for 316 stainless-steel alloys is approximately 1,000 parts per million (ppm).

When selecting valve materials, long-term durability and resistance to the operational environment should be prioritized. Corrosion-resistant materials, such as 316 stainless steel, typically do not require supplemental protection when submerged in environments with chloride levels below the permissible threshold. In contrast, iron and steel pipes should be protected with durable epoxy coatings designed for harsh conditions.

It is recommended that the at-grade level covers be constructed from ultraviolet (UV)-resistant FRP to ensure long-term durability and protection against sunlight exposure.

4.2 Gravity Thickener

The GT is a circular basin with a mechanical mechanism in the center that slowly rotates to transfer thickened sludge collected at the bottom of the basin to the center pipe to feed the anaerobic digesters. Supernatant is decanted from the top of the basin and is returned to the liquid treatment process at the headworks. The GT thickens sludge from the primary clarifiers before anaerobic digestion. The GT has reached the end of its useful life and needs to be fully rehabilitated by replacing all mechanical equipment, adding covers, and recoating the interior surface.

4.2.1 Background

The GT was constructed as part of the 1973 Water Pollution Control Plant Modifications. It is 20 feet in diameter with a 10-inch wall and an exterior launder. A wood cover was placed over the GT as part of the 1977 Phase II Additions, which was later removed. A new cover is desired to limit the odor coming from the primary thickened sludge.

4.2.2 Design Criteria

Table 4-9 provides the design criteria for the mechanical rehabilitation of the GT.

Table 4-9. Gravity Thickener Facility Design Conditions

Parameter	Value
Diameter	20 feet
Depth	9 feet
Mechanism Type	Center mechanism
Cover Type	Under walkway flat cover

4.2.3 Rehabilitation Description

The GT must be fully rehabilitated because major mechanical equipment is clearly corroded, and the walls require complete recoating. The existing mechanism will be replaced. Table 4-10 presents the design criteria for the new replacement equipment .

Table 4-10. Gravity Thickener Mechanism Design Criteria

Parameter	Value
Diameter	20 feet
Depth	9 feet
Drive Horsepower	0.5 hp
Drive Voltage	480 V
Potential Manufacturer	Clear Stream Environmental

The walkway over the center of the GT will be replaced. New FRP flat covers will be placed on each side of the walkway over the liquid surface. The cover will have removable panels for necessary inspection and cleaning of the GT. The cover will not be airtight and will allow for airflow between the walkway and the cover edge opening. Removable panels will be incorporated into the cover design for maintenance access and visual inspection.

4.2.4 Instrumentation and Controls

New instrumentation will be provided to monitor and control the new process equipment as required. No new process controls, including flow meters, level and pressure instruments are included in the design at this time.

4.2.5 Corrosion

The 2021 assessment revealed that several interior concrete surfaces show signs of wear and paste loss, indicating the need for repair and resurfacing. This deterioration is likely caused by a combination of biogenic sulfide corrosion and exposure to abrasive media streams. To prevent further degradation, it is recommended that a CRC be applied to the resurfaced concrete surfaces, thereby protecting the new cementitious matrix. The CRC components will consist of the following:

- Primer: One coat of manufacturer's recommended moisture-resistant epoxy primer, 2 millimeters MDFT, as required by CRC manufacturer
- Surfacer/Filler: One coat of 100% solids, trowel applied epoxy surfacer, application rate as required to fill and level 100% of the concrete surface in preparation for coating, 1/16-inch nominal thickness
- Corrosion Barrier Lining: One coat of trowel grade, 100% solids, chemical-resistant amine-cured epoxy lining material, 125 MDFT
- Glaze Coat: Required for fiber-filled or aggregate-filled corrosion barrier lining products to provide a smooth surface; one coat of liquid applied, 100% solids, amine-cured chemical-resistant epoxy finish, 15 to 20 MDFT

Given that the GT mechanism is in poor condition, the submerged portions of the gravity mechanism should be replaced with stainless steel. If carbon steel is considered because of cost constraint, the carbon steel should be coated with an amine-cured chemical-resistant epoxy and cathodically protected with sacrificial anodes. All submerged mechanism fabrications must be fully seal welded to prevent crevice corrosion; no skip welds will be allowed.

It is recommended that the at-grade level covers be constructed from UV-resistant FRP to ensure long-term durability and protection against sunlight exposure.

4.3 Anaerobic Digestion

Two anaerobic digesters receive thickened solids flows from the GT and the RDT. Several key features and pieces of equipment in the digesters are failing or inadequate. The floating covers of both digesters have severe corrosion, with the oldest digester cover (Digester 2) having material failure where digester gas can freely escape. The rollers and guides for the floating covers are out of alignment, bent, and corroded, and the covers have tipped in the past. The biogas is currently being sent to either the digester boiler or a flare. The boiler that provides process heating for the digesters is at the end of its expected life and is difficult to keep operational. No redundant boiler is available.

4.3.1 Background

Digester 1 and the digester building were constructed as part of the 1977 Phase II Additions. The digester has a floating cover supported on corbels off the 10-inch wall. Digester 2 was constructed as part of the original plant construction and has a floating cover. Wall thickness at this digester is 9 inches at the top and 12 inches at the bottom.

4.3.2 Design Criteria

Table 4-11 provides the digester facility design conditions.

Table 4-11. Anaerobic Digester Facility Design Conditions

Parameter	Value
Design Sludge Flow Rate	12,015 gpd
Heating Design Point	98°F
SRT	20 days[a]
Boiler Capacity	452,000 Btu

[a] At Design ADWF

°F = degree(s) Fahrenheit
Btu = British thermal unit(s)
gpd = gallon(s) per day

4.3.3 Process Description

It is recommended to change the digester operation from in series to in parallel. The primary digester will be fed thickened sludge from the GT and the RDT at a constant flow rate. The DS from the secondary digester will be pumped at a constant rate to the DS storage basin. It is anticipated that the existing equipment can accommodate these operational changes. The upgrades required for the pumping facilities in relation to this operational change are described in Section 5.3.1.

4.3.4 Digester Rehabilitation

The digester rehabilitation details are provided in the following subsections.

4.3.4.1 Fixed Covers and Digester Gas Appurtenances

The existing floating covers will be replaced by fixed covers. The fixed cover design will include the following associated gas control equipment:

- Pressure and vacuum relief valve (with flame arresters and safety selector valve)
- Two access covers for operator access and temporary ventilation during confined space entry
  - Minimum of one 42-inch diameter or larger
- Sludge sampling port
- Pressure relief hatch with vacuum relief function
- Nitrogen purge ports with fame checks

It is recommended to install a foam separator on the gas line to the existing waste gas burner because the WWTF has a history of foaming digesters. The foam separator will be adjacent to the digester building stairway access, as shown on Figure 4-3. It will be supplied by approximately 60 feet of 3-inch-diameter ductile iron pipe (DIP) digester gas piping, which will tie into the existing 3-inch-diameter DIP digester gas pipe between the digester building and the waste gas burner. Three butterfly isolation valves will be installed between the two 3-inch tie-in locations and on the draw and return lines from the foam separator to allow for isolation of the foam separator with continued operation of the waste gas burner.

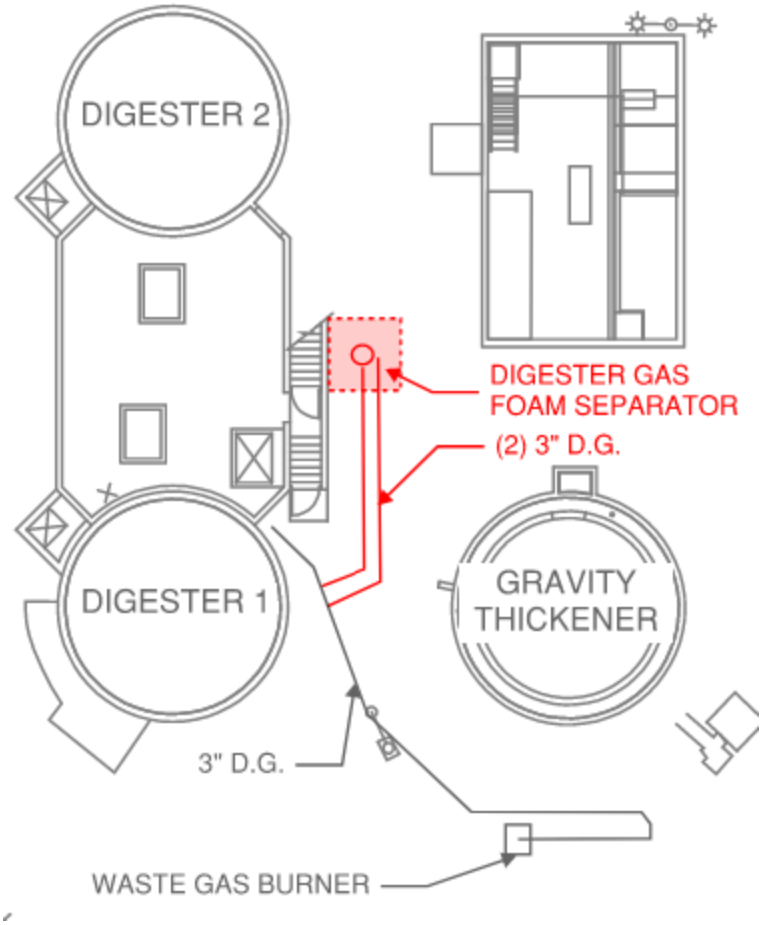


Figure 4-3. Digester Gas Foam Separator Location

Table 4-12 presents the cover and gas appurtenance design criteria.

Table 4-12. Cover and Gas Appurtenance Design Criteria

Parameter	Value
Digester Cover	
Number	2
Type	Fixed
Diameter	24 feet
Pressure Relief Hatch	
Diameter	24 inches
Maximum Allowed Working Pressure	1 foot
Maximum Allowable Working Vacuum	3-inch water column
Manufacturers	Varac, Groth Biogas, Shander, and Jurs

Parameter	Value
Foam Separator	
Number	1
Diameter	24 inches
Manufacturer	Varec

4.3.4.2 Digester Boiler

The existing boiler is at the end of its useful life, is oversized, and will be replaced. It is not anticipated that a gas conditioning system will be required; furthermore, it is more economical to replace the boiler than to install and maintain a gas conditioning system.

The required boiler design capacity is smaller than the available minimum capacity of boilers that run on digester gas; the typical minimum capacity of a digester gas boiler is 1 million Btu. Smaller boilers typically use natural gas rather than digester gas. Digester gas could be used if a gas conditioning system was installed to clean the gas. However, gas conditioning systems have high capital and maintenance costs and will not be included as part of this project. It may be possible to power a natural gas boiler with digester gas, but this would void the manufacturer's warranty. The recommendation is to provide an appropriately sized boiler for the digester operation and to use natural gas. If a natural gas boiler is provided, and natural gas is used as the feed source, then all digester gas will be combusted at the waste gas burner.

Table 4-13 provides the boiler design criteria.

Table 4-13. Boiler Design Criteria

Parameter	Value
Number	2 (1 duty, 1 standby)
Gas Type	Natural gas
Min Capacity, each	450,000 Btu
Horsepower, each	14.40 hp
Manufacturer and Model	Torus: WB0500 Hurst: Series 100 Superior: Osage

4.3.4.3 Structural

Current seismic provisions require a freeboard of 3.2 feet for the digesters to preclude designing the fixed covers to contain the sloshing fluid contents. Raising the top of wall elevation at Digester 1 to level with the digester building provides 4.67 of freeboard for a 25-foot operating sidewall fluid depth. Because the digester operation will be modified to have the digesters operating in parallel, maintaining the same fluid elevation in both will require a further wall extension of at least 0.53 foot at Digester 2 to meet the freeboard requirement for the new cover design. A wall extension of 2 feet will be provided to have the top of wall elevations at the same level for both digesters. Modifications to the digester control building built-up roofing will be required where the walls are extended.

4.3.5 Instrumentation and Controls

New instrumentation will be provided to monitor and control the new process equipment, including the boiler and gas conditioning system, if required. No new process controls, including flow meters and level and pressure instruments are included in the design at this time.

4.3.6 Corrosion

Further condition assessment is required to determine the extent of interior concrete and lining rehabilitation efforts required for the digesters. The concrete interiors of the digesters will likely require enhanced protective measures, especially at the headspace where the wall extensions are constructed. This is because of the formation of hydrogen sulfide gas in the headspace, which, when combined with moisture, produces sulfuric acid—a substance that significantly deteriorates concrete infrastructure.

5. Additional Improvements

This section describes the additional discipline-specific improvements required to support the upgrade project.

5.1 Primary Clarifiers

Significant wear was observed on the floor of the primary clarifiers during the conditions assessment conducted in August 2022. Scraper wear tracks have experienced severe corrosion and require replacement. Operations are currently working to keep the sludge blankets down to limit pressure and damage on flights.

Additionally, while updating the hydraulic calculations to account for realized peak flows, it was identified that the existing structure does not provide for adequate freeboard during peak flow events. The walls of the primary clarifiers will be raised approximately 1 foot to provide adequate freeboard height for peak flow conditions.

5.1.1 Process Description

The existing primary clarifiers are two rectangular clarifiers with chain and flight solids collection mechanisms. Screened and de-gritted influent flow is pumped into the primary clarifier distribution box, and the flow is split into three trains of clarifiers. Scum collected at the surface of the primary clarifiers is transferred to the skimmings collection box by a telescoping valve. The skimmings pump transfers scum to either the headworks or digesters or to the gravity or RDT. Solids collected in the primary clarifiers are transferred to the GT to thicken the solids concentration before the thickened solids are fed to the anaerobic digester. Supernatant of the GT is drained into the plant drain and sent back upstream of the headworks.

5.1.2 Design Criteria

Based on the conditions assessment and the current design conditions, the following are the recommended improvements for the primary clarifier:

- Primary clarifier concrete surfaces exhibit signs of wear and require repair and resurfacing in several locations.
- Replace wood framing walkways with aluminum walkways.
- Raise walls approximately 1 foot to provide adequate freeboard.

5.1.3 Process Description

The primary clarifier process will not be modified as part of this project. The rehabilitation only includes replacement or upgrade of failing mechanical systems and structural modifications. The mechanical equipment requiring replacement is shown as follows:

- Replace gear box of north sludge pump.
  - Replace clarifier mechanism wear strips, chains, and sprockets.
- Provide shelf spare drive for clarifier mechanism.
- Replace buried primary influent valves and provide new T-valve actuator tool.
- Replace motor-operated valves and gates in primary effluent flow structure.

5.1.4 Structural and Architectural Improvements

Surface degradation of the primary clarifier was observed during the 2022 condition assessment. Cementitious and epoxy repair materials will be used to restore the original concrete sections and surface. Where required, deteriorated concrete will be removed before repair to ensure the concrete remaining has sufficiently high pH to provide protection against corrosion of the existing reinforcing bars. No rebar will remain exposed following the completion of the improvements.

To provide adequate freeboard height during peak flow events, the walls of the primary clarifiers will be raised approximately 1 foot.

5.2 Grit Removal

The grit classifier equipment and associated piping is nearing the end of its useful life and will be replaced as part of the upgrade project.

5.2.1 Process Description

Two rectangular basins at the end of both primary clarifier basins serve as the grit settling area. Each basin is served by a grit pump that transfers grit to two grit cyclones for removal. Then, the grit is washed and dewatered in the grit classifier, and grit is transferred to a dumpster for removal.

Grit is defined as inorganic particles, such as sand and gravel, and other heavy materials not removed by the coarse screening facility at the headworks. Grit removal protects downstream mechanical equipment and reduces equipment fouling from inorganic particles. Grit accumulation can lead to poor settling in aeration tanks and may reduce biological treatment performance.

The grit classifier and associated piping will be replaced in kind.

5.2.2 Design Criteria

The existing equipment is the WesTech Shafted Grit Screw Classifier. As of January 2021, WesTech discontinued new sales in the headworks equipment line, so an alternate manufacturer is recommended for the replacement equipment. The design criteria of the replacement grit removal equipment will match the existing equipment design. Table 5-1 presents the design criteria. Appendix E provides the equipment cut sheets.

Table 5-1. Grit Removal Design Criteria

Parameter	Value
Number of Grit Basins	2
Grit Basin Capacity, each	3.9 MGD
Grit Removal Equipment Model and Manufacturer	WEMCO Hydrogritter
Grit Cyclone Capacity, each	140 gpm
Cyclone Inlet Pressure	5 psi
Cyclone Flow (Inlet/Underflow)	220/15 gpm
Classifier Horsepower	1/2 hp
Classifier Mesh Capacity	150
Classifier Diameter and Tank Type	12-inch steel

psi = pound(s) per square inch

5.3 Yard Piping and Valving

Pipe diameter and material information specific to the liquid improvements are in the associated facility section. The digested solids transfer piping will be replaced as part of this project because of the low operating velocities induced by the existing pipe infrastructure and the required transfer flow rate. Digester gas piping will be replaced as a new digester cover is being added. The material selection is discussed in the following subsections.

5.3.1 Digested Solids Transfer Yard Piping

Digested solids are transferred from the digester building to the dewatering building through an existing 300-foot, 6-inch-diameter diameter pipe. With the new operating scheme, including consistently transferring solids from the digesters to the digested solids storage facility, the existing pipeline results in flow velocities well below the recommended value for fluids, with 3% solids of 2 fps. The existing pipeline will be abandoned in place. A new smaller diameter pipeline will be installed from the digested solids transfer PS to the DS storage facility. Table 5-2 presents the pipeline specification. Figure 5-1 shows the proposed route for the new 4-inch-diameter DS pipe.

Table 5-2. Digested Sludge Transfer

Flow Stream	Material	Diameter	Approximate Length
DS (buried)	HDPE (DR 7 Class 335) with long radius bends	4 inches (ID of 3.3 inches)	360 feet
DS (exposed)	SST	3 inches	40 feet

HDPE = high-density polyethylene

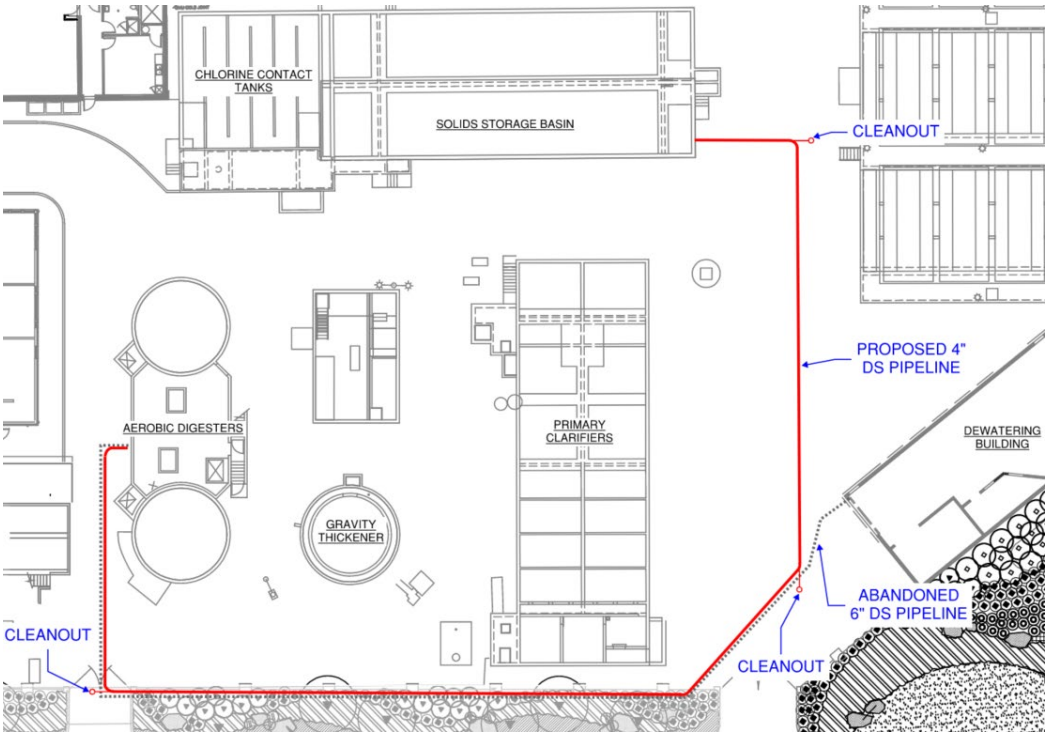


Figure 5-1. Proposed Digested Sludge Transfer Pipe Route

Cleanouts will be provided along the digested solids pipeline length to allow access for periodic maintenance. The cleanout locations are selected based on their location along the pipeline route and accessibility by service truck. These pressure cleanouts can be used to periodically flush the solids pipeline using plant water to prevent blockages. This flush water will be wasted to the digested solids storage basin. Because adding access water to digested solids is not desired, the cleanout procedure will be performed when the digested solids storage basin is free of SS. The cleanout debris can then be pumped to drain using a sump pump or a vacuum truck. Additionally, the use of pipeline pigs will be considered during final design. Pig launching is a method of removing blockages in pipelines using a rubber cylinder, which forces the blockage through the pipeline to the discharge location. Pig launching and receiving stations can be provided along the pipeline. However, the inclusion of these will be further analyzed to determine whether there is adequate site spacing for the equipment required for pig launching and retrieval.

5.3.2 Process Valving

The following section identifies the general value selection for use in the project. If the client has different preferences for valve selection, this section will be updated during final design. Table 5-3 presents the general valve selection.

Table 5-3. General Valve Selection by Flow Stream

Valve Type	Flow Stream	Pipeline Material
Plug Valve	DS WAS ML Primary effluent	DIP
Butterfly Valve	High pressure air	SST
Gate Valve	Filter effluent MBR filtrate Tertiary effluent	DIP
Gate Valve	Process water	Brass

5.4 Area Classification

An area classification assessment was completed in accordance with the NFPA standards for the existing and proposed facilities. NFPA 820 is the standard for fire protection in wastewater treatment. It establishes minimum requirements for protection against fire and explosion hazards in wastewater treatment plants, helping engineers classify hazardous spaces, define ventilation requirements, and select proper construction materials to mitigate risks. The area classification designations inform the HVAC design, the electrical components specifications, and equipment location. Appendix H shows the area classification determinations for the existing and proposed facilities.

5.5 Heating, Ventilation, and Air Conditioning

The following are applicable codes and standards for the HVAC and plumbing design for the project:

- 2025 CBC (*California Code of Regulations* Title 24)
- 2025 California Mechanical Code
- 2025 California Fire Code

- 2025 California Energy Code
- 2025 California Building Energy Efficiency Standards
- 2025 California Green Building Standards Code
- American Society of Heating, Refrigerating, and Air-Conditioning Engineers
  - Standard 62.1, Ventilation for Acceptable Indoor Air Quality
  - Standard 90.1, Energy Standard for Buildings Except Low Rise Residential
- Air-Conditioning, Heating, and Refrigeration Institute
- Sheet Metal and Air Conditioning Contractor's Association
- HVAC Duct Construction Standards – Metal and Flexible
- 2024 NFPA 820 Standard for Fire Protection in Wastewater Treatment and Collection Facilities

The following standards are based on the 2025 California Energy Commission CEC-400-2002-010-AP, Appendix JA2, Table 2-3 for Crescent City:

- Summer Design: 75°F dry bulb/61°F wet bulb at 0.10% annual frequency of occurrence
- Winter Design: 33°F dry bulb at 0.2% annual frequency of occurrence

Unless otherwise noted, HVAC design criteria will be as follows:

- Ductwork will be sized for a static pressure drop of 0.8 inch water column (WC) per 100 feet.
- Intake louvers will be sized for maximum of 400 feet per minute face velocity based on free area.
- Ductwork will be galvanized steel in non-corrosive environments and areas not subject to excess moisture. Corrosion-resistant ductwork material will be chosen to match the anticipated environmental needs.
- Any new HVAC equipment exposed to outdoors will need to be suitable for marine environment.
- Where required, ventilation will be sized at 6 or 12 ACH, as dictated by NFPA 820 for de-rating of spaces. Final design will address and include other measures required for declassification.

Table 5-4 and Table 5-5 summarize the HVAC scope and improvements for the individual facilities. Appendix G provides drawing markups showing the extent of the HVAC replacement work.

Table 5-4. HVAC – New Facilities

Facility	Extent of Scope	Notes
MBR Building Electrical Room	Indoor design criteria will be 85°F for cooling and 50°F for heating. Packaged DX heat pump will provide heating, cooling, and ventilation.	Installation of new MCCs is anticipated.
Dewatering Electrical Room	Indoor design criteria will be 85°F for cooling and 50°F for heating. Packaged DX heat pump will provide heating, cooling, and ventilation.	Installation of new MCCs is anticipated.
Pump Gallery	Ventilate and cool with wall-mounted louvers with motorized dampers and roof-mounted fans with backdraft dampers. Heating will be provided with wall-hung electric unit heaters. The intake louvers will be sized for 300 feet per minute based on the free area of the louver.	The indoor design criteria will be 10°F above ambient for cooling and 55°F for heating. Ventilation minimum will be sized in accordance with NFPA 820 for derating (12 ACH)

Facility	Extent of Scope	Notes
Solid Storage Pump Gallery	Ventilate and cool with wall-mounted louvers with motorized dampers and roof-mounted fans with backdraft dampers. Heating will be provided with wall-hung electric unit heaters. The intake louvers will be sized for 300 feet per minute based on the free area of the louver.	The indoor design criteria will be 10°F above ambient for cooling and 55°F for heating

DX = direct exchange
MCC = motor control center

Table 5-5. HVAC Improvements – Existing Facilities

Facility	Extent of Improvements	Reasoning
Digester Building	Replace all HVAC equipment in kind.	Past useful life
MBR Building – Chemical Room	Replace fan F-4124 and associated ductwork with new 316 stainless-steel ductwork.	Ducts and fan showing signs of corrosion and need for replacement
Administration Building	Replace all HVAC equipment in kind.	Past useful life
Dewatering Building	Replace all HVAC equipment in kind (fans, ductwork).	Past useful life; need to guarantee complying with standard NFPA 820 (6 ACH of ventilation)

5.6 Supervisory Control and Data Acquisition Improvements

The existing control system at the WWTF consists of a combination of vendor-supplied package system controllers, balance-of-plant controllers, and three standalone human-machine interface (HMI) workstations/servers. The scope of SCADA improvements for this project is focused specifically on process areas undergoing upgrades, with enhancements limited to control system components necessary to support those improvements.

The following key process areas are anticipated to impact the existing control system and will require integration or modification to the SCADA components:

- Primary clarifiers
- Grit removal system
- MBRs
- Cloth filters
- WAS storage and pumping
- GTs
- DS pumping

5.6.1 Equipment and Tag Numbering Convention

The WWTF currently uses a documented tag naming convention for equipment and instrumentation. However, this schema was not made available to Jacobs before the development of this preliminary design report. Once obtained, Jacobs will review and validate the schema to ensure consistency with existing plant standards. Before assigning tags to new equipment and instrumentation, Jacobs will confirm the availability of unused tag numbers to avoid duplication. All new tags will adhere to the established naming convention and will be uniquely assigned to support clear identification and integration within the upgraded control system.

5.7 Communication Block Diagram

The existing facility-wide communication ring is expected to remain largely intact throughout the proposed modifications. However, additional control panels may be required to support new input/output (I/O) points in areas where existing panels lack sufficient capacity. It is not anticipated that new programmable logic controller (PLC) processors will be necessary, except for PLCs required by the proposed equipment manufacturers, including filter equipment and the MBR facility. New panels will be configured as remote I/O panels to minimize costs associated with procuring additional processors.

Current assessments indicate the existing PLC processors are adequately sized to handle both current operational demands and the anticipated improvements. All new interbuilding Ethernet communication will use fiber optic cabling to ensure high-speed and reliable data transmission. Within buildings, new communication links will be established using copper-based cabling where appropriate.

5.7.1.1 Programmable Logic Controller Standards

The existing WWTF is standardized on Allen-Bradley ControlLogix PLCs for all area control panels. This platform has been in use for many years and is well-established across the facility. However, some components may be outdated or approaching obsolescence, particularly if they have not been upgraded in recent years. For example, the ControlLogix L5x series processors are discontinued, no longer manufactured, and commercially unavailable. At the time of this report, a formal condition assessment of the control system PLCs had not been completed by an instrumentation and control engineer, and operations and maintenance documentation for the area PLCs had not been provided. As the design progresses, any high-risk or obsolete PLC components identified will be reviewed with project stakeholders to determine appropriate alternatives or upgrade strategies.

To maintain consistency and ensure seamless integration with the existing SCADA system, all packaged system suppliers will be required to provide Allen-Bradley PLCs—specifically ControlLogix, CompactLogix, or MicroLogix platforms—provided they are compatible with the existing area controllers. This requirement supports long-term maintainability and reduces integration complexity across the facility.

The MBR system, based on available as-built documentation, currently uses ControlNet for communication between the MCP and the LCPs. Because ControlNet support is being phased out in newer Allen-Bradley PLC models, all existing ControlNet infrastructure will be decommissioned and replaced with Ethernet/Internet Protocol (EtherNetIP) communication. All new communication associated with the MBR system will also use EtherNetIP and interface with the existing MCP. Additionally, any obsolete PLC communication components within the MCP and LCPs will be upgraded to ensure long-term reliability and supportability. These upgrades will be defined as part of the membrane supplier's scope of work.

The cloth filter systems, also provided by a packaged system manufacturer, will include dedicated Allen-Bradley PLCs that will be integrated into the existing plant network. This approach ensures compatibility with the current SCADA system and supports the facility's standardized control architecture. Each cloth filter PLC will be configured to communicate effectively with the broader control system, maintaining operational consistency and simplifying future maintenance.

Control panel designs will include an uninterruptible power supply for all critical control components, including PLC power supplies, 24 volts direct current power supplies, instrumentation power from the panel, and other critical control components. Each device will be powered with a dedicated overcurrent protective device to isolate faults while maintaining power to the other critical components.

5.7.1.2 Human-Machine Interface Standards Hardware and Software

The facility currently uses three Windows 10-based desktop computers as the primary HMI. These systems serve as the central interface for monitoring and controlling plant operations. With Microsoft's announcement of the end of support for Windows 10 in October 2025, the City has initiated plans to upgrade or replace these computers with Windows 11-compatible systems. As part of this upgrade, the Rockwell Automation FactoryTalk View Site Edition software will also be updated to the latest available version to ensure continued compatibility and support. These upgrades are expected to be completed before the start of construction and will not be included in the contractor's scope of work for this project.

The design will incorporate provisions to support all new process modifications planned for the facility. This includes enhancements to the control system and reporting capabilities necessary to meet updated regulatory requirements. In particular, the upgraded system will include functionality to support expanded reporting needs associated with NPDES compliance, ensuring the facility can maintain accurate and timely environmental reporting in alignment with permit obligations.

To ensure the upgraded control system meets the operational needs of the facility, the design will include collaborative screen development and programming workshops. These workshops will be conducted by the contractor, with active guidance from the engineering team and direct feedback from City staff.
The purpose of these sessions is to develop and refine HMI screens, control logic, and reporting tools in alignment with the facility's workflows, operational preferences, and regulatory requirements.
This collaborative approach will help ensure the final system is intuitive, functional, and tailored to support both routine operations and compliance-related tasks, including those associated with NPDES reporting.

5.7.2 Preferred Instrumentation

The City provided a short list of preferred instrumentation manufacturers, which will be referenced in the design documentation. At a minimum, these preferred vendors will be named as the basis of design and, in some cases, may be specified as sole-source providers if desired. Given the relatively low volume of instrumentation required for this project, sole sourcing is not expected to significantly impact bid competitiveness or pricing. The following section outlines the types of instrumentation anticipated for the project, along with the City's preferred manufacturers, which are provided as follows:

- Ultrasonic Level Transmitters – Siemens
- Magnetic Flow Meter – Emerson Rosemount
- Pressure Transmitters – Emerson Rosemount
- Analytical Instruments – Hach

5.8 Electrical Improvements

Two new MCCs are required to power the proposed new equipment. Figure 5-2 shows the electrical one-line diagram for the proposed upgrade project. Loading for MCC-4002 will increase, requiring the feeder breaker in MCC-4002 feeding MCC-4002A to be upsized to 400 amperes (A). The cable connecting MCC-4002A and P4002AA will also need to increase to size MCC-500 cable. Appendix H includes the half-size drawing sheets for the recommended electrical improvements.

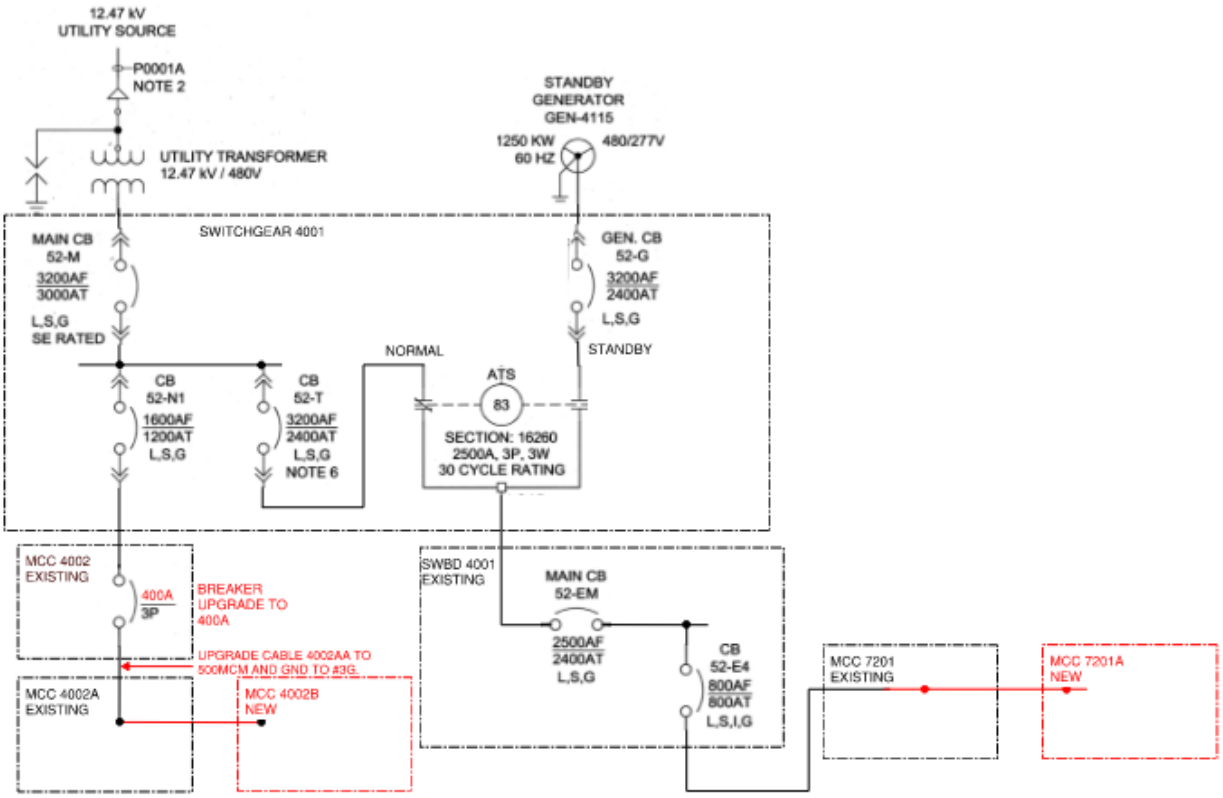


Figure 5-2. Electrical One-Line Diagram

5.8.1 Motor Control Center for new Membrane Bioreactor Facility

The MBR facility equipment can be run by a new MCC-4002B in the current MBR Electrical Room 40-03. The electrical bus and SCADA net trunk connections of existing MCC-4002A would be extended to the new six section line up. Figure 5-3 shows the proposed location and MCC elevation.

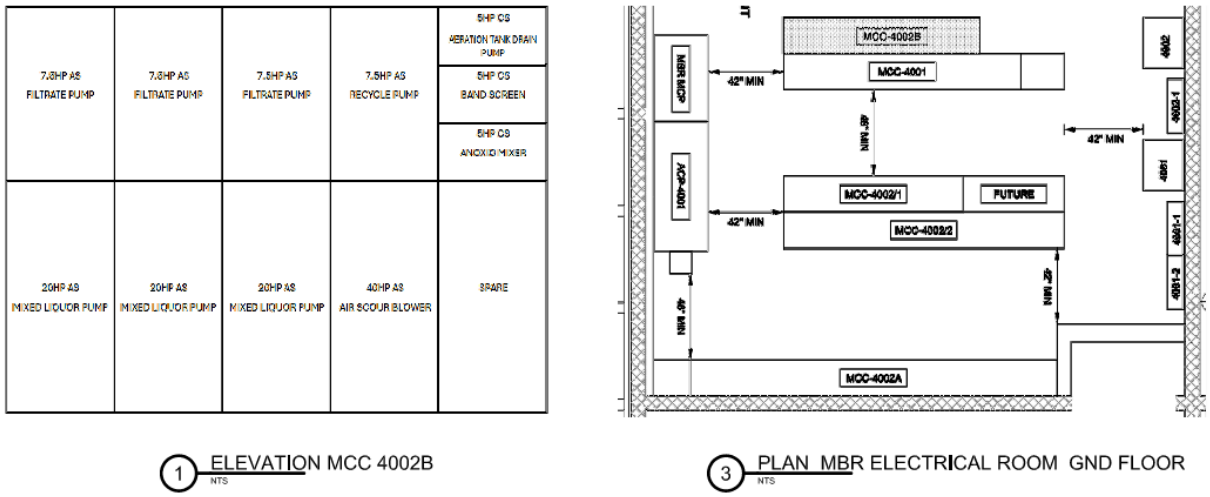


Figure 5-3. Motor Control Center 4002B Plan and Elevation

Table 5-6 presents the equipment associated with MCC-4002B.

Table 5-6. Motor Control Center 4002B

Equipment Name	Quantity	Horsepower, each	Control Type	Facility Location
ML Pumps 3, 4, and 5	3	20	Adjustable speed	MBR Train 2
Filtrate Pumps 3, 4, and 5	3	7.5	Adjustable speed	MBR building
Aeration Tank Transfer Pump	1	5	Constant speed	MBR Train 2
Fine Screen 2	1	5	Constant speed	MBR Train 2
Recycle Pump 2	1	7.5	Adjustable speed	MBR Train 2
Anoxic Mixer 2	1	5	Constant speed	MBR Train 2
Air Scour Blower 3	1	32	Adjustable speed	MBR building

The MBR building additions are approximately 145 hp in base connected load. If all run at full load, the expected current would be 180 A in accordance with National Electrical Code (NEC) Table 430-150. The existing feed from MCC-4002 to MCC-4002A is a 400-A breaker set at 250-A trip. Loading per drawing for MCC-4002A is approximately 170 A. The new MCC-4002B loads will not be run at full load simultaneously, and the expected amperage is expected near 150 A or less.

The upstream feed from MCC-4002 is 3#250MCM, rated for approximately 250 A. The feed would need to be upgraded to 3#350 at a minimum. The existing 3-inch galvanized rigid steel will accept up to 5#350MCM or 4#500 cables. Conduit run will need to be assessed for routing and pull constraints.

5.8.2 Motor Control Center for Attached Growth Facility, Filter Facility, and Waste Activated Sludge and Digested Sludge Storage Equipment

There is adequate space and power to support an additional small MCC in the dewatering building to support new operating loads for the attached growth facility, the filter facility, and the WAS and DS storage equipment. Space near an existing wall appears available to install a new, one section MCC-7201A. Figure 5-4 shows the elevation view of the proposed MCC-7201A. This MCC will be in the dewatering building electrical room. The existing MCC-7201 will have available bucket sections because of the removal of RBCs 4010 through 4120 and Blower BLO-4130. MCC appears to be a GE Evolution series and is still supported by the acquiring company ABB. Spacing for the replacement buckets will need to be verified with the ABB vendor. Overall, the connected load to MCC-7201 is increased by approximately 40 A.

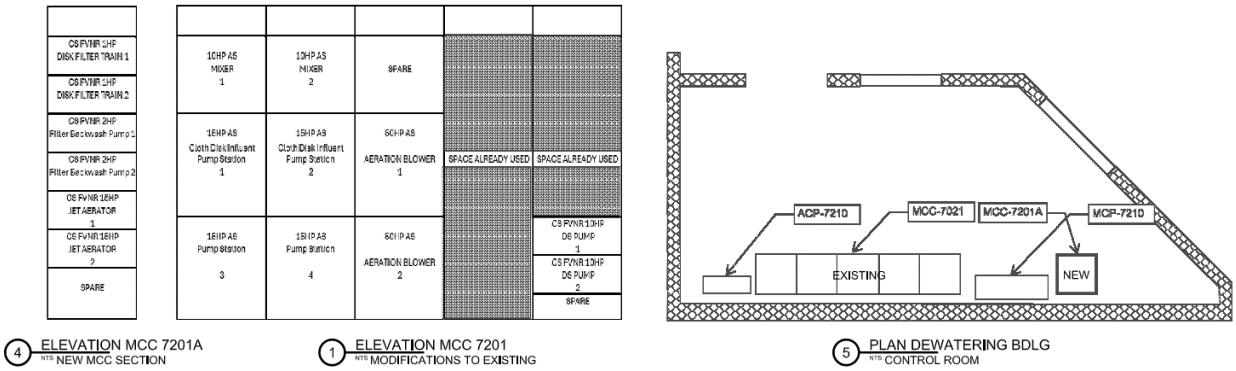


Figure 5-4. Motor Control Centers 7201A Elevation

Table 5-7 presents the equipment associated with MCC-7201 and MCC-7201A. There will be 2 to 10 hp constant speed DS pumps added to this existing MCC. Loading for the two pumps at full load adds 28 A to the existing 308 A.

Table 5-7. Motor Control Centers 7201 and 7201A

Equipment Name	Quantity	Horsepower, each	Control Type	Facility Location
MCC-7201				
SS Transfer Pumps 1 and 2	2	10	Adjustable speed	Pump gallery
MCC-7201A				
Aeration Blower, Attached Growth Trains 1 and 2	2	50	Adjustable speed	Adjacent to dewatering building
Disk Filter Trains 1 and 2	2	1	Constant speed	Cloth disk filters
Filter Backwash Pumps 1 and 2	2	2	Constant speed	Cloth disk filters
Mixing Pumps 1 and 2	2	15	Constant speed	Pump gallery
Jet Aerators 1 and 2	2	15	Constant speed	WAS storage basin

The dewatering building additions are approximately 200 hp in base connected load. If all run at full load, the expected current would be 240 A in accordance with NEC Table 430-150. The existing feed from MCC-7201 to MCC-7201A is an 800-A breaker set at 800-A trip. Loading per drawing for MCC-7201 is approximately 308A+28A (new DS pumps). The new MCC-7201A loads will not be run at full load simultaneously, and the expected amperage is expected near 200 A or less.

The upstream feed from MCC-7201 is 9#500MCM, rated for approximately 1,140 A. The feed would not need to be upgraded.

5.8.3 Outstanding Issues

For MCC-4002B, coordination of breaker settings will need to be reviewed, along with an updated arc flash study, to ensure proper labeling on existing and new MCC components.

Heat loading because of additional adjustable frequency controllers (AFCs) is approximated at 1.65 tons = 19,855 British thermal units per hour (Btu/hour) when all units run at full load. Present HVAC for Electrical Room 40-03 needs to be evaluated for sufficient cooling.

For MCC-7201A, coordination of breaker settings will need to be reviewed, along with an updated arc flash study, to ensure proper labeling on existing and new MCC components.

Heat loading because of additional AFCs is approximated at 2.3 tons = 27,500 Btu/hour when all units run at full load. Present HVAC for the dewatering floor area needs to be evaluated for sufficient cooling.

Any electrical equipment within classified areas will need to be explosion proof. This includes all motors (new or existing to be upgraded), disconnect switches, conduits, and fittings.

5.9 Odor Control

Odors produce the most direct impact that a WWTF has on its surrounding environment. Odor management at the Crescent City WWTF is critical to establishing its reputation as a good neighbor to the surrounding community.

The North Coast Unified Air Quality Management District (NCUAQMD) regulates odors for the City. Odors are classified as an "air contaminant" under district rules, and facilities can be required to obtain permits and comply with emission limits to prevent objectionable odors that could affect a substantial number of people.

Odor is treated as a nuisance with regulations stating it is never legal to impact neighbors with odors (qualitative and not quantitative). Facilities must operate in a manner that does not cause a nuisance. The district has the authority to enforce rules that limit or control emissions, including odors.

5.9.1 Odor Source Descriptions

The existing plant does not currently exhibit offsite odor impacts resulting in odor complaints. Furthermore, there are no regulatory requirements or air permit requirements dictating emissions limits because the plant is not expanding capacity, and therefore, emissions are not expected to increase. Table 5-8 and Table 5-9 describe the plant process odor sources.

Table 5-8. Liquids Processes Odor Sources

Process Area	Odor Source Description	New Odor Control Measures Required?
Course Screen and Dumpster	This source is typically considered to generate moderate nuisance odors. However, while this source is an open source, because the sewage is believed to be "fresh," odors have historically been mild, and there is a significant buffer between the plant boundary and the nearest odor receptor, odor control is not considered to be necessary. As such, no odor control is provided for this source at this time. Note that primary/preliminary sources are not currently covered and do not result in any offsite odor complaints	No.
Influent Pumping	This source is enclosed such that any emissions are limited. Therefore, odor control is not considered necessary for this source at this time.	No.
Aerated Grit and Grease Removal plus Dumpster	These sources are typically considered to generate moderate nuisance odors. However, while these sources are open sources, their distance from the plant fence line coupled with "fresh" wastewater characteristics allows these sources to remain uncontrolled. As such, no odor control is provided for these sources at this time.	No.

Process Area	Odor Source Description	New Odor Control Measures Required?
Open Primaries	This large open area source is typically considered to generate moderate nuisance odors. However, because of "fresh" wastewater characteristics, this large open source has historically not generated significant nuisance odors and is not considered to be a key offsite odor impactor. Therefore, no covering or odor control treatment is considered necessary at this time. Note that primary/ preliminary sources are not currently covered and do not result in any offsite odor complaints	No.
Screen Trains, MBR's, ML PS, Attached Growth Treatment Facility	Because these processes are downstream of primary sedimentation, the potential for nuisance odor emissions is significantly reduced. Furthermore, the type of odors expected are primarily earthy-musty and therefore are less offensive. As such, these sources do not warrant odor control at this time.	No.

Table 5-9. Solids Process Odor Sources

Process Area	Odor Source Description	New Odor Control Measures Required?
Primary Sludge Transfer PS	This facility is a modification to an existing pump gallery in the digester building. This PS is covered, and therefore, emissions are expected to be appropriately suppressed. Therefore, no odor control is considered for this source at this time.	No.
Primary Sludge GT	This process will be fully rehabilitated with new mechanism, coating systems, and walkway. In addition, the tank will be provided with FRP covers that are not airtight, allowing some fugitive odor emissions between walkway and covers. However, the covers are expected to suppress approximately 80% to 90% of the emissions. Therefore, no additional odor control is deemed necessary at this time.	No.
WAS Storage	The western secondary clarifier will be retrofitted to provide an open-air WAS storage with aeration. Because WAS is typically not a significant odor emitter, with odor characteristics more earthy-musty, which is less offensive, no odor control is considered necessary for this source at this time.	No.
WAS Drum Thickener	Similar to WAS storage, because WAS is typically not a significant odor emitter, with odor characteristics more earthy-musty, this process is not required to be odor controlled at this time.	No.

Process Area	Odor Source Description	New Odor Control Measures Required?
SS PS	The SS PS will be in the modified secondary clarifier and will be covered/enclosed with louver for passive ventilation. Expected odor emissions from this source are predicted to be moderate. However, with cover and passive ventilation, any odor plume is expected to be small and therefore a low risk for offsite odor impacts. As such, no odor control is considered for this source at this time.	No.
Anaerobic Digesters	This process is fully enclosed, and therefore, emissions are expected to be nil.	No.
DS Storage	The DS storage will be in the modified secondary clarifier and will be covered/enclosed with louver for passive ventilation. Expected odor emissions from this source are predicted to be moderate. However, with cover and passive ventilation, any odor plume is expected to be small and therefore a low risk for offsite odor impacts. As such, no odor control is considered for this source at this time.	No.
Dewatering BFP	The dewatering BFP is considered a moderate odor source because sludge is agitated, and offgassing is expected to result in nuisance odors characterized by hydrogen sulfide and various reduced sulfur compounds. Currently, an odor control system (ORT-7291) serves this source. ORT-7291 is a dry media adsorption system designed to remove odors typical of biosolids. This existing system is believed to be adequately treating odors from this source. Therefore, no replacement is being considered at this time.	No.

5.9.2 Odor Control System Sizing

The existing ORT-7291 is sized to contain, capture, and treat odors from the dewatering BFP area. Ventilation rates for sizing odor control systems typically comply with NFPA 820 and Jacobs engineering design practice for similar type facilities. In general, ventilation rates should meet the following objectives:

- Provide adequate ventilation to protect maintenance personnel within occupied spaces in accordance with NFPA 820, "Fire Protection in Wastewater Treatment and Collection Facilities," latest edition.
- Maintain a minimum negative pressure of 0.1-inch WC within wastewater holding tanks to contain odors under the following conditions:
  - Dynamic liquid level changes
  - Estimated crack openings in storage tank covers treated as sharp-edged orifices
- When a single access cover is removed, maintain sufficient velocities across the opening to prevent fugitive odors.
- Provide adequate turnover rate and air scavenging within storage tanks to reduce corrosion resulting from hydrogen sulfide pockets.

Note that ORT-7291 capacity can likely be adjusted by speeding up the fan in case ventilation rates are deemed inadequate.

5.9.3 Triggers Prompting Future Re-Evaluation of Odor Control

The following are considered triggers that would prompt future re-evaluation of odor control requirements at the plant:

- Encroachment of sensitive receptors, such as residential developments closer to plant boundary, which increase offsite odor sensitivity
- Changes in plant processes resulting in stronger odor emissions or more offensive odors
- Increase in odor complaints from offsite receptors
- Changes in air quality regulatory requirements resulting in more stringent odor or toxic air contaminant limits
- Increase in plant capacity in the future that could trigger NCUAQMD permitting requirements

Recommended next steps to stay ahead of odor issues include the following:

- Consider an ongoing odor monitoring program, which could include a weekly odor tour along the plant fence line to ensure fugitive odors are not present.
- Consider annual odor sampling of key sources at the plant and input into an odor air dispersion model for predicting offsite odor impacts.

Some recommended controls for preventing or limiting offsite odor impacts include the following:

- Maintain good housekeeping practices by hosing down idle wastewater or sludge storage tanks, removing any residuals or spills in a timely manner, and avoiding plant upsets.

5.10 Corrosion Control and Mitigation

The corrosion control and mitigation design will be based on the following codes and regulations:

- American Concrete Institute (ACI)
- ASTM international (ASTM)
- American Water Works Association (AWWA)
- Association for Materials Protection and Performance
- Ductile Iron Pipe Research Association
- U.S. Environmental Protection Agency (EPA)
- International Standard Organization (ISO)
- National Electrical Manufacturers Association (NEMA)
- The Society for Protective Coatings
- Underwriters Laboratories, Inc.

The aforementioned organizations have established standards to serve as guides, ensuring the quality and reliability of components and systems. These standards also govern nomenclature and define parameters for configuration and construction. The corrosion control design approach for this project can be divided into the following two categories:

- Identifying the corrosivity of the environment in relation to the proposed facility equipment and structures, which involves the following:
  - Conducting field testing to ascertain the corrosivity of the environment on interacting with the process structures and construction materials
  - Analyzing historical corrosion data/studies to determine the intended corrosion control approach

- Developing a comprehensive corrosion mitigation strategy that involves addressing a variety of environments that pose a potential threat to construction materials. This strategy covers the following underlying factors:
  - Atmospheric Conditions:
    - Accounting for various other conditions that may contribute to corrosion risks
    - Identifying specific challenges unique to the environment and developing targeted mitigation measures
  - Buried Environments:
    - Proposing measures to protect materials used in buried structures
    - Proposing factors such as soil composition and moisture levels
  - Submerged Conditions:
    - Proposing a cost-effective solution to counter corrosion in materials exposed to submerged environments
    - Ascertaining the impact of water chemistry and depth on corrosion susceptibility

5.10.1 Atmospheric Conditions

Atmospheric conditions are expected to be highly corrosive because of the WWTF's proximity to the coast. Atmospheric corrosivity will be determined in accordance with ISO 9223 or ISO 12944-2. These corrosive conditions will require that permanent facilities be properly protected for long-term service using corrosion-resistant materials and durable protective coatings where appropriate.

In addition, it is essential that materials and equipment are properly stored and protected during the construction period. Instrumentation, controls, and electrical and mechanical equipment are components that are most susceptible to damage by corrosion during the construction period.

The ISO Corrosivity Classification method, which is contained in ISO 9223 "Corrosion of Metals and Alloys," is divided into six environmental severity classification, as outlined in Table 5-10. Table 5-11 provides the corrosion rates for the first year of exposure for different corrosivity categories.

Table 5-10. Atmospheric Corrosion Classification

Category	Corrosivity
C1	Very low
C2	Low
C3	Medium
C4	High
C5	Very high
CX	Extreme

Table 5-11. Corrosion Rates, for the First Year of Exposure for the Different Corrosivity Categories

Corrosivity Category[a]	Corrosion rates of Metals r_{corr}				
	Unit	Carbon Steel	Zinc	Copper	Aluminum[b]
C1	g/(m^2·a) µm/a	$r_{corr} \leq 10.0$ $r_{corr} \leq 1.3$	$r_{corr} \leq 0.7$ $r_{corr} \leq 0.1$	$r_{corr} \leq 0.9$ $r_{corr} \leq 0.1$	negligible —
C2	g/(m^2·a) µm/a	$10.0 < r_{corr} \leq 200$ $1.3 < r_{corr} \leq 25.0$	$0.7 < r_{corr} \leq 5$ $0.1 < r_{corr} \leq 0.7$	$0.9 < r_{corr} \leq 5.0$ $0.1 < r_{corr} \leq 0.6$	$r_{corr} \leq 0.6$ —
C3	g/(m^2·a) µm/a	$200 < r_{corr} \leq 400$ $25.0 < r_{corr} \leq 50.0$	$5.0 < r_{corr} \leq 15.0$ $0.7 < r_{corr} \leq 2.1$	$5.0 < r_{corr} \leq 12.0$ $0.6 < r_{corr} \leq 1.3$	$0.6 < r_{corr} \leq 2.0$ —
C4	g/(m^2·a) µm/a	$400.0 < r_{corr} \leq 650.0$ $50.0 < r_{corr} \leq 80.0$	$1.5 < r_{corr} \leq 30.0$ 2.1 $< r_{corr} \leq 4.2$	$12.0 < r_{corr} \leq 25.0$ $1.3 < r_{corr} \leq 2.8$	$2.0 < r_{corr} \leq 5.0$ —
C5	g/(m^2·a) µm/a	$650.0 < r_{corr} \leq 1500.0$ $80.0 < r_{corr} \leq 1200.0$	$30.0 < r_{corr} \leq 60.0$ $4.2 < r_{corr} \leq 8.4$	$25.0 < r_{corr} \leq 50.0$ $2.8 < r_{corr} \leq 5.6$	$5.0 < r_{corr} \leq 10.0$ —
CX	g/(m^2·a) µm/a	$1\,500.0 < r_{corr} \leq 5500.0$ $200.0 < r_{corr} \leq 700.0$	$60.0 < rcorr \leq 180.0$ $8.4 < r_{corr}$ 25.0	$50.0 < r_{corr} \leq 90.0$ $5.6 < r_{corr} \leq 10.0$	$r_{corr} > 10.0$ —

Source: ISO 9223 2012

[a] The classification criterion is based on the methods of determination of corrosion rates of standard specimens for the evaluation of corrosivity (refer to ISO 9226).

[b] Aluminum experiences uniform and localized corrosion. The corrosion rates shown in this table are calculated as uniform corrosion. Maximum pit depth or number of pits can be a better indicator of potential damage. It depends on the final application. Uniform corrosion and localized corrosion cannot be evaluated after the first year of exposure because of passivation effects and decreasing corrosion rates.

g/(m^2·a) = gram(s) per square meter per year

µm/a = micrometer(s) per year

r_{corr} = corrosion rate

5.10.1.1 Design Recommendations

Recommendations for ferrous metals are as follows:

- Protect with an epoxy barrier coating; add UV-resistant topcoat to minimize chalking of epoxy coatings exposed to sunlight.
- Polymer-based materials (that is, plastic, non-metallic): Paint with a UV barrier (spray-applied coating) or provide material with resin that is UV stabilized (such as gel-coated FRP).
- Stainless steel: Protective coating is not required except for color-coding purposes.
- Copper-based materials: Protective coating is not required except for color-coding purposes; avoid where traces of hydrogen sulfide are present.
- Concrete and masonry: Painting is not required except for architectural purposes.
- Anchor bolts: Use stainless steel for anchor bolts; use stainless steel in high wash-down areas.
- Concrete embedded items (frames, grating): Use stainless steel; use hot-dip galvanized steel for indoor, dry exposures only.
- Covers and floor plates: Use stainless steel.

Recommendations for gratings, railings, and covers are as follows:

- Use anodized aluminum.
- Use stainless steel or fiberglass where exposed to continuously wet environment; fiberglass requires a UV barrier or integral gel coat.

Recommendations for the electrical system, include the following:

- Panels and Fixtures: Align with the pertinent NEMA classification; panels and fixtures commonly use the standard materials and finishes provided by the manufacturer. Optimal choices for locations with corrosive conditions include 316 SST NEMA enclosure Types 3, 4, and 6. In scenarios involving locally corrosive conditions, such as areas frequently subjected to washdowns, the use of watertight enclosures is also imperative.
- Conduits: Preferably, buried electrical conduits should be made of PVC. However, when metallic raceways are necessary or when exposed to outdoor elements or indoor wet conditions, PVC-coated galvanized steel or aluminum metal becomes a viable alternative. This material is also suitable for concrete floor and slab penetrations, especially during transitions from buried PVC conduit.
  In scenarios where dry conditions persist indoors, galvanized steel can be used for exposed conduits. Furthermore, PVC-coated conduits are recommended in areas with locally corrosive conditions.
- Grounding: Copper grounding materials may require supplemental corrosion protection depending on the corrosivity of the soil.

Other recommendations are as follows:

- Ladders: Use aluminum or stainless steel.
- Architectural components and louvers: Use fluoropolymer (Kynar)-coated aluminum; aluminum and painted steel are also acceptable.
- Stairs: Use aluminum if possible; hot-dip galvanized steel is acceptable in areas where trace hydrogen sulfide is not present.

5.10.2 Immersion Exposure

The generation of hydrogen sulfide may occur in significant amounts as wastewater travels through the collection and conveyance systems. This phenomenon typically results from the breakdown of organic matter and underscores the need for careful monitoring. Currently, the specific chloride content of the wastewater has yet to be assessed, but preliminary assumptions suggest it will exceed 200 ppm, indicating a considerable presence. Furthermore, sulfate concentrations will play a crucial role in determining the exposure class as defined by the ACI. While sulfate levels are expected to be relatively low, their exact impact will need to be evaluated to ensure appropriate materials and construction practices are employed to mitigate any potential exposure risks.

5.10.2.1 Design Recommendations

Following are immersion exposure design recommendations for the project:

- Ferrous metals: Provide high-performance protective coatings.
- Stainless steel: Use Type 316/316L.
- Aluminum: Not recommended for immersion service.
- Pipe: Use stainless steel, PVC, chlorinated PVC, HDPE, or FRP without protective coating or lining.

- Concrete: Provide protective lining for all concrete above the water line in concrete hydraulic structures exposed to hydrogen sulfide
- Anchor bolts and fasteners: Use Type 316 stainless steel.
- Frames (for grating, covers, slide gates, and similar): Use stainless steel.
- Slide gates, weir gates, and weirs: Use stainless steel or FRP.

5.10.3 Buried Exposure

A geotechnical investigation of the soil within the project site is required to be conducted to ascertain the corrosivity of the soil for buried ferrous metals. The laboratory soil analysis will include the moisture content, pH, electrical conductivity (converted to resistivity), chloride content, sulfate content, oxidation-reduction potential (commonly termed "redox potential" or "redox"), and presence of sulfides; all these are factors that can relate to corrosion of buried pipe materials.

Moisture content is a measure of the percentage by mass of water contained within the soil and is indicative of natural moisture conditions present in the site soil. This is helpful to understand how likely laboratory-tested conductivity and resistivity values will be present in the field. Conductivity and resistivity are often tested on saturated samples, so moisture content creates a more realistic appraisal of site soil conditions. However, this is limited to the time of year that the soil samples are collected and should be considered in concert with yearly weather conditions.

The pH is a measure of the soil's acidity and is determined by the concentration of hydrogen ion. Acidic pH values (below 7) in soils have the potential for deterioration or softening of cement mortar because of the acid-base reaction with the alkaline portland cement in these materials. Soils with pH values less than 5 can be detrimental to cement mortar and concrete. Progressively lower values are increasingly aggressive to ferrous metal pipe, and at pH values below 4, severe conditions exist.

Resistivity is a measure of the electrical conductivity of the soil, the value of which is obtained from the inverse of the measured conductivity value. It is determined by factors including the type of soil, mineral content, and moisture content. Low resistivity is correlated with a high potential for corrosion of ferrous metals. Resistivity alone is not a factor in the deterioration of concrete pipe because it is nonmetallic, and the metallic reinforcement within the concrete is protected by a passive film imparted by the highly alkaline concrete. However, it is expected that galvanic corrosion rates will increase in areas with lower resistivities, and any ferrous metal pipes directly connected to concrete pipes would be at risk of increased corrosion rates. Table 5-12 details the correlation between soil resistivity and corrosivity levels of soils at different soil types and resistivity boundaries.

Table 5-12. Soil Resistivity Correlation with Corrosivity Levels

Soil Resistivity (Ω-cm)	Soil Type	Moisture	Corrosivity
<500	Muskeg/sloughs/free water	Always wet	Very corrosive
500 to 2,000	Loamy/clay	Mainly wet	Corrosive
2,000 to 10,000	Gravels, sandy	Mainly dry	Moderately corrosive
10,000 to 20,000	Arid, sandy, gravel	Always dry	Mildly corrosive
>50,000	Gravels, sandy	Always dry	Essentially noncorrosive

Sources: Roberge 2008; CAPP 2018

Ω-cm = ohm-centimeter(s)

Chloride content is a measure of the amount of chloride ions present in the soil, and higher values correlate with higher corrosion rates of steel and metallic reinforcement in concrete. The concrete cover over the metallic reinforcement provides a highly alkaline environment and maintains a passive film on the metal. With higher chloride content, the passive film can be more easily broken down by chloride penetration to the underlying metal, resulting in increased corrosion rates. For soils with presence of chlorides, supplementary cementitious material additions, such as fly ash, slag cement, and silica fume are recommended. Alterations in the concrete mix properties, including maximum water to cement ratio, minimum strength, maximum chloride ion, amount of cover, and corrosion inhibitor additions can also be made to slow the diffusion of chloride ions through the concrete to limit corrosion on the underlying metal. The American Concrete Pressure Pipe Association recommends that when chloride levels exceed 400 milligrams per kilogram (mg/kg) and soil resistivity is below 1,500 Ω-cm, protective measures should be implemented. Protective measures recommended by American Concrete Pressure Pipe Association include a moisture barrier on exterior concrete surfaces, silica fume at 8% to 10% of cement weight or a corrosion inhibitor in the concrete mortar, and cathodic protection.

Sulfate content is a measure of the amount of sulfate ions present in the soil, and higher values correlate with higher corrosion rates of steel, concrete, and cement mortar. Sulfates can be particularly detrimental to concrete materials through chemical and physical attacks that may occur synergistically.

Sulfates can chemically react with compounds in concrete, which can lead to softening or physical expansion and cracking of the concrete. For soils with significant levels of sulfates, the concrete mix should be altered to limit the ability for sulfate ions to diffuse. Common alterations include lowering the water to cement ratio, decreasing the tricalcium-aluminate content, and adding pozzolans and slag. Documentation from the ACI recommends that sulfate concentrations of 200 mg/kg are significant and that cementitious materials have special requirements for sulfate resistance starting at that level; concentrations above 2,000 mg/kg are of even greater concern. Sulfates can also affect concrete and ferrous metals by allowing the growth of sulfate-reducing bacteria, which reduces the sulfates to sulfides. The sulfide-based waste products of these bacteria are expected to be corrosive to ferrous metals and cementitious materials.

Redox is a measure of the degree of aeration of the soil, and lower values are typically correlated with anaerobic soil conditions that can support sulfate-reducing bacteria, which are expected to be corrosive to ferrous metals and cementitious materials. Redox values less than 300 millivolts (mV) are of note when sulfides are also present, and values less than 100 mV are indicative of anaerobic soil conditions.

Measuring the presence of sulfides is a qualitative method of evaluating the presence of sulfate-reducing bacteria and is typically evaluated in concert with redox potential. When sulfides are present and redox values indicate anaerobic soil conditions, it is indicative that sulfate-reducing bacteria exist, and cementitious materials and ferrous metals are at greater risk of corrosion. Table 5-13 lists soil test parameters required by a laboratory on geotechnical analysis of the soil.

Table 5-13. Corrosion Parameters

Parameter	Classifications Based on the Following Guideline	Unit of Measurement
Soil Resistivity	ASTM G187, ASTM G57, BS1377 Part 3:1990 or equivalent	Ω-cm
Moisture Content	ASTM D2216 – 92 or BS1377 Part 2:1990 or equivalent	%
pH Measurements	ASTM D4972 – 13 or BS1377 Part 3:1990 or equivalent	N/A
Chloride Ion Concentration	ASTM D512 – 12 or BS1377 Part 3:1990 or equivalent	ppm or mg/kg

Parameter	Classifications Based on the Following Guideline	Unit of Measurement
Sulfate Ion Concentration	Applicable ASTM or BS1377 Part 3:1990 or equivalent	ppm or mg/kg
Sulfide Ion Concentration	Applicable ASTM or EPA Method 9034 or EPA Method 9215 or AWWA C105 or equivalent	ppm or %
Electrical Conductivity	BS ISO 11265 or equivalent	S/m
Redox Potential	ASTM G200, BS1377 Part 3:1990, or equivalent	mV

S/m = siemen(s) per meter

Table 5-14. Effects Or Environmental Factors on Corrosion Of Steel In Soil

Environmental Factor	Overall Corrosion Rate (mm/year)		Maximum Pitting Rate (mm/year)[a]			
	Maximum	Minimum	Average	Maximum	Minimum	Average
Resistivity (Ω-cm)						
<1,000	0.063	0.018	0.033	0.31	0.6	0.20
1,000 to 5,000	0.058	0.006	0.017	>0.45[b]	0.05	0.14
5,000 to 12,000	0.033	0.005	0.018	0.23	0.06	0.14
>12,000	0.036	0.003	0.014	0.26	0.03	0.6
Drainage						
Very Poor	0.058	0.038	0.046	>0.45[b]	0.16	0.28
Poor	0.037	0.010	0.024	0.23	0.05	0.14
Fair	0.063	0.018	0.022	0.31	0.08	0.16
Good	0.022	0.003	0.010	0.18	0.03	0.6
Porosity (Air Pore Space Percentage)						
<5	0.033	0.010	0.021	>0.45[b]	0.16	0.28
5 to 10	0.063	0.009	0.024	0.23	0.05	0.14
10 to 20	0.037	0.006	0.017	0.31	0.08	0.16
20 to 30	0.058	0.012	0.024	>0.45[b]	0.03	0.6
>30	0.038	0.004	0.013	0.23	0.03	0.09

Source: Revie 2000

[a] Original data are based on National Bureau of Standards field test on open-hearth steel for 12 years at 44 locations in the U.S.

[b] Perforated

mm/year = millimeter(s) per year

5.10.3.1 Design Recommendations

Other design recommendations are detailed as follows.

5.10.3.1.1 Steel Pipe and Appurtenances

Employ high-quality protective coatings, such as specialized epoxy or polyurethane coatings, which provide a barrier against moisture and corrosive agents. Additionally, implement cathodic protection systems, including sacrificial anodes or impressed current systems, to further mitigate corrosion risks. Non-welded steel pipe joints are required to be electrically bonded for continuity. Testing of the bonded joints by a National Association of Corrosion Engineers International-certified technician is required using a specific test method and criteria for evaluation of results. A CP test station is required at every isolation joint location, and every 1,000 feet.

- DIP and Fittings: Guidelines for coating specifications for buried ductile iron piping necessitate the application of a polyethylene encasement system, and manufacturers standard asphaltic coating, as outlined in AWWA C105. However, the soil corrosivity will dictate the type of coating that is required. Furthermore, both buried ductile and steel piping accessories will be coated with an epoxy system. Specific components, such as buried insulating flanges, metallic surfaces associated with nonmetallic pipes, and DIP sections not having cathodic protection anodes, will use a wax tape coating system in accordance with AWWA C217.
- It is recommended to enhance protection by incorporating joint bonds, designated test stations to monitor corrosion conditions, and CP systems to safeguard against corrosion.
- Steel or Cast/Ductile Iron Fittings in Nonmetallic Pipe: For fittings made from steel or cast/ductile iron, apply durable protective coatings, such as fusion-bonded epoxy, which forms a strong bond with the metal surface, providing enhanced resistance to corrosion. After assembling the system, ensure all steel fasteners are coated with a protective layer, such as wax tape or a comparable barrier, to shield them from environmental elements. Additionally, for larger diameter fittings or those in critical applications, consider using supplemental galvanic anodes that provide extra corrosion protection.
- Miscellaneous Steel or Cast/Ductile Iron Components: For any miscellaneous steel or cast/ductile iron parts, usage of robust protective coatings, including epoxy, fusion-bonded epoxy, or wax tape, is strongly recommended. These coatings effectively prevent moisture penetration and mitigate corrosion. In high-risk or critical applications, provide supplemental protection through galvanic anodes to enhance the overall corrosion resistance of these components.
- Lining: The selection of the appropriate lining material will be primarily influenced by the results of the current water quality testing being conducted. This testing will assess various parameters, such as pH levels, conductivity, alkalinity, total dissolved solid, calcium, temperature, magnesium, chloride, and sulfate. Additionally, consideration will be given to any historical data that may indicate the effectiveness of different lining materials used in similar conditions in the past.
- Electrical Isolation: To facilitate the effectiveness of the CP systems, all buried metallic pipelines necessitate electrical isolation from buildings and electrically grounded equipment. Insulating joints must be strategically placed in accessible locations to allow for testing and maintenance. It is advisable to avoid direct buried insulated flanges, when possible, given the challenges associated with repairing insulating components.
- Electrical isolation devices are used to establish an electrical break between two structures mechanically jointed to avoid losing CP current to other structures not intended to be cathodically protected. Electrical isolation devices may be flange isolation kits or prefabricated monolithic isolation joints.
- A CP system is considered electrically shorted when the CP current is lost to unintended paths; such losses affect the performance of the CP system. A cathodically protected pipeline system must be electrically isolated at its extents and at all metallic connections along its length to ensure the CP current is not lost to other piping systems, grounding systems, or unintended assets. This can be accomplished by strategically placing electrical isolation devices throughout the facility to prevent current drain to unintended structures, which could detrimentally affect the protection status of the system.

5.10.3.1.2 Cathodic Protection

Protective coatings have a propensity to deteriorate over an extended period. This deterioration is primarily attributed to age, changes in the soil environment because of seasonal variations, soil corrosivity, and other factors. Based on the susceptibility of the coating to degrade with time, buried steel structures, such as pipelines, flanges, and similar, need regular assessment to ascertain whether the structure's coating conditions and integrity are maintained. The longer the steel structures stay buried in the ground, the greater their susceptibility to corrosion damage and degradation. Buried pipeline coatings can degrade over time, especially if structures are put into an environment for which they were not designed (if they are exposed to excessive temperatures, pH, or chemicals or encounter soil stress, mechanical damage, and pressure reversals).

The protection given to a pipeline by protective coating is greatly influenced by discontinuities or holidays in the coating film. At discontinuous areas in the coating film, the pipeline is most susceptible to external corrosion, thus creating the necessity for a secondary protective system. The corrosion rate at discontinuous areas may be affected by factors, such as the coating substrate, the coating thickness, the electrolytes present at the discontinuity, and surface preparation. A combination of coating and CP will produce a more synergistic effect in mitigating corrosion.

CP of yard piping is required for buried steel and ductile iron using galvanic anodes. The theoretical conceptualization of galvanic CP systems is predicated on the simple application of dissimilar metal corrosion cells. The electrochemical process involves electrically connecting a steel structure to a metal higher in the electrochemical series (active metal) in the presence of a common conductive electrolyte, such as soil. The most active metal (anode) preferentially corrodes, consequently, dissipating CP current simultaneously.

The CP design will meet all the following principal design objectives:

- Provide sufficient current density on a continuous basis to ensure the steel surfaces are polarized to an acceptable criteria and uniform current distribution is applied on the external surfaces of the subject pipelines.
- Ensure the safety of the public and operating personnel and adhere to all applicable codes and standards.
- Ensure the selected current capacity is sufficient to effectively polarize the pipeline exterior surfaces available even after considerable coating deterioration, typically 5% to 10% for a 30-year system design life.
- Ensure the impressed current CP anodes are strategically placed in a location that is unaffected by freezing.
- Avoid polarization of the external surfaces of the subject pipelines to greater than -1,200 millivolts with respect to copper- copper sulfate reference electrode, thereby minimizing coating disbondment.
- Ensure circuit redundancy within the CP system.
- Ensure a minimum design life of 30 years.

5.10.3.1.3 Cathodic Protection Design Life

The CP system will be designed to last a minimum of 30 years. Following its commissioning, it is advised to conduct regular maintenance and inspections. As the system nears anode depletion, it is recommended to reassess and replace the anodes as necessary.

The lifespan of the anodes is directly linked to their current output. The theoretical design life of the CP system is also based on assuming constant current requirements and circuit resistance. However, real-world factors, such as potential further degradation of the coating or additional current loss to metallic sections, could affect this estimation.

5.10.4 Painting and Protective Coatings

Table 5-15 presents a succinct description of the painting and protective coating systems. These requirements adhere to industry standards and aim to ensure durable service for various applications.

Through deliberate and systematic categorization of coating systems according to their intended purposes, Table 5-15 offers a clear guideline for choosing an appropriate coating tailored to specific applications.

Table 5-15. Protective Coating Systems

No.	Surface	Exposure	Coating Materials	Surface Preparation[a]	No. Coats	Thickness[b]
2	Submerged metal	Nonpotable water	Epoxy	SP 5	2	16 millimeters
4	Exposed metal	Highly corrosive	Epoxy/Polyurethane	SP 10	3	9.5 millimeters
7	Encased metal	Concrete embedment	Epoxy	SP 6	2	16 millimeters
8	Buried steel	Soil	Epoxy	SP 10	2	16 millimeters
10	Nonferrous metal	Exposed	Epoxy	SP 16	1[c]	As required by manufacturer
19a	Exposed metals from concrete removal	Nonpotable water	Amine-cured epoxy	SP 11	2	16 millimeters
21	Concrete	Exposed	Epoxy nonskid (aggregated)	SP 13	1	160 ft^2/gal
25	FRP, PVC	Exposed	Acrylic latex	SP 1	2	640 ft^2/gal
27	Aluminum	Concrete or metal contact	Bituminous paint	SP 1	1	10 millimeters
29	Steel	As specified	Fusion-bonded epoxy	SP 10	1 to 2	7 millimeters
29A	Steel dowels	Concrete embedment	Fusion-bonded epoxy	SP 10	1 to 2	7 millimeters
109	Concrete masonry	Exposed, semi-gloss	Acrylic latex	Clean	3	555 ft^2/gal
115	Gypsum drywall	Indoor	Acrylic latex	Clean	3	1,150 ft^2/gal

No.	Surface	Exposure	Coating Materials	Surface Preparation[a]	No. Coats	Thickness[b]
116	Gypsum drywall	Indoor	Water-based epoxy	Clean	2	600 ft^2/gal
117	Concrete masonry	Exposed	Acrylic latex	Clean	3	675 ft^2/gal

[a] SP designations refer to Society for Protective Coatings standards.

[b] Thickness values are slightly variable and a result of the ft^2/gal coverage for coatings on nonmetallic structures, as opposed to dry film thickness in milliliter for metallic structures.

[c] Top coating according to the exposure is also required.

ft^2/gal = square foot (feet) per gallon

Certain equipment and structures come exclusively with coating systems applied at the manufacturer's factory. The selection of these systems is based on ensuring durability aligned with the specific project requirements. This approach aims to integrate coatings seamlessly into the equipment or structure, providing a reliable and long-lasting protective layer.

6. References

American Society of Civil Engineers (ASCE). n.d. ASCE Hazard Tool. Accessed 2025.

Canadian Association of Petroleum Producers (CAPP). 2018. *Pipeline Corrosion Management*. Calgary, Alberta.

City of Crescent City (City). 2001. *Crescent City General Plan.*

City of Crescent City (City). 2023. *2022-2030 Housing Element Update*. April.

Delattre, Marc, and Anne Rosinski. 2012. *Preliminary geologic map of onshore portions of the Crescent City and Orick 30' x 60' quadrangles, California.* Scale 1:100,000. California Geological Survey. Preliminary Geologic Maps PGM-12-05.

Federal Emergency Management Agency (FEMA). 2017. *FEMA Flood Insurance Rate Map #06015C0327F, Del Norte County, California and Incorporated Areas.*

Federal Emergency Management Agency (FEMA). 2018. Flo*od Insurance Study, Del Norte County, California and Incorporated* Areas #06015CV000C.

GeoVision. 2004. *Report of Geotechnical Engineering Services, Crescent City Water Treatment Plant, Crescent City, California*. Prepared for Brown and Caldwell. December 3.

Jacobs. 2025. Project Report.

U.S. Army Corps of Engineers (USACE). 1978. *Technical Report H-78-26.*

Water Environment Federation (WEF). 2025. *Design of Water Resource Recovery Facilities, Manual of Practice 8, 7th Edition*.

Peck, Ralph B., Walter E. Hanson, and Thomas H. Thornburn. 1974. Foundation Engineering. Second edition.

Revie, Winston R. 2000. *Uhlig's Corrosion Handbook*. Second edition.

Roberge, P. R. 2008. *Corrosion Engineering: Principles and Practice*. New York: McGraw-Hill.

U.S. Census Bureau. n.d. ACS Demographic and Housing Estimates. https://data.census.gov/table/ACSDP5Y2023.DP05?q=crescent+city.

Appendix A
National Pollutant Discharge Elimination System Permit
R1-2023-0039

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
NORTH COAST REGION

5550 Skylane Blvd, Suite A
Santa Rosa, CA 95403-1072
Phone (707) 576-2220 • Fax (707) 523-0135
California State Water Resources Control Board Website
(http://www.waterboards.ca.gov)

ORDER NO. R1-2023-0039
NPDES NO. CA0022756
WDID NO. 1A84006ODN

Waste Discharge Requirements and Water Recycling Permit

for the

City of Crescent City
Wastewater Treatment Facility
Del Norte County

The following Permittee is subject to waste discharge requirements (WDRs) set forth in this Order:

Permittee	**City of Crescent City**
Name of Facility	**Wastewater Treatment Facility**
Facility Address	**210 Battery Street** **Crescent City, CA 95531** **Del Norte County**

Table 1. Discharge Location

Discharge Point	Effluent Description	Discharge Point Latitude (North-South)	Discharge Point Longitude (East-West)	Receiving Water
001	Secondary treated wastewater	41˚44’ 38”	124˚12’ 10”	Pacific Ocean
002	Tertiary treated wastewater	--	--	Recycled Water System

This Order was adopted on:	**December 12, 2023**
This Order shall become effective on:	**February 1, 2024**
This Order shall expire on:	**January 31, 2029**

The Permittee shall file a Report of Waste Discharge as an application for reissuance of WDRs in accordance with title 23, California Code of Regulations, and an application for reissuance of a National Pollutant Discharge Elimination System (NPDES) permit no later than: **January 31, 2028.** The U.S. Environmental Protection Agency (U.S. EPA) and the California Regional Water Quality Control Board, North Coast Region have classified this discharge as follows: **Major**

I, Valerie M. Quinto, Executive Officer, do hereby certify that this Order with all attachments is a full, true, and correct copy of the Order adopted by the California Regional Water Quality Control Board, North Coast Region, on the date indicated above.

_____

Valerie M. Quinto, Executive Officer

TABLE OF CONTENTS

1. Facility Information 5
2. Findings 5
2.1. Legal Authorities 5
2.2. Background and Rationale for Requirements 5
2.3. Provisions and Requirements Implementing State Law 5
2.4. Notification of Interested Parties 5
2.5. Consideration of Public Comment 6
2.6. Anticipated Water Quality Impacts in Disadvantaged or Tribal Communities 6
3. Discharge Prohibitions 7
4. Effluent Limitations and Discharge Specifications 7
4.1. Effluent Limitations – Discharge Point 001 8
4.2. Land Discharge Specifications – Not Applicable 11
4.3. Recycling Specifications – Discharge Point 002 11
4.4. Other Requirements 16
5. Receiving Water Limitations 16
5.1. Surface Water Limitations 16
5.2. Groundwater Limitations 19
6. Provisions 20
6.1. Standard Provisions. 20
6.2. Monitoring and Reporting Program (MRP) Requirements 21
6.3. Special Provisions 21
7. Compliance Determination 28

TABLE OF TABLES

Table 1. Discharge Location 1
Table 2. Effluent Limitations[1] 9
Table 3. Recycled Water Discharge Specifications[1] 12

TABLE OF ATTACHMENTS

Attachment A - Definitions A-1
Attachment B - Map B-1
Attachment C - Flow Schematic C-1
Attachment D - Standard Provisions D-1
Attachment E - Monitoring and Reporting Program E-1

Attachment F - Fact Sheet F-1

1. FACILITY INFORMATION

Information describing the City of Crescent City (Permittee), Wastewater Treatment Facility (Facility) is summarized on the cover page and in sections 1 and 2 of the Fact Sheet (Attachment F). Section 1 of the Fact Sheet also includes information regarding the Facility's permit application.

2. FINDINGS

The California Regional Water Quality Control Board, North Coast Region (Regional Water Board), finds:

2.1. Legal Authorities

This Order serves as waste discharge requirements (WDRs) pursuant to article 4, chapter 4, division 7 of the California Water Code (commencing with section 13260). This Order is also issued pursuant to section 402 of the federal Clean Water Act (CWA) and implementing regulations adopted by the U.S. EPA and chapter 5.5, division 7 of the Water Code (commencing with section 13370). It shall serve as a National Pollutant Discharge Elimination System (NPDES) permit authorizing the Permittee to discharge into waters of the United States at the discharge location described in Table 1 subject to the WDRs in this Order. This Order also serves as a Master Recycling Permit pursuant to article 4, chapter 7, division 7 of the Water Code (commencing with section 13500).

2.2. Background and Rationale for Requirements

The Regional Water Board developed the requirements in this Order based on information submitted as part of the application, through monitoring and reporting programs, and other available information. The Fact Sheet (Attachment F), which contains background information and rationale for the requirements in this Order, is hereby incorporated into and constitutes Findings for this Order. Attachments A through E are also incorporated into this Order.

2.3. Provisions and Requirements Implementing State Law

The provisions/requirements in subsections 3.11, 4.2, 4.3, 4.4, 5.2, and 6.3.4.3 of this Order and sections 7, 9.1, 9.3, and 10.6 of the MRP are included to implement state law only. These provisions/requirements are not required or authorized under the federal CWA; consequently, violations of these provisions/requirements are not subject to the enforcement remedies that are available for NPDES violations.

2.4. Notification of Interested Parties

The Regional Water Board has notified the Permittee and interested agencies and persons of its intent to prescribe WDRs for the discharge and has provided them

with an opportunity to submit their written comments and recommendations. Details of the notification are provided in the Fact Sheet.

2.5. Consideration of Public Comment

The Regional Water Board, in a public meeting, heard and considered all comments pertaining to the discharge. Details of the Public Hearing are provided in the Fact Sheet.

2.6. Anticipated Water Quality Impacts in Disadvantaged or Tribal Communities

The Permittee, the City of Crescent City, operates a wastewater treatment facility within a disadvantaged community located along the Pacific Ocean in Del Norte County. The discharge is classified as "major" under federal regulations. Among other updates, this renewed permit contains new requirements to implement bacteria objectives for ocean waters used for water contact recreation and shellfish harvesting. Expanded monitoring and reporting requirements are also included in the renewed Order to monitor compliance with applicable water quality objectives. The Order does not contain a time schedule for meeting applicable water quality objectives, an alternative compliance path that allows time to come into compliance with water quality objectives, or a water quality variance (Wat. Code, section 13149.2, subd. (d)); all requirements must be met upon Order adoption.

The Regional Water Board publicly noticed the permit and provided opportunities for public comment. Public notice was provided to interested persons and public agencies in the region with jurisdiction over natural resources in the affected area, including the Del Norte County Community Development Department. While the discharge regulated by this Order is not expected to result in disproportionate impacts on water quality in tribal or disadvantaged communities, the Regional Water Board has conducted outreach consistent with Water Code section 189.7.

THEREFORE, IT IS HEREBY ORDERED, that Order No. R1-2017-0002 is rescinded upon the effective date of this Order except for enforcement purposes, and, in order to meet the provisions contained in division 7 of the Water Code (commencing with section 13000) and regulations adopted thereunder, and the provisions of the CWA and regulations and guidelines adopted thereunder, the Permittee shall comply with the requirements in this Order. This action in no way prevents the Regional Water Board from taking enforcement action for violations of the previous Order.

3. DISCHARGE PROHIBITIONS

3.1. The discharge of any waste not disclosed by the Permittee or not within the reasonable contemplation of the Regional Water Board is prohibited.

3.2. Creation of pollution, contamination, or nuisance, as defined by section 13050 of the Water Code is prohibited.

3.3. The discharge of sludge or digester supernatant is prohibited, except as authorized under section 6.3.4.2 of this Order (Sludge Disposal and Handling Requirements).

3.4. The discharge or recycling use of untreated or partially treated waste (receiving a lower level of treatment than described in section 2.1 of the Fact Sheet) from anywhere within the collection, treatment, or disposal systems is prohibited, except as provided for in Attachment D, Standard Provisions 1.7 (Bypass) and 1.8 (Upset).

3.5. The discharge of waste to land that is not owned by the Permittee, governed by City ordinance, or under agreement to use by the Permittee, or for which the Permittee has explicitly permitted such use, is prohibited, except for use for fire suppression as provided in title 22, sections 60307(a) and 60307(b) of the California Code of Regulations (CCR).

3.6. The discharge of waste at any point not described in Finding 2.2 of the Fact Sheet or authorized by a permit issued by the State Water Resources Control Board (State Water Board) or another Regional Water Board is prohibited.

3.7. The average dry weather flow of waste through the Facility shall not exceed 1.86 mgd, measured daily and averaged over a calendar month. The peak daily wet weather flow of waste through the Facility shall not exceed 6.12 mgd, measured daily. Compliance with this prohibition shall be determined as defined in sections 7.11 and 7.12 of this Order.

3.8. The discharge of any radiological, chemical, or biological warfare agent or high-level radioactive waste into waters of the state is prohibited.

3.9. The discharge of sludge directly into the ocean or into a waste stream that discharges to the ocean is prohibited.

3.10. The by-passing of untreated wastes containing concentrations of pollutants in excess of those of Ocean Plan Tables 3 or 4 (2019) is prohibited.

3.11. The acceptance of septage to a location other than an approved septage receiving station is prohibited.

4. EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS

4.1. **Effluent Limitations – Discharge Point 001**

4.1.1. **Final Effluent Limitations – Discharge Point 001**

4.1.1.1. The Permittee shall maintain compliance with the following effluent limitations at Discharge Point 001, with compliance measured at Monitoring Location EFF-001 as described in the Monitoring and Reporting Program (MRP), Attachment E:

Table 2. Effluent Limitations[1]

Parameter	Units	Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum	Six-Month Median
Biochemical Oxygen Demand 5-day @ 20°C (BOD_5)	mg/L	30	45	--	--	--	--
Total Suspended Solids	mg/L	30	45	--	--	--	--
pH	standard units	--	--	--	6.0	9.0	--
Oil and Grease	mg/L	25	40	--	--	75	--
Ammonia Nitrogen, Total (as N)	mg/L	--	--	72	--	180	18
Settleable Solids	mL/L	1.0	1.5	--	--	3.0	--
Turbidity	NTU	75	100	--	--	225	--
Copper, Total Recoverable	µg/L	--	--	300	--	840	32
Silver, Total Recoverable	µg/L	--	--	79	--	200	16
Endosulfan[4]	µg/L	--	--	0.54	--	0.81	0.27
Endrin	µg/L	--	--	0.12	--	0.18	0.060
Total Residual Chlorine[5]	µg/L	--	--	240	--	1800	60
DDT[6]	µg/L	0.0051	--	--	--	--	--

Parameter	Units	Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum	Six-Month Median
Heptachlor	µg/L	0.0015	--	--	--	--	--
Dieldrin	µg/L	0.0012	--	--	--	--	--

Table Notes

1. See Definitions in Attachment A and Compliance Determination discussion in section 7 of this Order.
2. The sum of the concentrations of endosulfan-alpha, endosulfan-beta, and endosulfan sulfate, as identified in Attachment A of this Order and Appendix I of the Ocean Plan under the Endosulfan definition.
3. See section 7.12 of this Order regarding compliance with chlorine residual effluent limitations.
4. The sum of the concentrations of 4,4'DDT, 2,4'DDT, 4,4'DDE, 2,4'DDE, 4,4'DDD, and 2,4'DDD.

4.1.1.2. **Percent Removal:** The average monthly percent removal of BOD_5 and total suspended solids shall not be less than 85 percent. Percent removal shall be determined from the monthly average value of influent wastewater concentration in comparison to the monthly average value of effluent concentration for the same constituent over the same time period as measured at Monitoring Locations INF-001 and EFF-001, respectively.

4.1.1.3. **Disinfection:** Disinfected effluent discharged from the wastewater treatment plant through Discharge Point 001 to the Pacific Ocean shall not contain fecal coliform bacteria exceeding the following concentrations, as measured at Monitoring Location EFF-001:

4.1.1.3.1. **Enterococci**

4.1.1.3.1.1. The 6-week rolling geometric mean of enterococci shall not exceed 30 colony forming units (CFU) per 100 mL; and

4.1.1.3.1.2. No sample shall exceed a CFU of 110 per 100 mL.

4.1.1.3.2. **Total Coliform Organisms**

4.1.1.3.2.1. The median value of total coliform bacteria shall not exceed an MPN of 70 per 100 mL in a calendar month; and

4.1.1.3.2.2. Not more than 10 percent of the samples collected in a calendar month shall exceed an MPN of 230 per 100 mL.

4.1.1.3.3. **Fecal Coliform**

4.1.1.3.3.1. The 30-day geometric mean of fecal coliform density not to exceed 200 per 100 mL;

4.1.2. **Interim Effluent Limitations – Not Applicable**

This Order does not establish interim effluent limitations or schedules for compliance with final limitations.

4.2. **Land Discharge Specifications – Not Applicable**

This Order does not authorize discharges to land.

4.3. **Recycling Specifications – Discharge Point 002**

4.3.1. When discharging to the recycled water system, the Permittee shall maintain compliance with the following limitations at Discharge Point 002, with compliance measured at Monitoring Location REC-001, as described in the attached MRP.

Table 3. Recycled Water Discharge Specifications[1]

Parameter	Units	Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
Biochemical Oxygen Demand 5-day @ 20°C	mg/L	10	15	--	--	--
Total Suspended Solids	mg/L	10	15	--	--	--
Settleable Solids	mL/L	0.1	--	0.2	--	--
pH	standard units	--	--	--	6.0	9.0

Table Notes

1. See Definitions in Attachment A and Compliance Determination discussion in section 7 of this Order.

4.3.1.1. **Disinfection:** Disinfected effluent discharged from the Facility to the recycled water system at Discharge Point 002 shall not contain total coliform bacteria exceeding the following concentrations, as measured at Monitoring Location REC-001:

4.3.1.1.1. The median concentration shall not exceed an MPN of 2.2 per 100 mL, using the bacteriological results of the last 7 days for which analysis have been completed:

4.3.1.1.2. The number of total coliform bacteria shall not exceed an MPN of 23 per 100 mL, in more than one sample in any 30-day period; and

4.3.1.1.3. No sample shall exceed an MPN of 240 total coliform bacteria per 100 mL.

4.3.2. **Water Recycling Requirements**

4.3.2.1. This Order includes water recycling requirements that apply to the production of recycled water. The Permittee shall obtain permit coverage for the use of recycled water, prior to initiating recycled water use.

4.3.2.2. The Permittee shall comply with applicable state and local requirements regarding the production and use of recycled water, including requirements of Water Code sections 13500 – 13577 (Water Reclamation) and State Water Board, Division of Drinking Water (DDW) regulations at title 22, sections 60301 – 60357 of the CCR (Water Recycling Criteria).

4.3.3. **Filtration Process Requirements**

4.3.3.1. **Filtration Rate.** When discharging to the recycled water system, the rate of filtration through the tertiary filters, as measured at Monitoring Location INT-001A, shall not exceed 5 gallons per minute per square foot of surface area or other filtration rates authorized in writing by the Regional Water Board Executive Officer and under conditions recommended by DDW.

4.3.3.2. **Turbidity.** When discharging to the recycled water system, the effluent from the filtration system shall at all times be filtered such that the filtered effluent does not exceed any of the following specifications at Monitoring Location INT-001B prior to discharge to the disinfection unit:

4.3.3.2.1. 0.2 NTU more than 5 percent of the time during any 24-hour period; and

4.3.3.2.2. 0.5 NTU at any time.

4.3.3.3. Filtered effluent in excess of the turbidity specifications shall not enter the recycling distribution system. Filtered effluent in excess of turbidity specifications shall be automatically diverted to an upstream treatment process unit or to emergency storage as soon as the Permittee is aware of the exceedance. The Permittee shall provide notification of non-compliance with the filtration process requirements as required in section 9.3.2.3 of the MRP (Attachment E).

4.3.4. **Disinfection Process Requirements**

When discharging to the recycled water system, the Permittee shall operate the ultraviolet light (UV) disinfection system in accordance with the operating protocol and technical and administrative requirements set out by DDW in order to ensure compliance with disinfection water recycling specifications in section 4.3.1.2 of this Order. Specifically, the Permittee shall:

4.3.4.1. Disinfect tertiary treated wastewater using a disinfection process that, when combined with the filtration process, has been demonstrated to inactivate and/or remove 99.999 percent of the plaque forming units of F-specific

bacteriophage MS2, or polio virus in the wastewater. At a minimum, the Permittee shall demonstrate a 99.99 percent removal and/or inactivation of MS2 through the UV disinfection system only.

4.3.4.2. Provide continuous, reliable monitoring of flow, UV transmittance, UV intensity, UV dose, and UV power at Monitoring Location INT-002B, and turbidity at Monitoring Location INT-001B. The Permittee must demonstrate compliance with the UV dose requirement.

4.3.4.3. Operate the UV disinfection system to provide a minimum UV dose of 80 millijoules per square centimeter (mJ/cm2) at all times at Monitoring Location INT-002B, unless otherwise approved by DDW.

4.3.4.4. The equations below must be used as part of the automatic UV disinfection control system for calculating UV dose.

RED = 10(1.49425 - 0.38577 * log (Q) -0.51275 * log (UVA) +0.40133*log (sensor))

And

Sensor Intensity High power = 10.465 (UVT) - 412.2

OR

4.3.4.5. Sensor Intensity Low power = 7.8655 (UVT) - 302.29

Where:

RED = Delivered UV dose per Reactor (mJ/cm2);

Q = flow in gpm [gallons per minute];

UVA = UV absorbance at 254 nm (%);

UVT = % UV transmittance at 254 nm (%).

4.3.4.6. Ensure that the UV transmittance (at least 254 nanometers) in the wastewater does not fall below 65 percent of maximum at any time, unless otherwise approved by DDW.

4.3.4.7. Visually inspect the quartz sleeves and cleaning system components per the manufacturer’s operation manual for physical wear (scoring, solarization, seal leaks, etc.) and to check the efficacy of the cleaning system.

4.3.4.8. Wipe/clean the quartz sleeves at least once every 24 hours following the manufacturer’s procedures to ensure the minimum required UV dose delivery is consistently achieved. Cleaning intervals shall be increased as necessary

to ensure compliance with permit requirements such as UV dose and total coliform organism requirements.

4.3.4.9. Operate the UV disinfection system in accordance with an approved operations and maintenance plan, which specifies clearly the operational limits and responses required for critical alarms. The Permittee shall maintain a copy of the approved operations plan at the treatment plant and make the plan readily available to operations personnel and regulatory agencies. The Permittee shall post a quick reference plant operations data sheet at the treatment plant. The data sheet shall include the following information:

4.3.4.9.1. The alarm set points for secondary and tertiary turbidity, high and low flow, UV dose and transmittance, UV lamp operations hours, and power.

4.3.4.9.2. The values of secondary and tertiary turbidity, high and low flow, UV dose and transmittance, UV lamp operation hours, and power when flow must be diverted to waste.

4.3.4.9.3. The values of high daily and weekly median total coliform when an operational response must be taken.

4.3.4.9.4. The required frequency of calibration for all meters measuring turbidity, flow, UV transmittance, and power.

4.3.4.9.5. The required frequency of mechanical cleaning/wiping and equipment inspection.

4.3.4.9.6. The UV lamp age tracking procedures and replacement intervals.

4.3.4.10. Replace lamps every 7,000 hours of operation, or sooner, if there are indications that the lamps are failing to provide adequate disinfection. The Permittee shall maintain lamp age and lamp replacement records for a time period consistent with the record retention requirements in the Standard Provisions (Attachment D, Section 4).

4.3.4.11. Properly calibrate flow meters and UV transmittance (UVT) monitors to ensure proper disinfection.

4.3.4.12. Inspect the UVT meter and check against a reference bench-top unit weekly to document accuracy.

4.3.4.13. Recalibrate the on-line UVT analyzer by a procedure recommended by the manufacturer if the on-line analyzer UVT reading varies from the bench-top spectrophotometer UVT reading by 2 percent or more.

4.3.4.14. Operate the UV disinfection system with a built-in automatic reliability feature that must be triggered when the system is below the target UV dose. If the measured UV dose goes below the minimum UV dose, the UV reactor in

question must alarm and startup the next available row of UV lamps or UV lamp bank.

4.3.4.15. Not allow equivalent or substitutions of equipment to occur without an adequate demonstration of equivalent disinfection performance to the satisfaction and approval of DDW.

4.3.4.16. Until adequate redundancy and reliability is provided and demonstrated, ensure that flow through the UV disinfection system does not exceed 0.6 mgd as a daily maximum. Upon demonstration of adequate redundancy and reliability, ensure that flow through the UV disinfection system does not exceed 1.2 mgd as a daily maximum, unless otherwise approved by DDW.

4.4. Other Requirements

4.4.1. Total Residual Chlorine, Monitoring Location INT-002A. As measured at the end of the chlorine contact tank at Monitoring Location INT-002A, the total residual chlorine concentration shall be maintained at a concentration that ensures the discharge meets the effluent limitations for total coliform, fecal coliform, and enterococci bacteria at the end of the disinfection process for discharges to Discharge Point 001.

5. RECEIVING WATER LIMITATIONS

Receiving water limitations are based on water quality objectives contained in the Ocean Plan (Surface Water Limitations) and the Basin Plan (Groundwater) are a required part of this Order. Receiving water conditions not in conformance with the limitation are not necessarily a violation of this Order. Compliance with receiving water limitations shall be measured at monitoring locations described in the MRP (Attachment E). The Regional Water Board may require an investigation to determine cause and culpability prior to asserting that a violation has occurred and/or may consider other available information.

5.1. Surface Water Limitations

Discharges from the Facility shall not cause the following in the receiving water upon completion of initial dilution:

5.1.1. Ocean Plan

5.1.1.1. Bacteria Characteristics

5.1.1.1.1. **Water-Contact Standards.** Within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone designated for water contact recreation use by the Regional Water Board, but including all kelp beds, the following bacteriological objectives shall be maintained throughout the water column:

5.1.1.1.1.1. A 30-day geometric mean of fecal coliform density not to exceed 200 per 100 mL, calculated based on the five most recent samples from each site, and a single sample maximum not to exceed 400 per 100 mL.

5.1.1.1.1.2. A 6-week rolling geometric mean of enterococci not to exceed 30 CFU per 100 mL, calculated weekly, and a statistical threshold value of 110 CFU per 100 mL not to be exceeded by more than 10 percent of the samples collected in a calendar month, calculated in a static manner.

5.1.1.1.2. **Shellfish Harvesting Standards.** At all areas where shellfish may be harvested for human consumption, as determined by the Regional Water Board, the following bacterial objectives shall be maintained throughout the water column:

5.1.1.1.2.1. The median total coliform density shall not exceed 70 per 100 mL, and not more than 10 percent of the samples shall exceed 230 per 100 mL.

5.1.1.1.3. **Physical Characteristics**

5.1.1.1.3.1. Floating particulates and oil and grease shall not be visible.

5.1.1.1.3.2. The discharge of waste shall not cause aesthetically undesirable discoloration of the ocean surface.

5.1.1.1.3.3. Natural light shall not be significantly reduced at any point outside the initial dilution zone as the result of the discharge of waste.

5.1.1.1.3.4. The rate of deposition of inert solids and the characteristics of inert solids in ocean sediments shall not be changed such that benthic communities are degraded.

5.1.1.1.4. **Chemical Characteristics**

5.1.1.1.4.1. The dissolved oxygen concentration shall not at any time be depressed more than 10 percent from that which occurs naturally, as the result of the discharge of oxygen demanding waste materials.

5.1.1.1.4.2. The pH shall not be changed at any time more than 0.2 units from that which occurs naturally.

5.1.1.1.4.3. The dissolved sulfide concentration of waters in and near sediments shall not be significantly increased above that present under natural conditions.

5.1.1.1.4.4. The concentration of substances set forth in Chapter II, Table 3 of the Ocean Plan shall not be increased in marine sediments to levels which would degrade indigenous biota.

5.1.1.1.4.5. The concentration of organic materials in marine sediments shall not be increased to levels that would degrade marine life.

5.1.1.1.4.6. Nutrient materials shall not cause objectionable aquatic growths or degrade indigenous biota.

5.1.1.1.4.7. Discharges shall not cause exceedances of water quality objectives for ocean waters of the state established in Chapter II, Table 3 of the Ocean Plan.

5.1.1.1.5. **Radiological Standards**

5.1.1.1.5.1. The discharge of radioactive waste shall not degrade marine life.

5.1.1.1.6. **Biological Characteristics**

5.1.1.1.6.1. Marine communities, including vertebrate, invertebrate and plant species, shall not be degraded.

5.1.1.1.6.2. The natural taste, odor, and color of fish, shellfish, or other marine resources used for human consumption shall not be altered.

5.1.1.1.6.3. The concentration of organic materials in fish, shellfish, or other marine resources used for human consumption shall not bioaccumulate to levels that are harmful to human health.

5.1.1.1.7. **General Standards**

5.1.1.1.7.1. The discharge shall not cause a violation of any applicable water quality standard for the receiving waters adopted by the Regional Water Board or the State Water Board as required by the CWA and regulations adopted thereunder.

5.1.1.1.7.2. Waste management systems that discharge to the ocean must be designed and operated in a manner that will maintain the indigenous marine life and a healthy and diverse marine community.

5.1.1.1.7.3. Waste discharged to the ocean must be essentially free of:

5.1.1.1.7.3.1. Material that is floatable or will become floatable upon discharge.

5.1.1.1.7.3.2. Settleable material or substances that may form sediments which will degrade benthic communities or other aquatic life.

5.1.1.1.7.3.3. Substances which will accumulate to toxic levels in marine waters, sediments or biota.

5.1.1.1.7.3.4. Substances that significantly decrease the natural light to benthic communities and other marine life.

5.1.1.1.7.3.5. Materials that result in aesthetically undesirable discoloration of the ocean surface.

5.1.1.1.7.4. Waste effluents shall be discharged in a manner which provides sufficient initial dilution to minimize the concentrations of substances not removed in the treatment.

5.1.1.1.7.5. Location of waste discharges must be determined after a detailed assessment of the oceanographic characteristics and current patterns to assure that:

5.1.1.1.7.5.1. Pathogenic organisms and viruses are not present in areas where shellfish are harvested for human consumption or in areas used for swimming or other body-contact sports.

5.1.1.1.7.5.2. Natural water quality conditions are not altered in areas designated as being of special biological significance or areas that existing marine laboratories use as a source of seawater.

5.1.1.1.7.5.3. Maximum protection is provided to the marine environment.

5.1.1.1.7.5.4. The discharge does not adversely affect recreational beneficial uses such as surfing and beach walking.

5.2. **Groundwater Limitations**

5.2.1. The collection, treatment, storage, and disposal of wastewater or use of recycled water shall not cause a statistically significant degradation of groundwater quality unless a technical evaluation is performed that demonstrates that any degradation that could reasonably be expected to occur, after implementation of all regulatory requirements (e.g., title 27 of the CCR) and reasonable BMPs, will not violate groundwater quality objectives or cause impacts to beneficial uses of groundwater.

5.2.2. The collection, treatment, storage, and disposal of wastewater or use of recycled water shall not cause alterations of groundwater that contain chemical concentrations in excess of limits specified in title 22, division 4, chapter 15, article 4, sections 64431; article 5.5, section 64444; and article 16, section 64449 of the CCR, and the Basin Plan.

5.2.3. The collection, treatment, storage, and use of wastewater or recycled water shall not cause or contribute to levels of radionuclides in groundwater in concentrations that cause nuisance or adversely affect beneficial uses, nor in excess of the MCLs and SMCLs established for these pollutants in title 22, division 4, chapter 15, article 5, sections 64442 and 64443 of the CCR.

5.2.4. The collection, treatment, storage, and disposal of wastewater or use of recycled water shall not cause groundwater to contain taste - or odor-producing

substances in concentrations that cause nuisance or adversely affect beneficial uses.

5.2.5. In groundwaters used for domestic or municipal supply (MUN), the collection, treatment, storage, and disposal of wastewater or use of recycled water shall not cause the median of the most probable number of coliform organisms over any 7-day period to exceed 1.1 MPN/100 mL or 1 colony/100 mL.

5.2.6. The collection, treatment, storage and use of wastewater or recycled water shall not cause groundwater to contain toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in humans, or that adversely affects beneficial uses. This limitation applies regardless of whether the toxicity is caused by a single substance or the synergistic effect of multiple substances.

6. PROVISIONS

6.1. Standard Provisions.

6.1.1. **Federal Standard Provisions.** The Permittee shall comply with all Standard Provisions included in Attachment D of this Order.

6.1.2. **Regional Water Board Standard Provisions.** The Permittee shall comply with the following provisions. In the event that there is any conflict, duplication, or overlap between provisions specified by this Order, the more stringent provision shall apply:

6.1.2.1. Failure to comply with provisions or requirements of this Order, or violation of other applicable laws or regulations governing discharges from this facility, may subject the Permittee to administrative or civil liabilities, criminal penalties, and/or other enforcement remedies to ensure compliance. Additionally, certain violations may subject the Permittee to civil or criminal enforcement from appropriate local, state, or federal law enforcement entities.

6.1.2.2. In the event the Permittee does not comply or will be unable to comply for any reason, with any prohibition, final effluent limitation, recycling specification, other specification, receiving water limitation, or provision of this Order that may result in a significant threat to human health or to the environment, such as inundation of treatment components, breach of pond containment, recycled water main break or equivalent release, irrigation runoff, etc., that results in a discharge to a drainage channel or a surface water, the Permittee shall:

6.1.2.2.1. Notify Regional Water Board staff within 24 hours of having knowledge of such noncompliance. Spill notification and reporting shall be conducted in accordance with Section 5.5 of Attachment D and 10.6 of the Monitoring and Reporting Program (Attachment E).

6.1.2.2.2. Investigate the cause(s) of final effluent limitation and discharge specification exceedances and failures to comply with any prohibition, specification, or provision of this Order that may result in significant threat to human health or the environment.

6.1.2.2.3. Identify and implement corrective actions to prevent future exceedances or failures to comply with Order requirements.

6.1.2.2.4. Report the results of such investigations and corrective actions implemented in the monthly self-monitoring report (SMR) as required by MRP section 10.3.6.2.5 and 10.3.6.2.6.

6.2. Monitoring and Reporting Program (MRP) Requirements

The Permittee shall comply with the MRP, included as Attachment E to this Order, and future revisions thereto.

6.3. Special Provisions

6.3.1. Reopener Provisions

6.3.1.1. **Standard Revisions.** If applicable water quality standards are promulgated or approved pursuant to Section 303 of the CWA, or amendments thereto, the Regional Water Board may reopen this Order and make modifications in accordance with such revised standards.

6.3.1.2. **Reasonable Potential.** This Order may be reopened for modification to include an effluent limitation, if monitoring establishes that the discharge causes, or has the reasonable potential to cause or contribute to, an excursion above a water quality criterion or objective applicable to the receiving water.

6.3.1.3. **Whole Effluent Toxicity**. As a result of a Toxicity Reduction Evaluation (TRE), this Order may be reopened to include a new chronic toxicity limitation, acute toxicity limitation and/or a limitation for a specific toxicant identified in the TRE.

6.3.1.4. **303(d)-Listed Pollutants.** If an applicable total maximum daily load (TMDL) (see Fact Sheet, section 3.4) program is adopted, this Order may be reopened and effluent limitations for the pollutant(s) that are the subject of the TMDL modified or imposed to conform this Order to the TMDL requirements.

6.3.2. Best Management Practices and Pollution Prevention

6.3.2.1. Pollutant Minimization Program

The Permittee shall, as required by the Regional Water Board Executive Officer (hereafter Executive Officer), develop and conduct a PMP, as further

described below, when there is evidence (e.g., sample results from analytical methods more sensitive than those methods required by this Order, presence of whole effluent toxicity, health advisories for fish consumption, results of benthic or aquatic organism tissue sampling) that a priority pollutant is present in the effluent above an effluent limitation and either:

6.3.2.1.1. The concentration of the pollutant is reported as “Detected, but Not Quantified” (DNQ) and the effluent limitation is less than the reported ML;

6.3.2.1.2. The concentration of the pollutant is reported as non-detect (ND) and the effluent limitation is less than the MDL, using definitions described in Attachment A and reporting protocols described in MRP section 10.3.5.

6.3.2.2. The PMP shall include, but not be limited to, the following actions and submittals acceptable to the Regional Water Board:

6.3.2.2.1. An annual review and semi-annual monitoring of potential sources of the reportable pollutant(s), which may include fish tissue monitoring and other bio-uptake sampling;

6.3.2.2.2. Quarterly monitoring for the reportable pollutant(s) in the influent to the wastewater treatment system;

6.3.2.2.3. Submittal of a control strategy designed to proceed toward the goal of maintaining concentrations of the reportable pollutant(s) in the effluent at or below the effluent limitation;

6.3.2.2.4. Implementation of appropriate cost-effective control measures for the reportable pollutant(s), consistent with the control strategy; and

6.3.2.2.5. An annual status report that shall be submitted as part of the Annual Facility Report, due **March 1st**, to the Regional Water Board including:

6.3.2.2.5.1. All PMP monitoring results for the previous year;

6.3.2.2.5.2. A list of potential sources of the reportable pollutant(s);

6.3.2.2.5.3. A summary of all actions undertaken pursuant to the control strategy; and

6.3.2.2.5.4. A description of actions to be taken in the following year.

6.3.3. **Construction, Operation and Maintenance Specifications**

6.3.3.1. **Proper Operation and Maintenance.** This Order (Attachment D, Standard Provision 1.4) requires that the Permittee at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) that are installed or used by the Permittee to achieve compliance with this Order. Proper operation and maintenance includes

adequate laboratory quality control and appropriate quality assurance procedures.

6.3.3.2. **Operation and Maintenance Manual.** The Permittee shall maintain an updated Operation and Maintenance (O&M) Manual for the operational components of the Facility. The Permittee shall update the O&M Manual, as necessary, to conform to changes in operation and maintenance of the Facility. The Permittee shall operate and maintain the Facility in accordance with the most recently updated O&M Manual. The O&M Manual shall be readily available to operating personnel onsite and for review by state or federal inspectors. The O&M Manual shall include the following.

6.3.3.2.1. Description of the Facility's organizational structure showing the number of employees, duties and qualifications and plant attendance schedules (daily, weekends and holidays, part-time, etc.). The description should include documentation that the personnel are knowledgeable and qualified to operate the Facility so as to achieve the required level of treatment at all times.

6.3.3.2.2. Detailed description of safe and effective operation and maintenance of treatment processes, process control instrumentation and equipment.

6.3.3.2.3. Description of laboratory and quality assurance procedures.

6.3.3.2.4. Inspection and essential maintenance schedules for all processes and equipment.

6.3.3.2.5. Description of safeguards to assure that, should there be reduction, loss, or failure of electric power, the Permittee will be able to comply with requirements of this Order.

6.3.3.2.6. Description of preventive (fail-safe) and contingency (response and cleanup) plans for controlling accidental discharges, and for minimizing the effect of such events. These plans shall identify the possible sources (such as loading and storage areas, power outage, waste treatment unit failure, process equipment failure, tank and piping failure) of accidental discharges, untreated or partially treated waste bypass, and polluted drainage.

6.3.3.3. **Operating Records.** The Permittee shall maintain operating records at the Facility or at the Permittee's central depository. The records shall include: all analyses specified in the reclamation criteria; any documentation of operational problems, plant and equipment breakdowns, and diversions to emergency storage or disposal; and documentation of all corrective or preventive actions taken

6.3.3.4. **Septage Handling Requirements**

6.3.3.4.1. **Septage Management Plan.** Prior to accepting septage, the Permittee shall submit a Septage Management Plan for approval by the Regional Water Board Executive Officer. The Septage Management Plan shall include a description of the proposed septage receiving station and how septage would be handled, identify the necessary legal authorities to monitor and enforce septage handling requirements, specify standard operating procedures (SOPs) for accepting septage, and demonstrate that the Facility has the capability of handling the septage without violating any conditions of this Order.

6.3.3.4.2. **Septage Handling Specifications.** The Permittee may accept septage upon written notification of approval of the Septage Management Plan by the Regional Water Board Executive Officer. The Permittee shall comply with the following specifications for accepting septage:

6.3.3.4.2.1. The Permittee shall implement any necessary legal authorities to monitor and enforce septage handling requirements, including restriction of discharges of toxic materials to the collection system and wastewater treatment facility and inspection facilities connected to the system.

6.3.3.4.2.2. The Permittee shall maintain a waste hauler manifest that identifies the name of the hauler, county identification number, the date and time the waste load was transferred, and the volume and source of the waste.

6.3.3.4.2.3. The Permittee shall accept the discharge of septage only during business hours and when the Permittee's operations staff is on site.

6.3.3.4.2.4. The Permittee shall accept septage only at an approved septage receiving station/location.

6.3.3.4.2.5. The Permittee shall collect representative grab samples of septage loads in accordance with the MRP (Attachment E).

6.3.4. Special Provisions for Publicly-Owned Treatment Works (POTWs)

6.3.4.1. Pretreatment of Industrial Waste

6.3.4.1.1. The Permittee shall be responsible for the performance of all pretreatment requirements contained in 40 C.F.R. part 403 and shall be subject to enforcement actions, penalties, fines, and other remedies by the U.S. EPA or other appropriate parties as provided in the CWA, as amended (33 USC 1351 et seq.). The Permittee shall implement and enforce its approved Facility Pretreatment Program. The Permittee's approved Facility Pretreatment Program is hereby made an enforceable condition of this Order. U.S. EPA may initiate enforcement action against an industrial user for noncompliance with applicable standards and requirements as provided in the CWA.

6.3.4.1.2. The Permittee shall enforce the requirements promulgated under Sections 307(b), 307(c), 307(d), and 402(d) of the CWA. The Permittee shall cause industrial users subject to Federal Categorical Standards to achieve compliance no later than the date specified in those requirements or, in the case of a new industrial user, upon commencement of the discharge.

6.3.4.1.3. The Permittee shall perform the pretreatment functions as required in 40 C.F.R. part 403 including, but not limited to:

6.3.4.1.3.1. Implement the necessary legal authorities as provided in 40 C.F.R. section 403.8(f)(1);

6.3.4.1.3.2. Enforce the pretreatment requirements under 40 C.F.R. sections 403.5 and 403.6;

6.3.4.1.3.3. Implement the programmatic functions as provided in 40 C.F.R. section 403.8(f)(2); and

6.3.4.1.3.4. Provide the requisite funding and personnel to implement the pretreatment program as provided in 40 C.F.R. section 403.8(f)(3).

6.3.4.1.4. The Permittee shall implement, as more completely set forth in 40 C.F.R. section 403.5, the necessary legal authorities, programs, and controls to ensure that the following incompatible wastes are not introduced to the treatment system:

6.3.4.1.4.1. Wastes which create a fire or explosion hazard in the treatment works;

6.3.4.1.4.2. Wastes which will cause corrosive structural damage to treatment works, but in no case wastes with a pH lower than 5.0, unless the works is specially designed to accommodate such wastes;

6.3.4.1.4.3. Solid or viscous wastes in amounts which cause obstruction to flow in sewers, or which cause other interference with proper operation of treatment works;

6.3.4.1.4.4. Any waste, including oxygen demanding pollutants (BOD5, etc.), released in such volume or strength as to cause inhibition or disruption in the treatment works, and subsequent treatment process upset and loss of treatment efficiency;

6.3.4.1.4.5. Heat in amounts that inhibit or disrupt biological activity in the treatment works, or that raise influent temperatures above 40°C (104°F);

6.3.4.1.4.6. Petroleum oil, non-biodegradable cutting oil, or products of mineral oil origin in amounts that will cause interference or pass through;

6.3.4.1.4.7. Pollutants which result in the presence of toxic gases, vapors, or fumes within the treatment works in a quantity that may cause acute worker health and safety problems; and

6.3.4.1.4.8. Any trucked or hauled pollutants, except at points predesignated by the Permittee, and consisting of waste that can be adequately treated at the Facility.

6.3.4.1.5. The Permittee shall implement, as more completely set forth in 40 C.F.R. section 403.5, the legal authorities, programs, and controls necessary to ensure that indirect discharges do not introduce pollutants into the sewerage system that, either alone or in conjunction with a discharge or discharges from other sources:

6.3.4.1.5.1. Flow through the system to the receiving water in quantities or concentrations that cause a violation of this Order, or

6.3.4.1.5.2. Inhibit or disrupt treatment processes, treatment system operations, or sludge processes, use, or disposal and either cause a violation of this Order or prevent sludge use or disposal in accordance with this Order.

6.3.4.2. **Sludge Disposal and Handling Requirements**

6.3.4.2.1. Sludge, as used in this Order, means the solid, semisolid, and liquid residues removed during primary, secondary, or advanced wastewater treatment processes. Solid waste refers to grit and screenings generated during preliminary treatment. Biosolids refers to sludge that has been treated, tested, and demonstrated to be capable of being beneficially and legally used pursuant to federal and state regulations as a soil amendment for agriculture, silviculture, horticulture, and land reclamation activities.

6.3.4.2.2. All collected sludge and other solid waste removed from liquid wastes shall be removed from screens, sumps, ponds, and tanks as needed to ensure optimal plant operation and disposed of in accordance with applicable federal and state regulations.

6.3.4.2.3. The use and disposal of biosolids shall comply with all of the land application and disposal requirements in 40 C.F.R. part 503, which are enforceable by the U.S. EPA, not the Regional Water Board. If during the life of this Order, the state accepts primacy for implementation of 40 C.F.R. part 503, the Regional Water Board may also initiate enforcement where appropriate.

6.3.4.2.4. Sludge or biosolids that are disposed of in a municipal solid waste landfill or used as daily landfill cover shall meet the applicable requirements of 40 C.F.R. part 258. In the annual self-monitoring report, the Permittee shall report the amount of sludge placed in a landfill and the landfill(s) which received the sludge or biosolids.

6.3.4.2.5. The Permittee shall take all reasonable steps to prevent and minimize any sludge use or disposal in violation of this Order that may adversely affect human health or the environment.

6.3.4.2.6. Solids and sludge treatment, storage, and disposal or reuse shall not create a nuisance, such as objectionable odors or flies, and shall not result in groundwater contamination.

6.3.4.2.7. Solids and sludge treatment and storage sites shall have facilities adequate to divert surface water runoff from adjacent areas, to protect the boundaries of the site from erosion, and to prevent drainage from the treatment and storage site. Adequate protection is defined as protection from a design storm with a 100-year recurrence interval and 24-hour duration.

6.3.4.2.8. The discharge of sewage sludge and solids shall not cause waste material to be in a position where it is, or can be, conveyed from the treatment and storage sites and deposited in the waters of the state.

6.3.4.2.9. For the land application of biosolids as soil amendment, the Permittee shall submit a report of waste discharge or the Permittee may dispose of biosolids at another appropriately permitted facility.

6.3.4.2.10. New sludge treatment and storage facilities must comply with the requirements of title 27 of the CCR for the protection of water quality.

6.3.4.3. **Wastewater Collection System**

The Permittee has coverage under, and is separately subject to, the requirements of State Water Board Order No. WQ 2022-0103-DWQ, Statewide Waste Discharge Requirements General Order for Sanitary Sewer Systems. As such, the Permittee provides notification and reporting of SSOs in accordance with the requirements of Order No. WQ 2022-0103-DWQ and any revisions thereto for operation of its wastewater collection system.

6.3.4.4. **Operator Certification**

Supervisors and operators of municipal wastewater treatment facilities shall possess a certificate of appropriate grade in accordance with CCR title 23 of the CCR, section 3680. The State Water Board may accept experience in lieu of qualification training. In lieu of a properly certified wastewater treatment facility operator, the State Water Board may approve use of a water treatment facility operator of appropriate grade certified by DDW where water recycling is involved.

6.3.4.5. **Ensuring Adequate Capacity**

If the Facility will reach capacity within 4 years, the Permittee shall notify the Regional Water Board. A copy of such notification shall be sent to appropriate

local elected officials, local permitting agencies, and the press. Factors to be evaluated in assessing reserve capacity shall include, at a minimum, (1) comparison of the wet weather design flow with the highest daily flow, and (2) comparison of the average dry weather design flow with the lowest 30-day flow. The Permittee shall demonstrate that adequate steps are being taken to address the capacity problem. The Permittee shall submit a technical report the Regional Water Board showing how flow volumes will be prevented from exceeding capacity, or how capacity will be increased, **within 120 days after providing notification to the Regional Water Board**, or within 120 days after receipt of Regional Water Board notification that the Facility will reach capacity within 4 years. The time for filing the required technical report may be extended by the Regional Water Board. An extension of 30 days may be granted by the Executive Officer, and longer extensions may be granted by the Regional Water Board itself. [Cal. Code. Regs., tit. 23, §2232].

6.3.5. Other Special Provisions

6.3.5.1. Storm Water

For the control of storm water discharges from the Facility, if required, the Permittee shall seek separate authorization to discharge under the requirements of the State Water Board's Water Quality Order No. 2014-0057-DWQ, NPDES General Permit No. CAS000001, General Permit for Storm Water Discharges Associated with Industrial Activities (or subsequent renewed versions of the NPDES General Permit CAS000001), which is not incorporated by reference in this Order.

BMPs to control the run-on of storm water to the Facility site shall be maintained and upgraded as necessary. The Permittee shall describe the effectiveness of these storm water BMPs, as well as activities to maintain and upgrade these BMPs during the previous year, in its annual report to the Regional Water Board.

6.3.6. Compliance Schedules – Not Applicable

This Order does not establish interim effluent limitations or schedules of compliance for final numeric effluent limitations.

7. COMPLIANCE DETERMINATION

Compliance with the effluent limitations contained in section 4 of this Order and with Discharge Prohibition 3.7 will be determined as specified below.

7.1. Compliance with Effluent Limitations

7.1.1. **Single Constituent Effluent Limitations.** The Permittee is out of compliance with the effluent limitation if the concentration of the pollutant in the monitoring

sample is greater than the effluent limitation and greater than or equal to the reported Minimum Level (ML).

7.1.2. **Effluent Limitations Expressed as a Sum of Several Constituents.** The Permittee is out of compliance with an effluent limitation which applies to the sum of a group of chemicals (e.g., PCBs) if the sum of the individual pollutant concentrations is greater than the effluent limitation. Individual pollutants of the group will be considered to have a concentration of zero if the constituent is reported as non-detect (ND) or detected but not quantified (DNQ).

7.2. **Multiple Sample Data**

When determining compliance with an AMEL for priority pollutants, and more than one sample result is available, the Permittee shall compute the arithmetic mean unless the data set contains one or more reported determinations of “Detected, but Not Quantified” (DNQ) or “Not Detected” (ND). In those cases, the Permittee shall compute the median in place of the arithmetic mean in accordance with the following procedure.

7.2.1. The data set shall be ranked from low to high, ranking the reported ND determinations lowest, DNQ determinations next, followed by quantified values (if any). The order of the individual ND or DNQ determinations is unimportant.

7.2.2. The median value of the data set shall be determined. If the data set has an odd number of data points, then the median is the middle value. If the data set has an even number of data points, then the median is the average of the two middle values unless one or both of the points are ND or DNQ, in which case the median value shall be the lower of the two data points where DNQ is lower than a value and ND is lower than DNQ and a value of zero shall be used for the ND or DNQ value in the median calculation for compliance purposes only. Using a value of zero for DNQ or ND samples does not apply when performing reasonable potential or antidegradation analyses.

7.3. **Average Monthly Effluent Limitation (AMEL)**

If the average (or when applicable, the median determined by section 7.2 above for multiple sample data) of daily discharges over a calendar month exceeds the AMEL for a given parameter, this will represent a single violation, though the Permittee will be considered out of compliance for each day of that month for that parameter (e.g., resulting in 31 days of non-compliance in a 31-day month).

If only a single sample is taken during the calendar month and the analytical result for that sample exceeds the AMEL, the Permittee will be considered out of compliance for that calendar month. The Permittee will only be considered out of compliance for days when the discharge occurs. If there are ND or DNQ results for a specific constituent in a calendar month, the Permittee shall calculate the median of all sample results within that month for compliance determination with the AMEL as described in section 7.2, above.

7.4. **Average Weekly Effluent Limitation (AWEL)**

If the average (or when applicable, the median determined by section 7.2 above for multiple sample data) of daily discharges over a calendar week (Sunday through Saturday) exceeds the AWEL for a given parameter, this will represent a single violation, though the Permittee will be considered out of compliance for each day of that week for that parameter, resulting in 7 days of non-compliance.

If only a single sample is taken during the calendar week and the analytical result for that sample exceeds the AWEL, the Permittee will be considered out of compliance for that calendar week. The Permittee will only be considered out of compliance for days when the discharge occurs. If there are ND or DNQ results for a specific constituent in a calendar week, the Permittee shall calculate the median of all sample results within that week for compliance determination with the AWEL as described in section 7.2, above.

7.5. **Maximum Daily Effluent Limitation (MDEL)**

If a daily discharge (or when applicable, the median determined by section 7.2, above, for multiple sample data of a daily discharge) exceeds the MDEL for a given parameter, the Permittee will be considered out of compliance for that parameter for that 1 day only within the reporting period.

7.6. **Instantaneous Minimum Effluent Limitation**

If the analytical result of a single grab sample is lower than the instantaneous minimum effluent limitation for a parameter, the Permittee will be considered out of compliance for that parameter for that single sample. Non-compliance for each sample will be considered separately (e.g., the results of two grab samples taken within a calendar day that both are lower than the instantaneous minimum effluent limitation would result in two instances of non-compliance with the instantaneous minimum effluent limitation).

If the Permittee monitors pH continuously, pursuant to 40 C.F.R. section 401.17, the Permittee shall be in compliance with the pH limitation specified herein provided that both of the following conditions are satisfied: (1) the total sum of time during which the pH values are outside the required range of pH values shall not exceed 7 hours and 26 minutes in any calendar month; and (2) no individual excursion from the range of pH values shall exceed 60 minutes.

7.7. **Instantaneous Maximum Effluent Limitation**

If the analytical result of a single grab sample is higher than the instantaneous maximum effluent limitation for a parameter, the Permittee will be considered out of compliance for that parameter for that single sample. Non-compliance for each sample will be considered separately (e.g., the results of two grab samples taken within a calendar day that both exceed the instantaneous maximum effluent

limitation would result in two instances of non-compliance with the instantaneous maximum effluent limitation).

If the Permittee monitors pH continuously, pursuant to 40 C.F.R. section 401.17, the Permittee shall be in compliance with the pH limitation specified herein provided that both of the following conditions are satisfied: (1) the total sum of time during which the pH values are outside the required range of pH values shall not exceed 7 hours and 26 minutes in any calendar month; and (2) no individual excursion from the range of pH values shall exceed 60 minutes.

7.8. **Bacteriological Limitations (Fecal Coliform Bacteria, Enterococci, and Total Coliform Bacteria)**

7.8.1. **Median.** The median is the central tendency concentration of the pollutant. The data set shall be ranked from low to high, ranking any ND concentrations lowest, followed by quantified values. The median value is determined based on the number of data points in the set. If the data set has an odd number of data points, then the median is the middle value. If the data set has an even number of data points, the median is the average of the two middle values, unless one or both points are ND or DNQ, in which case the median value shall be the lower of the two middle data points. DNQ is lower than a detected value, and ND is lower than DNQ.

7.8.2. **Geometric Mean (GM).** The geometric mean is a type of mean or average that indicates the central tendency or typical value of a set of numbers by using the product of their values (as opposed to the arithmetic mean which uses their sum). The geometric mean shall be calculated using the 5 most recent samples from a site using the following formula:

$$\text{Geometric Mean} = \sqrt[n]{(x_1)(x_2)(x_3)\dots(x_n)}$$

Where x is the sample value and n is the number of samples taken.

7.8.3. **Six-week Rolling Geometric Mean.** The rolling geometric mean shall be calculated using at least 5 sample results over a 6-week period from a site using the following formula:

$$\text{Geometric Mean} = \sqrt[n]{(x_1)(x_2)(x_3)\dots(x_n)}$$

Where x is the sample value and n is the number of samples taken.

7.8.4. **Statistical Threshold Value.** (1) The data set shall be ranked from low to high, ranking any ND concentrations lowest, followed by quantified values. (2) The number of sample results should then be multiplied by 90 percent then rounded

up to the nearest whole number. (3) Count the values in the data set starting from lowest to highest until the number indicated in step (2) is reached. (4) To be compliant with the statistical threshold value in Receiving Water Limitation 5.1.1.1.1.2, all sample results less than the point described in step 3 must be less than 100 MPN/100 mL.

7.9. **Chronic Toxicity**

Compliance with the accelerated monitoring and TRE provisions shall constitute compliance with the chronic toxicity requirements, all specified in the MRP (Attachment E, sections 5.1 and 5.2).

7.10. **Average Dry Weather Flow**

Compliance with the average dry weather flow prohibition in section 3.7 of this Order will be determined once each calendar year by evaluating all flow data collected in a calendar year. The flow through the facility, measured daily and averaged monthly, must be 1.86 mgd or less for the month with the lowest average monthly flow.

7.11. **Peak Daily Wet Weather Flow**

The peak daily wet weather flow is the maximum flow rate that occurs over a 24-hour period. Compliance with the peak daily wet weather flow prohibition in section 3.7 of this Order will be determined daily by measuring the daily average flow at Monitoring Location INF-001. If the measured daily average flow exceeds 6.12 mgd, the discharge is not in compliance with Prohibition 3.7 of this Order.

7.12. **Chlorine Residual Effluent Limitations**

Compliance with the chlorine residual effluent limitations shall be based on continuous residual monitoring at Monitoring Location EFF-001. The Permittee shall report from discrete readings of the continuous monitoring every hour on the hour. Compliance shall be based on an average of these discrete hourly readings on a daily basis. The Permittee shall retain continuous monitoring readings for at least three years. The Regional Water Board retains the right to use all continuous monitoring data for discretionary enforcement.

ATTACHMENT A - DEFINITIONS

AREAS OF SPECIAL BIOLOGICAL SIGNIFICANCE (ASBS)

Those areas designated by the State Water Resources Control Board (State Water Board) as ocean areas requiring protection of species or biological communities to the extent that alteration of natural water quality is undesirable. All Areas of Special Biological Significance are also classified as a subset of STATE WATER QUALITY PROTECTION AREAS.

ARITHMETIC MEAN (μ)

Also called the average, is the sum of measured values divided by the number of samples. For ambient water concentrations, the arithmetic mean is calculated as follows:

$$\text{Arithmetic mean} = \mu = \Sigma x / n$$

where: Σx is the sum of the measured ambient water concentrations, and n is the number of samples.

AVERAGE MONTHLY EFFLUENT LIMITATION (AMEL)

The highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.

AVERAGE WEEKLY EFFLUENT LIMITATION (AWEL)

The highest allowable average of daily discharges over a calendar week (Sunday through Saturday), calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week.

CHLORDANE

Shall mean the sum of chlordane-alpha, chlordane-gamma, chlordene-alpha, chlordene-gamma, nonachlor-alpha, nonachlor-gamma, and oxychlordane.

COEFFICIENT OF VARIATION (CV)

CV is a measure of the data variability and is calculated as the estimated standard deviation divided by the arithmetic mean of the observed values.

CHRONIC TOXICITY

This parameter shall be used to measure the acceptability of waters for supporting a healthy marine biota until improved methods are developed to evaluate biological response. See also Test of Significant Toxicity.

DAILY DISCHARGE

Daily Discharge is defined as either: (1) the total mass of the constituent discharged over the calendar day (12:00 am through 11:59 pm) or any 24-hour period that reasonably represents a calendar day for purposes of sampling (as specified in the permit), for a constituent with limitations expressed in units of mass or; (2) the unweighted arithmetic mean measurement of the constituent over the day for a constituent with limitations expressed in other units of measurement (e.g., concentration).

The daily discharge may be determined by the analytical results of a composite sample taken over the course of one day (a calendar day or other 24-hour period defined as a day) or by the arithmetic mean of analytical results from one or more grab samples taken over the course of the day.

For composite sampling, if 1 day is defined as a 24-hour period other than a calendar day, the analytical result for the 24-hour period will be considered as the result for the calendar day in which the 24-hour period ends.

DDT

Shall mean the sum of 4,4’DDT, 2,4’DDT, 4,4’DDE, 2,4’DDE, 4,4’DDD, and 2,4’DDD.

DEGRADE

Degradation shall be determined by comparison of the waste field and reference site(s) for characteristic species diversity, population density, contamination, growth anomalies, debility, or supplanting of normal species by undesirable plant and animal species. Degradation occurs if there are significant differences in any of three major biotic groups, namely, demersal fish, benthic invertebrates, or attached algae. Other groups may be evaluated where benthic species are not affected, or are not the only ones affected.

DETECTED, BUT NOT QUANTIFIED (DNQ)

Sample results that are less than the reported Minimum Level, but greater than or equal to the laboratory’s MDL. Sample results reported as DNQ are estimated concentrations.

DICHLOROBENZENES

Shall mean the sum of 1,2- and 1,3-dichlorobenzene.

DILUTION CREDIT

Dilution Credit is the amount of dilution granted to a discharge in the calculation of a water quality-based effluent limitation, based on the allowance of a specified mixing zone. It is calculated from the dilution ratio or determined through conducting a mixing zone study or modeling of the discharge and receiving water.

DOWNSTREAM OCEAN WATERS

Waters downstream with respect to ocean currents.

DREDGED MATERIAL

Any material excavated or dredged from the navigable waters of the United States, including material otherwise referred to as “spoil.”

EFFLUENT CONCENTRATION ALLOWANCE (ECA)

ECA is a value derived from the water quality criterion/objective, dilution credit, and ambient background concentration that is used, in conjunction with the coefficient of variation for the effluent monitoring data, to calculate a long-term average (LTA) discharge concentration. The ECA has the same meaning as wasteload allocation (WLA) as used in U.S. EPA guidance (Technical Support Document For Water Quality-based Toxics Control, March 1991, second printing, EPA/505/2-90-001).

ENCLOSED BAYS

Indentations along the coast that enclose an area of oceanic water within distinct headlands or harbor works. Enclosed bays include all bays where the narrowest distance between headlands or outermost harbor works is less than 75 percent of the greatest dimension of the enclosed portion of the bay. This definition includes but is not limited to: Humboldt Bay, Bodega Harbor, Tomales Bay, Drakes Estero, San Francisco Bay, Morro Bay, Los Angeles Harbor, Upper and Lower Newport Bay, Mission Bay, and San Diego Bay.

ENDOSULFAN

The sum of endosulfan-alpha and -beta and endosulfan sulfate.

ESTIMATED CHEMICAL CONCENTRATION

The estimated chemical concentration that results from the confirmed detection of the substance by the analytical method below the ML value.

ESTUARIES AND COASTAL LAGOONS

Estuaries and Coastal Lagoons are waters at the mouths of streams that serve as mixing zones for fresh and ocean waters during a major portion of the year. Mouths of

streams that are temporarily separated from the ocean by sandbars shall be considered as estuaries. Estuarine waters will generally be considered to extend from a bay or the open ocean to the upstream limit of tidal action but may be considered to extend seaward if significant mixing of fresh and salt water occurs in the open coastal waters. The waters described by this definition include but are not limited to the Sacramento-San Joaquin Delta as defined by Section 12220 of the California Water Code, Suisun Bay, Carquinez Strait downstream to Carquinez Bridge, and appropriate areas of the Smith, Klamath, Mad, Eel, Noyo, and Russian Rivers.

GEOMETRIC MEAN

The geometric mean is a type of mean or average that indicates the central tendency or typical value of a set of numbers by using the product of their values (as opposed to the arithmetic mean which uses their sum). The geometric mean is defined as the nth root of the product of n numbers. The formula is expressed as:

$$\text{Geometric Mean} = \sqrt[n]{(x_1)(x_2)(x_3)\dots(x_n)}$$

Where:

x is the sample value and n is the number of samples taken.

HALOMETHANES

Halomethanes shall mean the sum of bromoform, bromomethane (methyl bromide) and chloromethane (methyl chloride).

HCH

HCH shall mean the sum of the alpha, beta, gamma (lindane) and delta isomers of hexachlorocyclohexane.

INITIAL DILUTION

The process that results in the rapid and irreversible turbulent mixing of wastewater with ocean water around the point of discharge.

For a submerged buoyant discharge, characteristic of most municipal and industrial wastes that are released from the submarine outfalls, the momentum of the discharge and its initial buoyancy act together to produce turbulent mixing. Initial dilution in this case is completed when the diluting wastewater ceases to rise in the water column and first begins to spread horizontally.

For shallow water submerged discharges, surface discharges, and non-buoyant discharges, characteristic of cooling water wastes and some individual discharges, turbulent mixing results primarily from the momentum of discharge. Initial dilution, in

these cases, is considered to be completed when the momentum induced velocity of the discharge ceases to produce significant mixing of the waste, or the diluting plume reaches a fixed distance from the discharge to be specified by the Regional Water Board, whichever results in the lower estimate for initial dilution.

INSTANTANEOUS MAXIMUM EFFLUENT LIMITATION

The highest allowable value for any single grab sample or aliquot (i.e., each grab sample or aliquot is independently compared to the instantaneous maximum limitation).

INSTANTANEOUS MINIMUM EFFLUENT LIMITATION

The lowest allowable value for any single grab sample or aliquot (i.e., each grab sample or aliquot is independently compared to the instantaneous minimum limitation).

INSTREAM WASTE CONCENTRATION (IWC)

The concentration of a toxicant or effluent in the receiving water after mixing (the inverse of the dilution factor).

KELP BEDS

For purposes of the bacteriological standards of the Ocean Plan, are significant aggregations of marine algae of the genera Macrocystis and Nereocystis. Kelp beds include the total foliage canopy of Macrocystis and Nereocystis plants throughout the water column.

MARICULTURE

The culture of plants and animals in marine waters independent of any pollution source.

MATERIAL

(a) In common usage: (1) the substance or substances of which a thing is made or composed (2) substantial; (b) For purposes of the Ocean Plan relating to waste disposal, dredging and the disposal of dredged material and fill, MATERIAL means matter of any kind or description which is subject to regulation as waste, or any material dredged from the navigable waters of the United States. See also, DREDGED MATERIAL.

MAXIMUM DAILY EFFLUENT LIMITATION (MDEL)

The highest allowable daily discharge of a pollutant.

MEDIAN

The middle measurement in a set of data. After the measurements are ranked in order, the median is the middle measurement if the number of measurements is odd. If the

number of measurements is even, then the median is the arithmetic mean of the middle pair of ranked measurements.

METHOD DETECTION LIMIT (MDL)

The minimum concentration of a substance that can be reported with 99 percent confidence that the measured concentration is distinguishable from method blank results, as defined in 40 C.F.R. part 136, Attachment B.

MINIMUM LEVEL (ML)

The concentration at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method specified sample weights, volumes, and processing steps have been followed.

MIXING ZONE

Mixing Zone is a limited volume of receiving water that is allocated for mixing with a wastewater discharge where water quality criteria can be exceeded without causing adverse effects to the overall water body.

NATURAL LIGHT

Reduction of natural light may be determined by the Regional Water Board by measurement of light transmissivity or total irradiance, or both, according to the monitoring needs of the Regional Water Board.

NOT DETECTED (ND)

Those sample results less than the laboratory's MDL.

OCEAN WATERS

The territorial marine waters of the state as defined by California law to the extent these waters are outside of enclosed bays, estuaries, and coastal lagoons. If a discharge outside the territorial waters of the state could affect the quality of the waters of the state, the discharge may be regulated to assure no violation of the Ocean Plan will occur in ocean waters.

PAHS (POLYNUCLEAR AROMATIC HYDROCARBONS)

The sum of acenaphthylene, anthracene, 1,2-benzanthracene, 3,4 benzofluoranthene, benzo[k]fluoranthene, 1,12-benzoperylene, benzo[a]pyrene, chrysene, dibenzo[ah]anthracene, fluorene, indeno[1,2,3-cd]pyrene, phenanthrene and pyrene.

PCBS (POLYCHLORINATED BIPHENYLS)

The sum of chlorinated biphenyls whose analytical characteristics resemble those of Aroclor-1016, Aroclor-1221, Aroclor-1232, Aroclor-1242, Aroclor-1248, Aroclor-1254 and Aroclor-1260.

POLLUTANT MINIMIZATION PROGRAM (PMP)

PMP means waste minimization and pollution prevention actions that include, but are not limited to, product substitution, waste stream recycling, alternative waste management methods, and education of the public and businesses. The goal of the PMP shall be to reduce all potential sources of Ocean Plan Table 1 pollutants through pollutant minimization (control) strategies, including pollution prevention measures as appropriate, to maintain the effluent concentration at or below the water quality-based effluent limitation. Pollution prevention measures may be particularly appropriate for persistent bioaccumulative priority pollutants where there is evidence that beneficial uses are being impacted. The Regional Water Board may consider cost effectiveness when establishing the requirements of a PMP. The completion and implementation of a Pollution Prevention Plan, if required pursuant to Water Code section 13263.3(d), shall be considered to fulfill the PMP requirements.

POLLUTION PREVENTION

Pollution Prevention means any action that causes a net reduction in the use or generation of a hazardous substance or other pollutant that is discharged into water and includes, but is not limited to, input change, operational improvement, production process change, and product reformulation (as defined in Water Code section 13263.3). Pollution prevention does not include actions that merely shift a pollutant in wastewater from one environmental medium to another environmental medium, unless clear environmental benefits of such an approach are identified to the satisfaction of the State Water Resources Control Board (State Water Board) or Regional Water Board.

PUBLICLY OWNED TREATMENT WORKS (POTW)

Pollution A treatment works as defined in section 212 of the Clean Water Act (CWA), which is owned by a government agency as defined by section 502(4) of the CWA. Section 502(4) of the CWA defines a municipality as a city, town, borough, county, parish, district, association, or other public body created by or pursuant to state law and having jurisdiction over disposal of sewage, industrial wastes, or other wastes. This definition includes any devices and systems used in the storage, treatment, recycling, and recycling of municipal sewage or industrial wastes of a liquid nature. It also includes sewers, pipes and other conveyances only if they convey wastewater to a POTW Treatment Plant. The term also means the municipality as defined in section 502(4) of the CWA, which has jurisdiction over the Indirect Discharges to and the discharges from such a treatment works.

RECYCLED WATER

Water which, as a result of treatment of municipal wastewater, is suitable for a direct beneficial use or a controlled use that would not otherwise occur and is therefore considered a valuable resource (Water Code section 13050). The terms “recycled water” and “reclaimed water” have the same meaning (Water Code section 26).

REPORTED MINIMUM LEVEL

The reported ML (also known as the Reporting Level or RL) is the ML (and its associated analytical method) chosen by the Permittee for reporting and compliance determination from the MLs included in this Order, including an additional factor if applicable as discussed herein. The MLs included in this Order correspond to approved analytical methods for reporting a sample result that are selected by the Regional Water Board either from Appendix II of the Ocean Plan in accordance with section III.C.5.a. of the Ocean Plan or established in accordance with section III.C.5.b. of the Ocean Plan. The ML is based on the proper application of method-based analytical procedures for sample preparation and the absence of any matrix interferences. Other factors may be applied to the ML depending on the specific sample preparation steps employed. For example, the treatment typically applied in cases where there are matrix-effects is to dilute the sample or sample aliquot by a factor of ten. In such cases, this additional factor must be applied to the ML in the computation of the reported ML.

SATELLITE COLLECTION SYSTEM

The portion, if any, of a sanitary sewer system owned or operated by a different public agency than the agency that owns and operates the wastewater treatment facility that a sanitary sewer system is tributary to.

SHELLFISH

Organisms identified by the California Department of Health Services as shellfish for public health purposes (i.e., mussels, clams and oysters).

SIGNIFICANT DIFFERENCE

Defined as a statistically significant difference in the means of two distributions of sampling results at the 95 percent confidence level.

SIX-MONTH MEDIAN EFFLUENT LIMITATION

The highest allowable moving median of all daily discharges for any 180-day period.

STATE WATER QUALITY PROTECTION AREAS (SWQPAS)

Non-terrestrial marine or estuarine areas designated to protect marine species or biological communities from an undesirable alteration in natural water quality. All AREAS OF SPECIAL BIOLOGICAL SIGNIFICANCE (ASBS) that were previously

designated by the State Water Board in Resolutions 74-28, 74-32, and 75-61 are now also classified as a subset of State Water Quality Protection Areas and require special protections afforded by the Ocean Plan.

TCDD EQUIVALENTS

The sum of the concentrations of chlorinated dibenzodioxins (2,3,7,8-CDDs) and chlorinated dibenzofurans (2,3,7,8-CDFs) multiplied by their respective toxicity factors, as shown in the table below.

Isomer Group	Toxicity Equivalence Factor
2,3,7,8-tetra CDD	1.0
2,3,7,8-penta CDD	0.5
2,3,7,8-hexa CDDs	0.1
2,3,7,8-hepta CDD	0.01
octa CDD	0.001
2,3,7,8 tetra CDF	0.1
1,2,3,7,8 penta CDF	0.05
2,3,4,7,8 penta CDF	0.5
2,3,7,8 hexa CDFs	0.1
2,3,7,8 hepta CDFs	0.01
octa CDF	0.001

TEST OF SIGNIFICANT TOXICITY (TST)

The statistical approach described in National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document (EPA 833-R10-003, 2010). TST was developed by the U.S. Environmental Protection Agency (EPA) for analyzing WET and ambient toxicity data. Using the TST approach, the sample is declared toxic if there is greater than or equal to a 25% effect in chronic tests, or if there is greater than or equal to a 20% effect in acute tests at the permitted instream waste concentration (IWC) (referred to as the toxic regulatory management decision (RMD)). The sample is declared non-toxic if there is less than or equal to a 10% effect at the IWC in acute or chronic tests (referred to as the non-toxic RMD).

TOXICITY REDUCTION EVALUATION (TRE)

A study conducted in a step-wise process designed to identify the causative agents of effluent or ambient toxicity, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in toxicity. The first steps of the TRE consist of the collection of data relevant to the toxicity, including additional toxicity

testing, and an evaluation of facility operations and maintenance practices, and best management practices. A Toxicity Identification Evaluation (TIE) may be required as part of the TRE, if appropriate. (A TIE is a set of procedures to identify the specific chemical(s) responsible for toxicity. These procedures are performed in three phases (characterization, identification, and confirmation) using aquatic organism toxicity tests.)

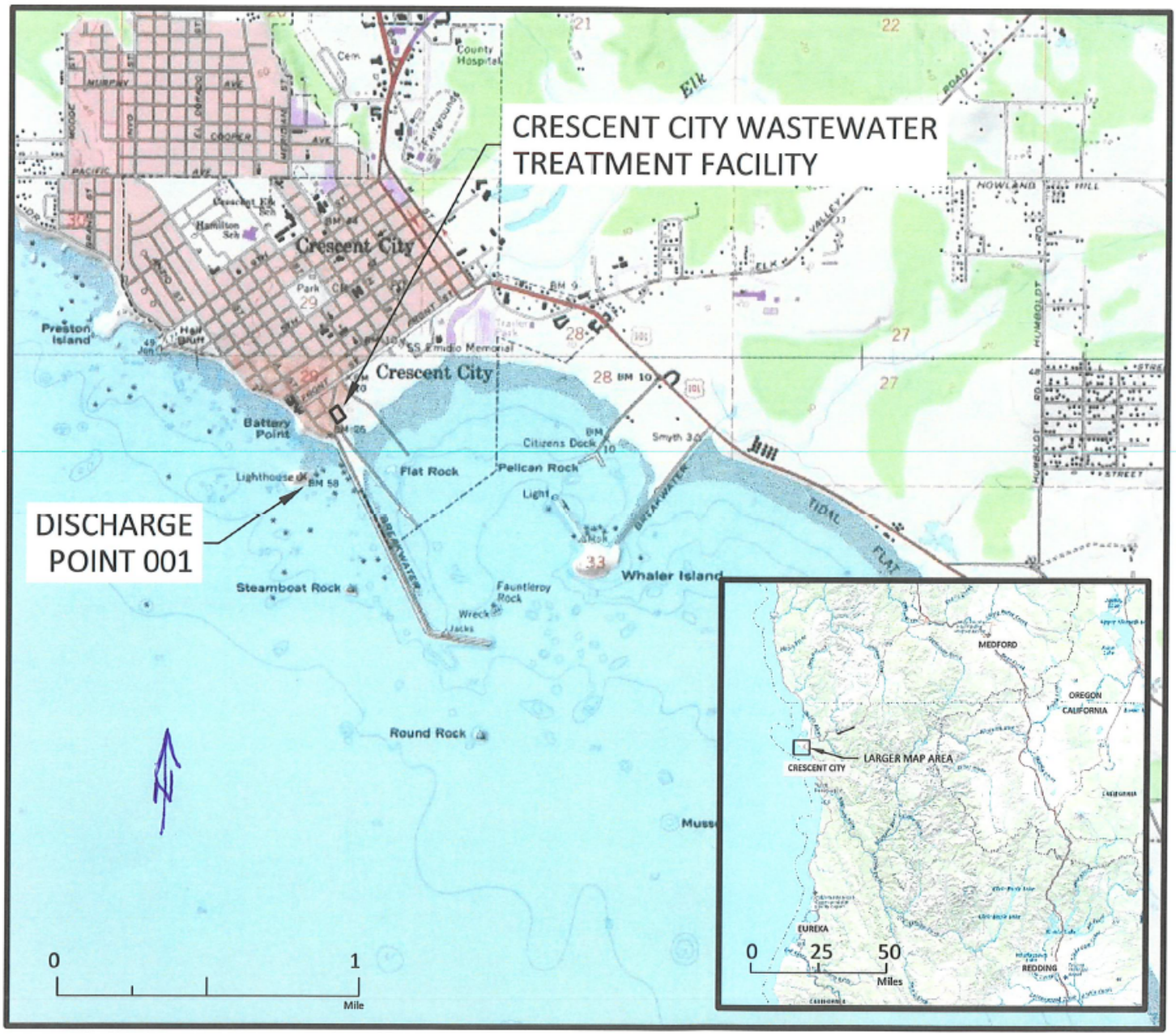
WASTE

As used in the Ocean Plan, waste includes a Permittee's total discharge, of whatever origin, i.e., gross, not net, discharge.

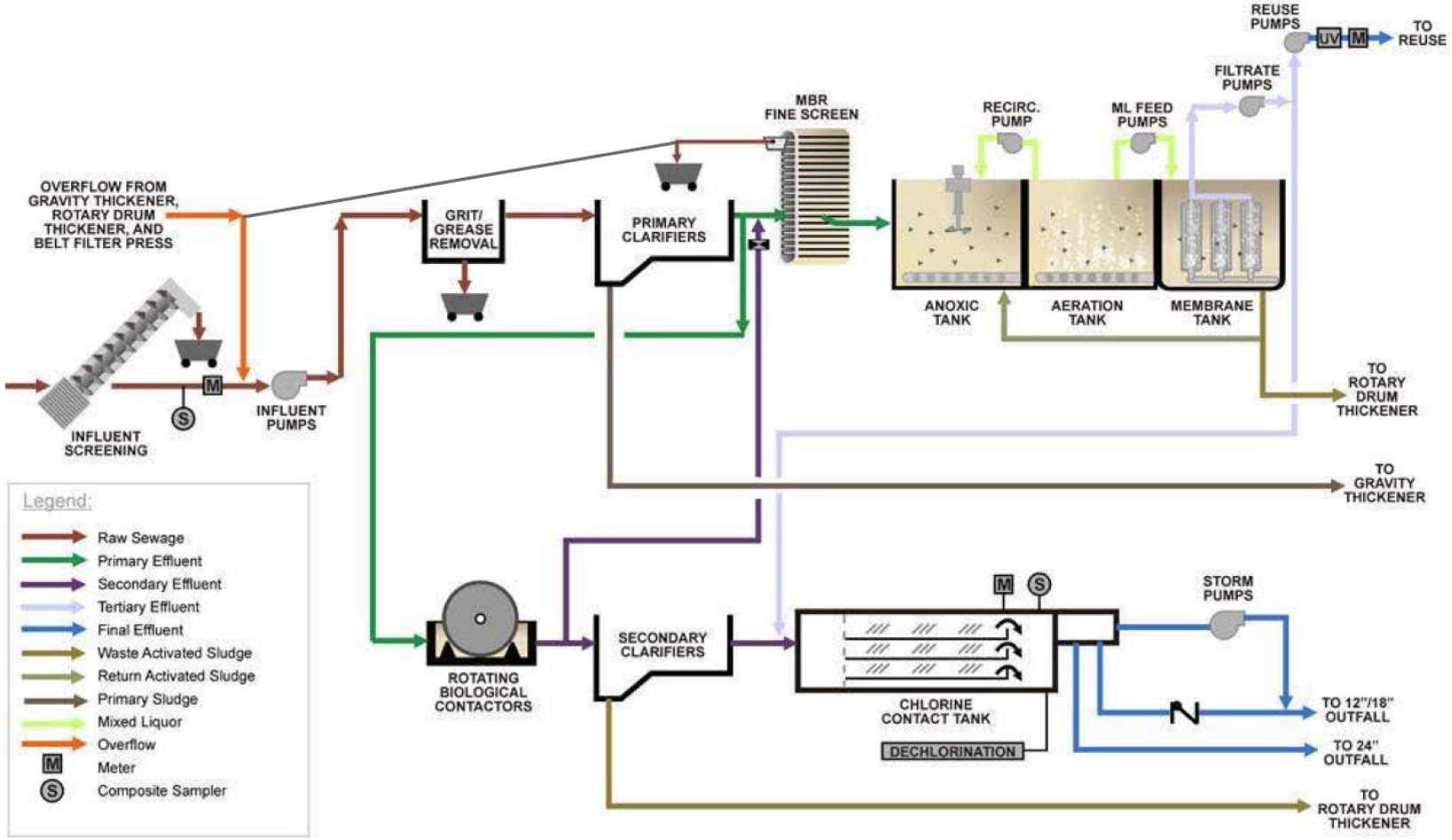
WATER RECYCLING

The treatment of wastewater to render it suitable for reuse, the transportation of treated wastewater to the place of use, and the actual use of treated wastewater for a direct beneficial use or controlled use that would not otherwise occur.

ATTACHMENT B - MAP



ATTACHMENT C - FLOW SCHEMATIC



ATTACHMENT D - STANDARD PROVISIONS

1. STANDARD PROVISIONS – PERMIT COMPLIANCE

1.1. Duty to Comply

1.1.1. The Permittee must comply with all of the terms, requirements, and conditions of this Order. Any noncompliance constitutes a violation of the Clean Water Act (CWA) and the California Water Code and is grounds for enforcement action; permit termination, revocation and reissuance, or modification; denial of a permit renewal application; or a combination thereof. (40 C.F.R. § 122.41(a); Wat. Code, §§ 13261, 13263, 13265, 13268, 13000, 13001, 13304, 13350, 13385.)

1.1.2. The Permittee shall comply with effluent standards or prohibitions established under Section 307(a) of the CWA for toxic pollutants within the time provided in the regulations that establish these standards or prohibitions, even if this Order has not yet been modified to incorporate the requirement. (40 C.F.R. § 122.41(a)(1).)

1.2. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for a Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Order. (40 C.F.R. § 122.41(c).)

1.3. Duty to Mitigate

The Permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this Order that has a reasonable likelihood of adversely affecting human health or the environment. (40 C.F.R. § 122.41(d).)

1.4. Proper Operation and Maintenance

The Permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Permittee to achieve compliance with the conditions of this Order. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems that are installed by a Permittee only when necessary to achieve compliance with the conditions of this Order. (40 C.F.R. § 122.41(e).)

1.5. Property Rights

1.5.1. This Order does not convey any property rights of any sort or any exclusive privileges. (40 C.F.R. § 122.41(g).)

1.5.2. The issuance of this Order does not authorize any injury to persons or property or invasion of other private rights, or any infringement of state or local law or regulations. (40 C.F.R. § 122.5(c).)

1.6. **Inspection and Entry**

The Permittee shall allow the Regional Water Board, State Water Board, U.S. EPA, and/or their authorized representatives (including an authorized contractor acting as their representative), upon the presentation of credentials and other documents, as may be required by law, to (33 U.S.C. § 1318(a)(4)(B); 40 C.F.R. § 122.41(i); Wat. Code, §§ 13267, 13383):

1.6.1. Enter upon the Permittee's premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of this Order (33 U.S.C. § 1318(a)(4)(B)(i); 40 C.F.R. § 122.41(i)(1); Wat. Code, §§ 13267, 13383);

1.6.2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order (33 U.S.C. § 1318(a)(4)(B)(ii); 40 C.F.R. § 122.41(i)(2); Wat. Code, §§ 13267, 13383);

1.6.3. Inspect and photograph, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order (33 U.S.C. § 1318(a)(4)(B)(ii); 40 C.F.R. § 122.41(i)(3); Wat. Code, §§ 13267, 13383); and

1.6.4. Sample or monitor, at reasonable times, for the purposes of assuring Order compliance or as otherwise authorized by the CWA or the Water Code, any substances or parameters at any location. (33 U.S.C. § 1318(a)(4)(B); 40 C.F.R. § 122.41(i)(4); Wat. Code, §§ 13267, 13383.)

1.7. **Bypass**

1.7.1. **Definitions**

1.7.1.1. “Bypass” means the intentional diversion of waste streams from any portion of a treatment facility. (40 C.F.R. § 122.41(m)(1)(i).)

1.7.1.2. “Severe property damage” means substantial physical damage to property, damage to the treatment facilities, which causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production. (40 C.F.R. § 122.41(m)(1)(ii).)

1.7.2. **Bypass not exceeding limitations.** The Permittee may allow any bypass to occur which does not cause exceedances of effluent limitations, but only if it is for essential maintenance to assure efficient operation. These bypasses are not

subject to the provisions listed in Standard Provisions – Permit Compliance 1.7.3, 1.7.4, and 1.7.5 below. (40 C.F.R. § 122.41(m)(2).)

1.7.3. **Prohibition of bypass.** Bypass is prohibited, and the Regional Water Board may take enforcement action against a Permittee for bypass, unless (40 C.F.R. § 122.41(m)(4)(i)):

1.7.3.1. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage (40 C.F.R. § 122.41(m)(4)(i)(A));

1.7.3.2. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass that occurred during normal periods of equipment downtime or preventive maintenance (40 C.F.R. § 122.41(m)(4)(i)(B)); and

1.7.3.3. The Permittee submitted notice to the Regional Water Board as required under Standard Provisions – Permit Compliance 1.7.6 below. (40 C.F.R. § 122.41(m)(4)(i)(C).)

1.7.4. **Burden of Proof.** In any enforcement proceeding, the permittee seeking to establish the bypass defense has the burden of proof.

1.7.5. The Regional Water Board may approve an anticipated bypass, after considering its adverse effects, if the Regional Water Board determines that it will meet the three conditions listed in Standard Provisions – Permit Compliance 1.7.3 above. (40 C.F.R. § 122.41(m)(4)(ii).)

1.7.6. **Notice**

1.7.6.1. **Anticipated bypass.** If the Permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least 10 days before the date of the bypass. The notice shall be sent to the Regional Water Board. As of December 21, 2025 a notice shall be submitted electronically to the initial recipient defined in Standard Provisions – Reporting 5.10 below. Notices shall comply with 40 C.F.R. part 3, 40 C.F.R. section 122.22, and 40 C.F.R. part 127. (40 C.F.R. § 122.41(m)(3)(i).)

1.7.6.2. **Unanticipated bypass.** The Permittee shall submit a notice of an unanticipated bypass as required in Standard Provisions - Reporting 5.5 below (24-hour notice). The notice shall be sent to the Regional Water Board. As of December 21, 2025, a notice shall be submitted electronically to the initial recipient defined in Standard Provisions – Reporting 5.10 below. Notices shall comply with 40 C.F.R. part 3, 40 C.F.R. section 122.22, and 40 C.F.R. part 127. (40 C.F.R. § 122.41(m)(3)(ii).)

1.8. **Upset**

Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation. (40 C.F.R. § 122.41(n)(1).)

1.8.1. **Effect of an upset.** An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of Standard Provisions – Permit Compliance 1.8.2 below are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review. (40 C.F.R. § 122.41(n)(2).)

1.8.2. **Conditions necessary for a demonstration of upset.** A Permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs or other relevant evidence that (40 C.F.R. § 122.41(n)(3)):

1.8.2.1. An upset occurred and that the Permittee can identify the cause(s) of the upset (40 C.F.R. § 122.41(n)(3)(i));

1.8.2.2. The permitted facility was, at the time, being properly operated (40 C.F.R. § 122.41(n)(3)(ii));

1.8.2.3. The Permittee submitted notice of the upset as required in Standard Provisions – Reporting 5.5.2.2 below (24-hour notice) (40 C.F.R. § 122.41(n)(3)(iii)); and

1.8.2.4. The Permittee complied with any remedial measures required under Standard Provisions – Permit Compliance 1.3 above. (40 C.F.R. § 122.41(n)(3)(iv).)

1.8.3. **Burden of proof.** In any enforcement proceeding, the Permittee seeking to establish the occurrence of an upset has the burden of proof. (40 C.F.R. § 122.41(n)(4).)

2. STANDARD PROVISIONS – PERMIT ACTION

2.1. **General**

This Order may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Permittee for modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any Order condition. (40 C.F.R. § 122.41(f).)

2.2. **Duty to Reapply**

If the Permittee wishes to continue an activity regulated by this Order after the expiration date of this Order, the Permittee must apply for and obtain a new permit. (40 C.F.R. § 122.41(b).)

2.3. **Transfers**

This Order is not transferable to any person except after notice to the Regional Water Board. The Regional Water Board may require modification or revocation and reissuance of the Order to change the name of the Permittee and incorporate such other requirements as may be necessary under the CWA and the Water Code. (40 C.F.R. §§ 122.41(l)(3), 122.61.)

3. STANDARD PROVISIONS – MONITORING

3.1. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. (40 C.F.R. § 122.41(j)(1).)

3.2. Monitoring must be conducted according to test procedures approved under 40 C.F.R. part 136 for the analyses of pollutants unless another method is required under 40 C.F.R. chapter 1, subchapter N. Monitoring must be conducted according to sufficiently sensitive test methods approved under 40 C.F.R. part 136 for the analysis of pollutants or pollutant parameters or as required under 40 C.F.R. chapter 1, subchapter N. For the purposes of this paragraph, a method is sufficiently sensitive when:

3.2.1. The method minimum level (ML) is at or below the level of the most stringent effluent limitation established in the permit for the measured pollutant or pollutant parameter, and either the method ML is at or below the level of the most stringent applicable water quality criterion for the measured pollutant or pollutant parameter or the method ML is above the applicable water quality criterion but the amount of the pollutant or pollutant parameter in the facility's discharge is high enough that the method detects and quantifies the level of the pollutant or pollutant parameter in the discharge; or

3.2.2. The method has the lowest ML of the analytical methods approved under 40 C.F.R. part 136 or required under 40 C.F.R. chapter 1, subchapter N for the measured pollutant or pollutant parameter.

In the case of pollutants or pollutant parameters for which there are no approved methods under 40 C.F.R. part 136 or otherwise required under 40 C.F.R. chapter 1, subchapter N, monitoring must be conducted according to a test procedure specified in this Order for such pollutants or pollutant parameters. (40 C.F.R. §§ 122.21(e)(3),122.41(j)(4), 122.44(i)(1)(iv).)

4. STANDARD PROVISIONS – RECORDS

4.1. The Permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the application for this Order, for a period of at least three (3) years from the date of the sample, measurement, report or application. This period may be extended by request of the Regional Water Board Executive Officer at any time. (40 C.F.R. § 122.41(j)(2).)

4.2. Records of monitoring information shall include:

4.2.1. The date, exact place, and time of sampling or measurements (40 C.F.R. § 122.41(j)(3)(i));

4.2.2. The individual(s) who performed the sampling or measurements (40 C.F.R. § 122.41(j)(3)(ii));

4.2.3. The date(s) analyses were performed (40 C.F.R. § 122.41(j)(3)(iii));

4.2.4. The individual(s) who performed the analyses (40 C.F.R. § 122.41(j)(3)(iv));

4.2.5. The analytical techniques or methods used (40 C.F.R. § 122.41(j)(3)(v)); and

4.2.6. The results of such analyses. (40 C.F.R. § 122.41(j)(3)(vi).)

4.3. Claims of confidentiality for the following information will be denied (40 C.F.R. § 122.7(b)):

4.3.1. The name and address of any permit applicant or Permittee (40 C.F.R. § 122.7(b)(1)); and

4.3.2. Permit applications and attachments, permits and effluent data. (40 C.F.R. § 122.7(b)(2).)

5. STANDARD PROVISIONS – REPORTING

5.1. Duty to Provide Information

The Permittee shall furnish to the Regional Water Board, State Water Board, or U.S. EPA within a reasonable time, any information which the Regional Water Board, State Water Board, or U.S. EPA may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Order or to determine compliance with this Order. Upon request, the Permittee shall also furnish to the Regional Water Board, State Water Board, or U.S. EPA copies of records required to be kept by this Order. (40 C.F.R. § 122.41(h); Wat. Code, §§ 13267, 13383.)

5.2. **Signatory and Certification Requirements**

5.2.1. All applications, reports, or information submitted to the Regional Water Board, State Water Board, and/or U.S. EPA shall be signed and certified in accordance with Standard Provisions – Reporting 5.2.2, 5.2.3, 5.2.4, 5.2.5, and 5.2.6 below. (40 C.F.R. § 122.41(k).)

5.2.2. All permit applications shall be signed by either a principal executive officer or ranking elected official. For purposes of this provision, a principal executive officer of a federal agency includes: (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of U.S. EPA). (40 C.F.R. § 122.22(a)(3).).

5.2.3. All reports required by this Order and other information requested by the Regional Water Board, State Water Board, or U.S. EPA shall be signed by a person described in Standard Provisions – Reporting 5.2.2 above, or by a duly authorized representative of that person. A person is a duly authorized representative only if:

5.2.3.1. The authorization is made in writing by a person described in Standard Provisions – Reporting 5.2.2 above (40 C.F.R. § 122.22(b)(1));

5.2.3.2. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.) (40 C.F.R. § 122.22(b)(2)); and

5.2.3.3. The written authorization is submitted to the Regional Water Board and State Water Board. (40 C.F.R. § 122.22(b)(3).)

5.2.4. If an authorization under Standard Provisions – Reporting 5.2.3 above is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Standard Provisions – Reporting 5.2.3 above must be submitted to the Regional Water Board and State Water Board prior to or together with any reports, information, or applications, to be signed by an authorized representative. (40 C.F.R. § 122.22(c).)

5.2.5. Any person signing a document under Standard Provisions – Reporting 5.2.2 or 5.2.3 above shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system

designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations." (40 C.F.R. § 122.22(d).)

5.2.6. Any person providing the electronic signature for documents described in Standard Provisions – 5.2.1, 5.2.2, or 5.2.3 that are submitted electronically shall meet all relevant requirements of Standard Provisions – Reporting 5.2, and shall ensure that all relevant requirements of 40 C.F.R. part 3 (Cross-Media Electronic Reporting) and 40 C.F.R. part 127 (NPDES Electronic Reporting Requirements) are met for that submission. (40 C.F.R § 122.22(e).)

5.3. **Monitoring Reports**

5.3.1. Monitoring results shall be reported at the intervals specified in the Monitoring and Reporting Program (Attachment E) in this Order. (40 C.F.R. § 122.41(l)(4).)

5.3.2. Monitoring results must be reported on a Discharge Monitoring Report (DMR) form or forms provided or specified by the Regional Water Board or State Water Board. As of December 21, 2016, all reports and forms must be submitted electronically to the initial recipient defined in Standard Provisions – Reporting 5.10 and comply with 40 C.F.R. part 3, 40 C.F.R. section 122.22, and 40 C.F.R. part 127. (40 C.F.R. § 122.41(l)(4)(i).)

5.3.3. If the Permittee monitors any pollutant more frequently than required by this Order using test procedures approved under 40 C.F.R. part 136, or another method required for an industry-specific waste stream under 40 C.F.R. chapter 1, subchapter N, the results of such monitoring shall be included in the calculation and reporting of the data submitted in the DMR or reporting form specified by the Regional Water Board or State Water Board. (40 C.F.R. § 122.41(l)(4)(ii).)

5.3.4. Calculations for all limitations, which require averaging of measurements, shall utilize an arithmetic mean unless otherwise specified in this Order. (40 C.F.R. § 122.41(l)(4)(iii).)

5.4. **Compliance Schedules**

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this Order, shall be submitted no later than 14 days following each schedule date. (40 C.F.R. § 122.41(l)(5).)

5.5. **Twenty-Four Hour Reporting**

5.5.1. The Permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the Permittee becomes aware of the circumstances. A report shall also be provided within five (5) days of the time the Permittee becomes aware of the circumstances. The report shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

For noncompliance events related to combined sewer overflows, sanitary sewer overflows, or bypass events, these reports must include the data described above (with the exception of time of discovery) as well as the type of event (i.e., combined sewer overflow, sanitary sewer overflow, or bypass event), type of overflow structure (e.g., manhole, combined sewer overflow outfall), discharge volume untreated by the treatment works treating domestic sewage, types of human health and environmental impacts of the event, and whether the noncompliance was related to wet weather.

As of December 2025, all reports related to combined sewer overflows, sanitary sewer overflows, or bypass events must be submitted to the Regional Water Board and must be submitted electronically to the initial recipient defined in Standard Provisions – Reporting 5.10. The reports shall comply with 40 C.F.R. part 3, 40 C.F.R. section 122.22, and 40 C.F.R. part 127. The Regional Water Board may also require the Permittee to electronically submit reports not related to combined sewer overflows, sanitary sewer overflows, or bypass events under this section. (40 C.F.R. § 122.41(l)(6)(i).)

5.5.2. The following shall be included as information that must be reported within 24 hours:

5.5.2.1. Any unanticipated bypass that exceeds any effluent limitation in this Order. (40 C.F.R. § 122.41(l)(6)(ii)(A).)

5.5.2.2. Any upset that exceeds any effluent limitation in this Order. (40 C.F.R. § 122.41(l)(6)(ii)(B).)

5.5.3. The Regional Water Board may waive the above required written report on a case-by-case basis if an oral report has been received within 24 hours. (40 C.F.R. § 122.41(l)(6)(ii)(B).)

5.6. **Planned Changes**

The Permittee shall give notice to the Regional Water Board as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required under this provision only when (40 C.F.R. § 122.41(l)(1)):

5.6.1. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in section 122.29(b) (40 C.F.R. § 122.41(l)(1)(i)); or

5.6.2. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants that are not subject to effluent limitations in this Order. (40 C.F.R. § 122.41(l)(1)(ii).)

5.6.3. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants that are subject neither to effluent limitations in this Order nor to notification requirements under section 122.42(a)(1) (see Additional Provisions—Notification Levels 7.1.1). (40 C.F.R. § 122.41(l)(1)(ii))

5.7. **Anticipated Noncompliance**

The Permittee shall give advance notice to the Regional Water Board of any planned changes in the permitted facility or activity that may result in noncompliance with this Order's requirements. (40 C.F.R. § 122.41(l)(2).)

5.8. **Other Noncompliance**

The Permittee shall report all instances of noncompliance not reported under Standard Provisions – Reporting 5.3, 5.4, and 5.5 above at the time monitoring reports are submitted. The reports shall contain the information listed in Standard Provision – Reporting 5.5 above. For noncompliance events related to combined sewer overflows, sanitary sewer overflows, or bypass events, these reports shall contain the information described in Standard Provision – Reporting 5.5 and the applicable required data in appendix A to 40 C.F.R. part 127. The Regional Water Board may also require the Permittee to electronically submit reports not related to combined sewer overflows, sanitary sewer overflows, or bypass events under this section. (40 C.F.R. § 122.41(l)(7).)

5.9. **Other Information**

When the Permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Regional Water Board, State Water Board, or U.S. EPA, the Permittee shall promptly submit such facts or information. (40 C.F.R. § 122.41(l)(8).)

5.10. **Initial Recipient for Electronic Reporting Data**

The owner, operator, or the duly authorized representative is required to electronically submit NPDES information specified in appendix A to 40 C.F.R. part 127 to the initial recipient defined in 40 C.F.R. section 127.2(b). U.S. EPA will identify and publish the list of initial recipients on its website and in the Federal

Register, by state and by NPDES data group [see 40 C.F.R. section 127.2(c)]. U.S. EPA will update and maintain this listing. (40 C.F.R. § 122.41(l)(9).)

6. STANDARD PROVISIONS – ENFORCEMENT

6.1. The Regional Water Board is authorized to enforce the terms of this permit under several provisions of the Water Code, including, but not limited to, sections 13268, 13350**,** 13385, 13386, and 13387.

7. ADDITIONAL PROVISIONS – NOTIFICATION LEVELS

7.1. Publicly-Owned Treatment Works (POTWs)

All POTWs shall provide adequate notice to the Regional Water Board of the following (40 C.F.R. § 122.42(b)):

7.1.1. Any new introduction of pollutants into the POTW from an indirect discharger that would be subject to sections 301 or 306 of the CWA if it were directly discharging those pollutants (40 C.F.R. § 122.42(b)(1)); and

7.1.2. Any substantial change in the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of adoption of the Order. (40 C.F.R. § 122.42(b)(2).)

7.1.3. Adequate notice shall include information on the quality and quantity of effluent introduced into the POTW as well as any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW. (40 C.F.R. § 122.42(b)(3)).

ATTACHMENT E - MONITORING AND REPORTING PROGRAM

TABLE OF CONTENTS

1. General Monitoring Provisions E-3
2. Monitoring Locations E-5
3. Influent Monitoring Requirements E-6
3.1. Monitoring Location INF-001 ..... E-6
4. Effluent Monitoring Requirements E-7
4.1. Monitoring Location EFF-001 ..... E-7
5. Whole Effluent Toxicity Testing Requirements E-10
5.1. Chronic Toxicity Testing E-10
5.2. Toxicity Reduction Evaluation (TRE) Process E-15
6. Land Discharge Monitoring Requirements – Not Applicable E-17
7. Recycling Monitoring Requirements E-17
7.1. Monitoring Location REC-001 ..... E-17
8. Receiving Water Monitoring Requirements E-18
8.1. Monitoring Location RSW-001 ..... E-18
8.2. Groundwater Monitoring – Not Required E-19
9. Other Monitoring Requirements E-20
9.1. Outfall Inspection E-20
9.2. Biological Survey E-20
9.3. Filtration Process Monitoring (Monitoring Locations INT-001A and INT-001B) E-20
9.4. Chlorine Disinfection Process Monitoring (Monitoring Location INT-002A) E-21
9.5. Ultraviolet Light Disinfection Process Monitoring (Monitoring Location INT-002B) E-22
9.6. Sludge Monitoring (Monitoring Location BIO-001) E-23
9.7. Septage Station Monitoring (Monitoring Location SEP-001) E-23
10. Reporting Requirements E-24
10.1. Special Studies, Technical Reports and Additional Monitoring Requirements E-24
10.2. General Monitoring and Reporting Requirements E-25
10.3. Self-Monitoring Reports (SMRs) E-25
10.4. Discharge Monitoring Reports (DMRs) E-29
10.5. Other Reports E-29
10.6. Spill Notification E-35

TABLE OF TABLES

Table E-1. Monitoring Station Locations.....E-5
Table E-2. Influent Monitoring E-6
Table E-3. Effluent Monitoring.....E-7
Table E-4. Recycled Water Monitoring Requirements.....E-17
Table E-5. Receiving Water Monitoring Requirements – Monitoring Location RSW-001 .....E-18
Table E-6. Internal Effluent Monitoring – Monitoring Location INT-002A.....E-21
Table E-7. Septage Monitoring – Monitoring Location SEP-001 .....E-23
Table E-8. Monitoring Periods and Reporting Schedule.....E-26
Table E-9. Reporting Requirements for Special Provisions Reports E-29

ATTACHMENT E – MONITORING AND REPORTING PROGRAM (MRP)

Section 308 of the federal Clean Water Act (CWA) and sections 122.41(h), (j)-(l), 122.44(i), and 122.48 of title 40 of the Code of Federal Regulations (40 C.F.R.) require that all NPDES permits specify monitoring and reporting requirements. Water Code sections 13267 and 13383 also authorize the Regional Water Board to establish monitoring, inspection, entry, reporting, and recordkeeping requirements. This MRP establishes monitoring, reporting, and recordkeeping requirements that implement the federal and California laws and/or regulations.

1. GENERAL MONITORING PROVISIONS

1.1. **Wastewater Monitoring Provision.** Composite samples may be taken by a proportional sampling device approved by the Executive Officer or by grab samples composited in proportion to flow. In compositing grab samples, the sampling interval shall not exceed 1 hour.

1.2. **Supplemental Monitoring Provision.** If the Permittee monitors any pollutant more frequently than required by this Order, using test procedures approved by 40 C.F.R. part 136 or as specified in this Order, the results of such monitoring shall be included in the calculation and reporting of the data submitted in the monthly and annual discharge monitoring reports.

1.3. **Laboratory Certification.** Laboratories analyzing monitoring samples shall be certified by the State Water Resources Control Board (State Water Board) in accordance with the provisions of Water Code section 13176, and must include quality assurance/quality control data with their analytical reports.

The Permittee may analyze pollutants with short hold times (e.g., pH, chlorine residual, etc.) with field equipment or its on-site laboratory provided that the Permittee has written standard operating procedures (SOPs) that identify quality assurance/quality control procedures to be followed to ensure accurate results. The Permittee must demonstrate sufficient capability to adequately perform these field tests (e.g., qualified and trained employees, properly calibrated and maintained field instruments). The program shall conform to U.S. EPA guidelines or other approved procedures.

1.4. **Instrumentation and Calibration Provision.** All monitoring instruments and devices used by the Permittee to fulfill the prescribed monitoring program shall be properly maintained and calibrated as necessary to ensure their continued accuracy. All flow measurement devices shall be calibrated no less than the manufacturer's recommended intervals or one year intervals, (whichever comes first) to ensure continued accuracy of the devices.

1.5. **Minimum Levels (ML) and Reporting Levels (RL).** U.S. EPA published regulations for the Sufficiently Sensitive Methods Rule (SSM Rule) which became effective September 18, 2015. Unless otherwise specified by this MRP, all monitoring shall be conducted according to test procedures established at 40 C.F.R. 136, Guidelines Establishing Test Procedures for Analysis of Pollutants. All analyses shall be conducted using the lowest practical quantitation limit achievable using U.S. EPA approved methods. For the purposes of the NPDES program, when more than one test procedure is approved under 40 C.F.R., part 136 for the analysis of a pollutant or pollutant parameter, the test procedure must be sufficiently sensitive as defined at 40 C.F.R. 122.21(e)(3) and 122.44(i)(1)(iv).

A U.S. EPA-approved analytical method is sufficiently sensitive where:

1.5.1. The ML is at or below both the level of the applicable water quality criterion/objective and the permit limitation for the measured pollutant or pollutant parameter; or

1.5.2. In permit applications, the ML is above the applicable water quality criterion/objective, but the amount of the pollutant or pollutant parameter in a facility's discharge is high enough that the method detects and quantifies the level of the pollutant or pollutant parameter in the discharge; or

1.5.3. The method has the lowest ML of the U.S. EPA-approved analytical methods where none of the U.S. EPA-approved analytical methods for a pollutant can achieve the MLs necessary to assess the need for effluent limitations or to monitor compliance with a permit limitation.

Where effluent limitations are set below the lowest achievable quantitation limits, pollutants not detected at the lowest practical quantitation limits will be considered in compliance with effluent limitations. Analysis for toxics listed in Table 3 of the *Water Quality Control Plan for Ocean Waters of California, California Ocean Plan* (2019) (Ocean Plan) shall also adhere to guidance and requirements contained in the Ocean Plan. However, there may be situations when analytical methods are published with MLs that are more sensitive than the MLs for analytical methods listed in the Ocean Plan. For instance, U.S. EPA Method 1631E for mercury is not currently listed in Ocean Plan Appendix II, but it is published with an ML of 0.5 ng/L that makes it a sufficiently sensitive analytical method. Similarly, U.S. EPA Method 245.7 for mercury is published with an ML of 5 ng/L.

1.6. **Discharge Monitoring Report Quality Assurance (DMR-QA) Study.** The Permittee shall participate in the DMR-QA program and ensure that the results of the DMR-QA Study or the most recent Water Pollution Performance Evaluation Study from each laboratory providing testing services for the permit are submitted annually to the State Water Board at qualityassurance@waterboards.ca.gov. For more information on the DMR-QA Program, contact the State DMR-QA Coordinator at the aforementioned email address.

2. MONITORING LOCATIONS

The Permittee shall establish the following monitoring locations to demonstrate compliance with the effluent limitations, discharge specifications, and other requirements in this Order:

Table E-1. Monitoring Station Locations

Discharge Point Name	Monitoring Location Name	Monitoring Location Description
--	INF-001	Influent wastewater prior to treatment and following all significant input of waste to the treatment system and consisting of wastewater from both the collection system and any future septage receiving station.
--	INT-001A	Internal monitoring location for monitoring the surface loading rate through the membrane bioreactor (MBR) system.
--	INT-001B	Internal monitoring location for monitoring the turbidity of treated effluent immediately following the MBR system.
--	INT-002A	Internal Monitoring location for purpose of demonstrating the presence of a chlorine residual at the end of the chlorine contact tank.
--	INT-002B	Internal monitoring location for monitoring ultraviolet light (UV) radiation dose and UV transmittance of the UV disinfection system.
001	EFF-001	A location where representative samples of the treated wastewater to be discharged to the Pacific Ocean at Discharge Point 001 can be collected at a point after treatment, including chlorination/dechlorination, and before contact with the receiving water. Latitude: 41° 44’ 38” Longitude: -124° 12’ 10”

Discharge Point Name	Monitoring Location Name	Monitoring Location Description
002	REC-001	Location where the flow rate of recycled water can be monitored and representative samples of treated wastewater to be distributed to the recycled water system can be collected.
--	RSW-001	Location in the receiving water in the vicinity of the outfall, within the waste field where initial dilution is completed.
--	SEP-001	Septage receiving station after complete mixing of septage wastes and prior to the headworks. This station may be established upon receipt and Regional Water Board Executive Officer approval of a Septage Management Plan.
--	BIO-001	A representative sample of the sludge or biosolids generated when removed for disposal.

The North latitude and West longitude information in Table E-1 are approximate for administrative purposes. Monitoring Locations INT-001A, INT-001B, and REC-001 are applicable if the Permittee produces and distributes recycled water.

3. INFLUENT MONITORING REQUIREMENTS

3.1. Monitoring Location INF-001

3.1.1. The Permittee shall monitor influent to the facility at Monitoring Location INF-001 as follows:

Table E-2. Influent Monitoring

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method[1]
Influent Flow[2]	mgd	Meter	Continuous	--
Biochemical Oxygen Demand 5-day @ 20°C (BOD_5)[3]	mg/l	24-hr Composite	Weekly	Standard Methods
Total Suspended Solids (TSS)	mg/l	24-hr Composite	Weekly	Standard Methods

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method[1]
Ocean Plan Table 3[4]	µg/L	Grab/Composite[5]	Once per permit term[6]	Standard Methods

Table Notes:

1. In accordance with the current edition of Standard Methods for Examination of Water and Wastewater (American Public Health Administration) or current test procedures specified in 40 C.F.R. part 136.
2. Each month, the Permittee shall report the average daily and average monthly flows.
3. For purposes of determining percent removal of BOD_5, the Permittee may sum the BOD_5 mass computed from samples collected at INF-001 and the BOD_5 mass removed by the Rumiano Cheese Company pretreatment process during the same interval. The Permittee must provide and certify pretreatment data considered in percent removal determinations.
4. Excluding acute and chronic toxicity and total chlorine residual.
5. Grab samples shall be used for volatile chemicals listed in Table II-1 of the Ocean Plan (2012). 24-hour composite samples shall be used for all other Ocean Plan Table 1 parameters.
6. Within the first year of the permit term.

4. EFFLUENT MONITORING REQUIREMENTS

4.1. Monitoring Location EFF-001

4.1.1. The Permittee shall monitor treated effluent at Monitoring Location EFF-001 during periods of discharge to the Pacific Ocean at Discharge Point 001 as follows. If more than one analytical test method is listed for a given parameter, the Permittee must select from the listed methods and corresponding Minimum Level:

Table E-3. Effluent Monitoring

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method[1]
Effluent Flow[2]	mgd	Meter	Continuous	--

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method[1]
Biochemical Oxygen Demand 5-day @ 20°C (BOD_5)	mg/L	24-hour composite	Weekly[3]	Standard Methods
Total Suspended Solids (TSS)	mg/L	24-hour composite	Weekly[3]	Standard Methods
Settleable Solids	ml/L	Grab	Daily[4]	Standard Methods
Oil and Grease	mg/L	Grab	Monthly[5]	Standard Methods
Turbidity	NTU	Grab	Weekly[3]	Standard Methods
pH	s.u.	Grab	Daily[4]	Standard Methods
Total Coliform Bacteria	MPN/100 ml	Grab	Weekly	Standard Methods
Fecal Coliform Bacteria	MPN/100 mL	Grab	Weekly[3]	Standard Methods
Enterococcus Bacteria	MPN/100 ml	Grab	Weekly	Standard Methods
Ammonia Nitrogen, Total (as N)	mg/L	24-hour composite	Twice Weekly[3]	Standard Methods
Total Residual Chlorine[6]	mg/L	Meter	Continuous	Standard Methods
Copper, Total Recoverable	µg/L	24-hour composite	Monthly[5]	Standard Methods
Silver, Total Recoverable	µg/L	24-hour composite	Quarterly[5]	Standard Methods
Endosulfans[7]	µg/L	Grab	Quarterly[5]	Standard Methods
Endrin	µg/L	Grab	Monthly[5]	Standard Methods
DDT[8]	µg/L	Grab	Quarterly[5]	Standard Methods

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method[1]
Heptachlor	µg/L	Grab	Quarterly[5]	Standard Methods
Dieldrin	µg/L	Grab	Quarterly[5]	Standard Methods
Ocean Plan Table 3 Pollutants[9]	µg/L	Grab/Composite[10]	Annually[5]	Standard Methods
Chronic Toxicity[11]	Pass or Fail, % Effect	Grab	Annually	See Section 5 below

Table Notes:

1. In accordance with the current edition of Standard Methods for Examination of Water and Wastewater (American Public Health Administration) or current test procedures specified in 40 C.F.R. part 136.
2. Each month, the Permittee shall report the daily average and monthly average flows.
3. Accelerated Monitoring (weekly monitoring frequency). If two consecutive weekly test results exceed an effluent limitation, the Permittee shall take two samples each of the two weeks following receipt of the second sample result. During the intervening period, the Permittee shall take steps to identify the cause of the exceedance and take steps to return to compliance.
4. Accelerated Monitoring (daily monitoring frequency). If a test result exceeds an effluent limitation, the Permittee shall increase the monitoring frequency to a minimum of twice a day for a week to evaluate whether the exceedance is persisting. If two or more samples in a week exceed an effluent limitation, the Permittee shall take steps to identify the cause of the exceedance and take steps needed to return to compliance.
5. Accelerated Monitoring (monthly, quarterly, and annual monitoring frequency). If a test result exceeds an effluent limitation the Permittee shall take two more samples, one within 7 days and one within 14 days following receipt of the initial sample result. During the intervening period, the Permittee shall take steps to identify the cause of the exceedance and take steps needed to return to compliance.
6. The Permittee shall report from discrete readings of the continuous monitoring every hour on the hour and report the average of the hourly readings on a daily basis in accordance with Compliance Determination section 7.12 of this Order. The Permittee shall calibrate chlorine residual analyzers against grab samples as frequently as necessary to maintain accurate and reliable operations.
7. Endosulfans shall mean the sum of endosulfan-alpha and –beta and endosulfan sulfate.

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method[1]
8. DDT shall mean the sum of 4,4'-DDT, 2,4'-DDT, 4,4'-DDE, 2,4'-DDE, 4,4'-DDD, and 2,4'-DDD. 9. Excluding acute toxicity. 10. Grab samples shall be used for volatile chemicals listed in Table II-1 of the Ocean Plan (2019). 24-hour composite samples shall be used for all other Ocean Plan Table 3 parameters. 11. Whole effluent chronic toxicity shall be monitored in accordance with the requirements of section 5 of this Monitoring and Reporting Program.				

5. WHOLE EFFLUENT TOXICITY TESTING REQUIREMENTS

5.1. Chronic Toxicity Testing

The Permittee shall conduct chronic toxicity testing in accordance with the following chronic toxicity testing requirements:

5.1.1. **Test Frequency.** The Permittee shall conduct chronic WET testing in accordance with the schedule established in this MRP, while discharging at Discharge Point 001, as summarized in Table E-3, above.

5.1.2. **Discharge In-stream Waste Concentration (IWC) for Chronic Toxicity.** The chronic toxicity IWC for this discharge is 3.45[1] percent effluent.

5.1.3. **Sample Volume and Holding Time.** The total sample volume shall be determined by the specific toxicity test method used. Sufficient sample volume shall be collected to perform the required toxicity test. All toxicity tests shall be conducted as soon as possible following sample collection.

For toxicity tests requiring renewals (Atherinops affinis), a minimum of three samples shall be collected. The lapsed time (holding time) from sample collection to first use of each sample must not exceed 36 hours.

5.1.4. **Chronic Marine Test Species and Test Methods.** If effluent samples are collected from outfalls discharging to receiving waters with salinity >1 ppt, the Permittee shall conduct the following chronic toxicity tests on effluent samples at the IWC for the discharge in accordance with species and test methods in *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving*

[1] The IWC is calculated using the approved dilution ratio of 29 to 1 (seawater to wastewater) as follows: (1 ÷ 29) x 100.

Waters to West Coast Marine and Estuarine Organisms (EPA/600/R-95/136, 1995). Artificial sea salts or hypersaline brine prepared from natural seawater shall be used to increase sample salinity. In no case shall these species be substituted with another test species unless written authorization from the Executive Officer is received.

5.1.4.1. A static renewal toxicity test with the topsmelt, *Atherinops affinis* (Larval Survival and Growth Test Method 1006.0).

5.1.4.2. A static non-renewal toxicity test with the purple sea urchin, *Strongylocentrotus purpuratus*, and the sand dollar, *Dendraster excentricus* (Fertilization Test Method 1008.0), or a static non-renewal toxicity test with the mussel, *Mytilus sp.* (Embyro-Larval Shell Development Test Method).

5.1.4.3. A static non-renewal toxicity test with the giant kelp, *Macrocystis pyrifera* (Germination and Growth Test Method 1009.0).

5.1.5. **Species Sensitivity Screening.** Species sensitivity screening shall be conducted during this permit's first required sample collection. The Permittee shall collect a single effluent sample and concurrently conduct three chronic toxicity tests using the fish, an invertebrate, and the alga species identified in section 5.1.4, above. This sample shall also be analyzed for the parameters required for the discharge. The species that exhibits the highest "Percent (%) Effect" at the discharge IWC during species sensitivity screening shall be used for routine monitoring during the permit term[2].

5.1.6. **Quality Assurance and Additional Requirements.** Quality assurance measures, instructions, and other recommendations and requirements are found in the test methods manual previously referenced. Additional requirements are specified below.

5.1.6.1. The discharge is subject to determination of "Pass" or "Fail" and "Percent (%) Effect" for chronic toxicity tests using the TST approach described in *National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document* (EPA 833-R10-003, 2010), Appendix A, Figure A-

[2] If the percent effect is less than or equal to zero percent effect for each species, or all percent effect are the same value, in the species sensitivity screening test, the Permittee shall either use the species that was most sensitive during the previous permit term for routine monitoring or repeat the species sensitivity screening for all species to confirm the results of the first screening before selecting the most sensitive species to use for routine monitoring. If two consecutive species sensitivity screening tests demonstrate that the percent effect for all species exhibit less than or equal to zero percent, the Permittee may select the species to be used for routine monitoring during the permit term.

1, and Table A-1. The null hypothesis (Ho) for the TST approach is: Mean discharge IWC response ≤ 0.75 × Mean control response. A test result that rejects this null hypothesis is reported as "Pass". A test result that does not reject this null hypothesis is reported as "Fail". The relative "Percent (%) Effect" at the discharge IWC is defined and reported as: ((Mean control response - Mean discharge IWC response) ÷ Mean control response)) × 100.

5.1.6.2. If the effluent toxicity test does not meet the minimum effluent or reference toxicant test acceptability criteria (TAC) specified in the referenced test method, then the Permittee shall re-sample and re-test within 14 days.

5.1.6.3. Dilution water and control water, including brine controls, shall be laboratory water prepared and used as specified in the test methods manual. If dilution water and control water is different from test organism culture water, then a second control using culture water shall also be used.

5.1.6.4. Monthly reference toxicant testing is sufficient. All reference toxicant test results should be reviewed and reported.

5.1.6.5. The Permittee shall perform toxicity tests on final effluent samples collected at Monitoring Location EFF-001 (after chlorination and dechlorination). Ammonia shall not be removed from the effluent sample prior to toxicity testing, unless explicitly authorized under this section of the MRP and the rationale is explained in the Fact Sheet (Attachment F). If any chlorine is detected in the sample upon arrival at the analytical laboratory, the effluent sample may be further dechlorinated with anhydrous sodium thiosulfate to non-toxic levels in accordance with section 8.8.7 of the test method identified in section 5.1.4, above. The removal of chlorine by the analytical laboratory shall be clearly documented in the chronic toxicity report submitted to the Regional Water Board.

5.1.6.6. **Ammonia Removal.** Except with prior approval from the Executive Officer of the Regional Water Board, ammonia shall not be removed from bioassay samples. The Permittee must demonstrate the effluent toxicity is caused by ammonia because of increasing test pH when conducting the toxicity test. It is important to distinguish the potential toxic effects of ammonia from other pH sensitive chemicals, such as certain heavy metals, sulfide, and cyanide. The following may be steps to demonstrate that the toxicity is caused by ammonia and not other toxicants before the Executive Officer would allow for control of pH in the test.

5.1.6.6.1. There is consistent toxicity in the effluent and the maximum pH in the toxicity test is in the range to cause toxicity due to increased pH.

5.1.6.6.2. Chronic ammonia concentrations in the effluent are greater than 4 mg/L total ammonia.

5.1.6.6.3. Conduct graduated pH tests as specified in the toxicity identification evaluation methods. For example, mortality should be higher at pH 8 and lower at pH 6.

5.1.6.6.4. Treat the effluent with a zeolite column to remove ammonia. Mortality in the zeolite treated effluent should be lower than the non-zeolite treated effluent. Then add ammonia back to the zeolite-treated samples to confirm toxicity due to ammonia.

When it has been demonstrated that toxicity is due to ammonia because of increasing test pH, pH may be controlled using appropriate procedures which do not significantly alter the nature of the effluent.

5.1.7. **Notification.** The Permittee shall notify the Regional Water Board verbally **within 72 hours** and in writing **within 14 days** after the receipt of a result of "Fail" during routine or accelerated monitoring.

5.1.8. **Accelerated Monitoring Requirements.** The trigger for accelerated monitoring for chronic toxicity is exceeded when a chronic toxicity test, analyzed using the TST approach, results in "Fail" and the "Percent Effect" is ≥0.50. Within 24 hours of the time the Permittee becomes aware of a result of "Fail", the Permittee shall implement an accelerated monitoring schedule consisting of four toxicity tests—consisting of 5-effluent concentrations (including the discharge IWC) and a control—conducted at approximately 2-week intervals, over an 8-week period. If each of the accelerated toxicity tests results is "Pass," the Permittee shall return to routine monitoring for the next monitoring period. If one of the accelerated toxicity tests results is "Fail", the Permittee shall immediately implement the TRE Process conditions set forth in section 5.2, below.

5.1.9. **Reporting**

5.1.9.1. **Routine Reporting.** Chronic toxicity monitoring results for effluent at Monitoring Location EFF-001 shall be submitted with the monthly self-monitoring report (SMR) for the month in which chronic toxicity monitoring was performed. Routine reporting shall include the following in order to demonstrate compliance with permit requirements:

5.1.9.1.1. WET reports shall include the contracting laboratory's complete report provided to the Permittee and shall be consistent with the appropriate "Report Preparation and Test Review" sections of the methods manual and this MRP. The WET test reports shall contain a narrative report that includes details about WET test procedures and results, including the following:

5.1.9.1.1.1. Receipt and handling of the effluent sample that includes a tabular summary of initial water quality characteristics (e.g., pH, dissolved oxygen, temperature, conductivity, hardness, salinity, chlorine, ammonia);

5.1.9.1.1.2. The source and make-up of the lab control/diluent water used for the test;

5.1.9.1.1.3. Any manipulations done to lab control/diluent and effluent such as filtration, nutrient addition, etc.;

5.1.9.1.1.4. Identification of any reference toxicant testing performed;

5.1.9.1.1.5. Tabular summary of test results for control water and each effluent dilution and statistics summary to include calculation of the NOEC, TUc, and IC25;

5.1.9.1.1.6. The toxicity test results for the TST approach, reported as “Pass” or “Fail” and “Percent (%) Effect” at the chronic toxicity IWC for the discharge;

5.1.9.1.1.7. Identification of any anomalies or nuances in the test procedures or results;

5.1.9.1.1.8. Summary and conclusions section.

5.1.9.1.1.9. WET test results shall include, at a minimum, for each test:

5.1.9.1.1.9.1. Sample date(s);

5.1.9.1.1.9.2. Test initiation date;

5.1.9.1.1.9.3. Test species;

5.1.9.1.1.9.4. Determination of “Pass” or “Fail” and “Percent Effect” following the Test of Significant Toxicity hypothesis testing approach in *National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document* (EPA 833-R-10-003, 2010). The “Percent Effect” shall be calculated as follows:

“Percent Effect” (or Effect, in %) = ((Control mean response – IWC mean response) ÷ Control mean response)) x 100

5.1.9.1.1.9.5. End point values for each dilution (e.g., number of young, growth rate, percent survival);

5.1.9.1.1.9.6. NOEC value(s) in percent effluent;

5.1.9.1.1.9.7. IC15, IC25, IC40, and IC50 values (or EC15, EC25…etc.) in percent effluent;

5.1.9.1.1.9.8. TUc values (100/NOEC);

5.1.9.1.1.9.9. Mean percent mortality (±s.d.) after 96 hours in 100 percent effluent (if applicable);

5.1.9.1.1.9.10. NOEC and LOEC values for reference toxicant test(s);

5.1.9.1.1.9.11. IC50 or EC50 value(s) for reference toxicant test(s);

5.1.9.1.1.9.12. Available water quality measurements for each test (e.g., pH, DO, temperature, conductivity, hardness, salinity, ammonia);

5.1.9.1.1.9.13. Statistical methods used to calculate endpoints;

5.1.9.1.1.9.14. The statistical program (e.g., TST calculator, CETIS, etc.) output results, which includes the calculation of percent minimum significant difference (PMSD); and

5.1.9.1.1.9.15. Results of applicable reference toxicant data with the statistical output page identifying the species, NOEC, LOEC, type of toxicant, dilution water used, concentrations used, PMSD and dates tested; the reference toxicant control charts for each endpoint, to include summaries of reference toxicant tests performed by the contracting laboratory; and any information on deviations from standard test procedures or problems encountered in completing the test and how the problems were resolved.

5.1.9.2. **TRE/TIE Results.** The Executive Officer shall be notified **no later than 30 days** from completion of each aspect of TRE/TIE analyses. TRE/TIE results shall be submitted to the Regional Water Board **within 60 days** of completion.

5.2. Toxicity Reduction Evaluation (TRE) Process

5.2.1. **TRE Work Plan.** The Permittee submitted a revised TRE Work Plan to the Regional Water Board on October 1, 2014. The Permittee's TRE Work Plan shall be reviewed by **February 1, 2025** for consistency with permit requirements and the Permittee's procedures updated as necessary in order to remain current and applicable to the discharge and requirements of this Order.

The Permittee shall notify the Regional Water Board of this review and submit any revisions of the TRE Work Plan within 90 days of the notification, to be ready to respond to toxicity events. The TRE Work Plan shall describe the steps the Permittee intends to follow if toxicity is detected, and should include at least the following items:

5.2.1.1. A description of the investigation and evaluation techniques that would be used to identify potential causes and sources of toxicity, effluent variability, and treatment system efficiency.

5.2.1.2. A description of the facility's methods of maximizing in-house treatment efficiency, good housekeeping practices, and a list of all chemicals used in the operation of this Facility.

5.2.1.3. If a toxicity identification evaluation (TIE) is necessary, an indication of the person who would conduct the TIEs (i.e., an in-house expert or an outside contractor).

5.2.2. **Preparation and Implementation of a Detailed TRE Work Plan.** If one of the accelerated toxicity tests described in section V.A.8, above, results in "Fail", the Permittee shall immediately initiate a TRE using, according to type of treatment facility, EPA manual *Generalized Methodology for Conducting Industrial Toxicity Reduction Evaluations* (EPA/600/2-88/070, 1989) and **within 30 days** of receipt of the accelerated monitoring result submit to the Regional Water Board Executive Officer a Detailed TRE Work Plan, which shall follow the generic TRE Work Plan revised as appropriate for the toxicity event described in section 5.1.8 of this MRP. The Detailed TRE Work Plan shall include the following information, and comply with additional conditions set by the Regional Water Board Executive Officer:

5.2.2.1. Further actions by the Permittee to investigate, identify, and correct causes of toxicity.

5.2.2.2. Actions the Permittee will take to mitigate effects of the discharge and prevent the recurrence of toxicity.

5.2.2.3. A schedule for these actions, progress reports, and the final report.

5.2.3. **TIE Implementation.** The Permittee may initiate a TIE as part of a TRE to identify the causes of toxicity using the same species and test methods and, as guidance, EPA manuals: *Methods for Aquatic Toxicity Identification Evaluations: Phase I Toxicity Characterization Procedures* (EPA/600/6-91/003, 1991); *Methods for Aquatic Toxicity Identification Evaluations, Phase II Toxicity Identification Procedures for Samples Exhibiting Acute and Chronic Toxicity* (EPA/600/R-92/080, 1993); *Methods for Aquatic Toxicity Identification Evaluations, Phase III Toxicity Confirmation Procedures for Samples Exhibiting Acute and Chronic Toxicity* (EPA/600/R-92/081, 1993); and *Marine Toxicity Identification Evaluation (TIE): Phase I Guidance Document* (EPA/600/R-96-054, 1996). The TIE should be conducted on the species demonstrating the most sensitive toxicity response.

5.2.4. Many recommended TRE elements parallel required or recommended efforts for source control, pollution prevention, and storm water control programs. TRE efforts should be coordinated with such efforts. As toxic substances are identified or characterized, the Permittee shall continue the TRE by determining the sources and evaluating alternative strategies for reducing or eliminating the substances from the discharge. All reasonable steps shall be taken to reduce toxicity to levels consistent with toxicity evaluation parameters.

5.2.5. The Permittee shall conduct routine effluent monitoring for the duration of the TRE process. Additional accelerated monitoring and TRE work plans are not required once a TRE has begun.

5.2.6. The Regional Water Board recognizes that toxicity may be episodic and identification of the causes and reduction of sources of toxicity may not be successful in all cases. The TRE may be ended at any stage if monitoring finds there is no longer toxicity.

6. LAND DISCHARGE MONITORING REQUIREMENTS – NOT APPLICABLE

This Order does not authorize discharges to land.

7. RECYCLING MONITORING REQUIREMENTS

The following requirements apply after the Permittee implements a recycled water system.

7.1. Monitoring Location REC-001

7.1.1. The Permittee shall monitor effluent to the recycled water system at Monitoring Location REC-001 as follows:

Table E-4. Recycled Water Monitoring Requirements

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method[1]
Effluent Flow[2]	mgd	Meter	Continuous	
Biochemical Oxygen Demand 5-day @ 20°C (BOD_5)	mg/L	24-hour composite	Weekly	Standard Methods
Total Suspended Solids (TSS)	mg/L	24-hour composite	Weekly	Standard Methods
pH	s.u.	Grab	Weekly	Standard Methods
Total Coliform Bacteria	MPN/100 ml	Grab	Daily	Standard Methods
Nitrate Nitrogen, Total (as N)[3]	mg/L	Grab	Monthly	Standard Methods
Nitrite Nitrogen (as N)[3]	mg/L	Grab	Monthly	Standard Methods

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method[1]
Ammonia Nitrogen (as N)[3]	mg/L	24-hour composite	Monthly	Standard Methods
Organic Nitrogen (as N)[3]	mg/L	Grab	Monthly	Standard Methods
Total Dissolved Solids (TDS)	mg/L	Grab	Monthly[4]	Standard Methods

Table Notes:

1. In accordance with the current edition of Standard Methods for Examination of Water and Wastewater (American Public Health Administration) or current test procedures specified in 40 C.F.R. part 136.
2. Each month, the Permittee shall report the daily average and monthly average flows.
3. Monitoring for nitrate, nitrite, ammonia, and organic nitrogen is for the purpose of determining total nitrogen concentration for agronomic rate calculations.
4. The monitoring frequency for TDS may be reduced to annually if the first 12 months of monitoring data collected after the effective date of this Order demonstrate that concentrations of TDS are consistently lower than water quality objectives for protection of groundwater.

7.1.2. The Permittee shall comply with Water Recycling Specifications and Requirements contained in section 4.3 of this Order:

8. RECEIVING WATER MONITORING REQUIREMENTS

8.1. Monitoring Location RSW-001

8.1.1. The Permittee shall monitor the Pacific Ocean at Monitoring Location RSW-001 as follows:

Table E-5. Receiving Water Monitoring Requirements – Monitoring Location RSW-001

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method[1]
Fecal Coliform Bacteria[2]	MPN/100 ml	Grab	Weekly	Standard Methods
Total Coliform Bacteria[2]	MPN/100 ml	Grab	Weekly	Standard Methods

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method[1]
Enterococcus Bacteria[3]	MPN/100 ml	Grab	Weekly	Standard Methods

Table Notes:

1. In accordance with the current edition of Standard Methods for Examination of Water and Wastewater (American Public Health Administration) or current test procedures specified in 40 C.F.R. part 136.
2. Test methods used for coliforms (total and fecal) shall be those presented in Table 1A of 40 CFR Part 136, unless alternate methods have been approved in advance by U.S. EPA pursuant to 40 CFR Part 136.
3. Test methods used for enterococcus shall be those presented in EPA publication EPA 600/4-85/076, Test Methods for Escherichia coli and Enterococci in Water By Membrane Filter Procedure, or any improved method determined by the Regional Water Board to be appropriate. The Regional Water Board finds that the methods presented in Table 1A of 40 C.F.R. Part 136 are appropriate methods to use for the analysis of enterococcus bacteria.

8.1.2. The geometric mean for fecal coliform density shall be calculated using the five most recent sample results for comparison with the 30-day geometric mean receiving water limitation in section 5.1.1.1.1.1 of this Order. The 6-week rolling geometric mean for enterococci shall be calculated weekly for comparison with the 30-day geometric mean receiving water limitation in section 5.1.1.1.1.2 of this Order.

8.1.3. If a single sample exceeds any of the single sample maximum receiving water limitations in sections 5.1.1.1.1 and 5.1.1.1.2 of this Order, the Permittee shall conduct repeat sampling at that location to determine the extent and persistence of the exceedance. Repeat sampling shall be conducted within 24 hours of receiving analytical results and continued every 24 hours until the sample result is less than the single sample maximum receiving water limitation or until a sanitary survey is conducted to determine the source of the high bacterial densities.

When repeat sampling is required because of an exceedance of any one single sample density, values from all samples collected during that 30-day period will be used to calculate the geometric mean.

8.2. **Groundwater Monitoring – Not Required**

This Order does not require groundwater monitoring at this time.

9. OTHER MONITORING REQUIREMENTS

9.1. Outfall Inspection

The Permittee shall conduct a comprehensive evaluation/inspection of the outfall once during the term of the permit to verify the operational status and integrity of the outfall. By **June 1, 2024**, the Permittee shall submit to the Regional Water Board Executive Officer for approval, an Outfall Inspection/Evaluation Work Plan identifying the evaluation and inspection plan, methodology, and timeline for conducting the outfall inspection. A report documenting the results of the outfall inspection and evaluation shall be submitted no later than **April 1, 2026**. The report shall include a description of the outfall condition, including any observed cracks, breaks, leaks, or other malfunctions, and identify any needed maintenance and repairs.

9.2. Biological Survey

The Permittee shall conduct a comparative evaluation of indigenous biota in the vicinity of the outfall and a reference station outside the influence of the discharge using a qualified aquatic biologist at least once every 5 years. The biologist shall prepare a report that includes a photographic survey of the intertidal flora and fauna and observations of objectionable aquatic growths, floating particulates or grease and oil, aesthetically undesirable discoloration of the ocean surface, color of fish or shellfish, and any evidence of degradation of indigenous biota attributable to the rate of deposition of inert solids, settleable material, nutrient materials, increased concentrations of organic materials, or increased concentrations of Ocean Plan Table 3 substances. The Permittee shall submit to the Regional Water Board Executive Officer for approval a Biological Survey Work Plan no later than **December 1, 2024**, in order to complete the survey and prepare a final report by the due date for receipt of an application for permit renewal. The final report shall be submitted no later than **June 1, 2027**.

9.3. Filtration Process Monitoring (Monitoring Locations INT-001A and INT-001B)

If the Permittee produces and distributes recycled water, filtration process monitoring shall demonstrate compliance with section 4.3.3 (Filtration Process Requirements) of the Order and applies to discharges to the recycled water system. The Permittee is required to implement the following filtration process monitoring:

9.3.1. Effluent Filter Monitoring (Monitoring Location INT-001A)

9.3.1.1. **Monitoring.** The Permittee shall calculate on a daily basis the surface loading rate in gallons per minute per square meter and report the maximum surface loading rate and any exceedances of the surface loading rate limitations specified in section 4.3.3.1 of the Order. The rate of flow through the tertiary filters shall be measured at Monitoring Location INT-001A.

9.3.1.2. **Compliance.** Compliance with the maximum daily filter surface loading rate, as specified in section 60301.320 of the CCR Water Recycling Criteria (title 22), shall be calculated based on the flow rate through each filter unit.

9.3.1.3. **Reporting.** The maximum daily filter surface loading rate shall be reported on the monthly SMR.

9.3.2. **Effluent Filter Monitoring (Monitoring Location INT-001B)**

9.3.2.1. **Monitoring.** The turbidity of the filtered effluent shall be continuously measured and recorded at Monitoring Location INT-001B. Should the turbidity meter and recorder fail, grab sampling at a minimum frequency of 1.2 hours may be substituted for a period of up to 24 hours. The recorded data shall be maintained by the Permittee for at least 3 years. The daily maximum and 95th percentile turbidity results shall be reported on the monthly SMRs.

9.3.2.2. **Compliance.** Compliance with the effluent turbidity limitation specified in title 22, as referenced in section 4.3.3.2 of the Order, shall be determined using the levels of recorded turbidity taken at intervals of no more than 1.2 hours over a 24-hour period.

9.3.2.3. **Reporting.** If the filtered effluent turbidity exceeds 0.2 NTU for more than 5 percent of the time in a 24-hour period or 0.5 NTU at any time, the incident shall be reported in the monthly SMR and to the Regional Water Board and DDW by telephone within 24 hours in accordance with Provision 4.3.3.3 of the Order, only if the effluent was sent to the recycled water system. A written report describing the incident and the actions undertaken in response shall be included in the monthly SMR. Mitigation of the event shall consist of diverting all inadequately treated wastewater to temporary storage or an upstream process or automatically activated chemical addition to comply with title 22 requirements (sections 60304 and 60307).

9.4. **Chlorine Disinfection Process Monitoring (Monitoring Location INT-002A)**

9.4.1. The Permittee shall monitor the discharge from the chlorine contact chamber prior to dechlorinating at Monitoring Location INT-001A as follows:

Table E-6. Internal Effluent Monitoring – Monitoring Location INT-002A

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method[1]
Chlorine, Total Residual[2]	mg/L	Meter	Continuous	Standard Methods

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method[1]

Table Notes:

1. In accordance with the current edition of Standard Methods for Examination of Water and Wastewater (American Public Health Administration) or current test procedures specified in 40 C.F.R. part 136.
2. The Permittee shall monitor continuously to demonstrate that the appropriate chlorine residual concentration is maintained in the effluent at INT-002A at all times. At a minimum, the Permittee shall record readings of the continuous monitoring every hour on the hour and report the maximum recorded daily chlorine residual. The Permittee shall calibrate chlorine residual analyzers against grab samples as frequently as necessary to maintain accurate and reliable operation.

9.5. **Ultraviolet Light Disinfection Process Monitoring (Monitoring Location INT-002B)**

If the Permittee produces and distributes recycled water, disinfection process monitoring shall demonstrate compliance with section 4.3.4 (Disinfection Process Requirements) of the Order and applies to discharges to the recycled water system. The Permittee is required to implement the following disinfection process monitoring:

9.5.1. **Monitoring Location INT-002B**

9.5.1.1. **Monitoring.** The UV transmittance of the effluent from the UV disinfection system shall be monitored continuously and recorded at Monitoring Location INT-002B. The operational UV dose shall be calculated from UV transmittance and flow.

9.5.1.2. **Compliance.** The UV transmittance shall not fall below 65 percent of maximum at any time, unless otherwise approved by DDW. The operational UV dose shall not fall below 80 millijoules per square centimeter (mJ/cm2) at any time, unless otherwise approved by DDW. Flow through the UV disinfection system shall not exceed 0.6 mgd, unless otherwise approved by DDW.

9.5.1.3. **Reporting.** The Permittee shall report daily average and lowest daily transmittance and operational UV dose on its monthly SMRs. The Permittee shall report daily average and maximum flow through the UV disinfection system. If the UV transmittance falls below 65 percent or UV dose falls below 80 mJ/cm2, the event shall be reported to the Regional Water Board by telephone within 24 hours. Any inadequately treated and disinfected wastewater shall be diverted to a storage basin or an upstream process for adequate treatment.

9.6. **Sludge Monitoring (Monitoring Location BIO-001)**

9.6.1. Sludge sampling shall be conducted according to the requirements specified by the location and type of disposal activities undertaken.

9.6.2. Sampling records shall be retained for a minimum of 5 years. A log shall be maintained for sludge quantities generated and for handling and disposal activities. The frequency of entries is discretionary; however, the log must be complete enough to serve as a basis for developing the Sludge Handling and Disposal report that is required as part of the Annual Report.

9.7. **Septage Station Monitoring (Monitoring Location SEP-001)**

Upon Regional Water Board approval of a septage management program, the following requirements apply when the Facility is receiving septage.

9.7.1. **Monitoring Location SEP-001**

9.7.1.1. For each septage load delivered to the Facility, the Permittee shall require the hauler to collect and report a pH value representative of the load.

9.7.1.2. The Permittee shall estimate, prior to the beginning of a quarterly and semiannual monitoring period, the number of anticipated septage deliveries for the given monitoring frequency, and generate a random load number from this total. When the delivery corresponding to the pre-chosen random number is received, the Permittee will collect a representative septage sample and have the samples analyzed in accordance with Table E-7 and with standard sample collection and handling procedures. Each sample shall be analyzed in accordance with the following table:

Table E-7. Septage Monitoring – Monitoring Location SEP-001

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method[1]
pH	s.u.	Meter	Continuous	Standard Methods
Biochemical Oxygen Demand	mg/L	Grab	Quarterly	Standard Methods
Chemical Oxygen Demand	mg/L	Grab	Quarterly	Standard Methods
Oil and Grease	mg/L	Grab	Quarterly	Standard Methods

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method[1]
Metals and Trace Elements	µg/L	Grab	Quarterly	Standard Methods
Purgeable Organic Compounds[2]	µg/L	Grab	Semiannually	Standard Methods
Semivolatile Organic Compounds[3]	µg/L	Grab	Semiannually	Standard Methods

1. In accordance with the current edition of Standard Methods for Examination of Water and Wastewater (American Public Health Administration) or current test procedures specified in 40 C.F.R. part 136.
2. Purgeable organic compounds shall include the parameters listed in U.S. EPA Method 624.
3. Semivolatile organic compounds shall include the parameters listed in U.S. EPA Method 625.

9.7.2. **Septage Hauler Tracking**

9.7.2.1. For any month when septage waste is received by the Facility, the source(s) of the waste shall be documented. A summary table of all septage discharged to the Facility shall be submitted with each quarterly SMR and shall include:

9.7.2.1.1. Date and time of discharge;

9.7.2.1.2. Name, County identification number, and City identification number of the hauler;

9.7.2.1.3. Volume discharged;

9.7.2.1.4. Source(s) of the waste; and

9.7.2.1.5. pH of septage load.

10. REPORTING REQUIREMENTS

10.1. Special Studies, Technical Reports and Additional Monitoring Requirements

10.1.1. **Sanitary Sewer Evaluation Survey (SSES).** The Permittee shall conduct a SSES to evaluate the condition of its collection system and determine where and what rehabilitation and replacement efforts need to be completed to reduce inflow and infiltration (I/I) and flood risk. As part of the survey, the Permittee shall characterize the existing collection system using available closed circuit

television (CCTV) data and employing a system for ranking the condition of pipelines that meets the National Association of Sewer Service Companies (NASCO) or other industry-accepted standards, identify and prioritize collection system deficiencies, provide a schedule of needed long-term and short-term repairs to address system deficiencies and reduce exfiltration, I/I, include a hydraulic analysis of the collection system under estimated dry weather and peak wet weather flow conditions, present findings of the hydraulic analysis on a GIS system map or other database, and identify areas where increases in pipeline size, I&I reduction programs, increases and redundancy in pumping capacity are needed to eliminate any identified hydraulic capacity deficiencies. The Permittee shall submit a work plan for conducting the survey by **April 1, 2025**. The survey shall be initiated within 3 years of the permit effective date and a final report summarizing the results of the study shall be submitted by the Regional Water Board in conjunction with the Report of Waste Discharge by **January 31, 2028**.

10.2. **General Monitoring and Reporting Requirements**

10.2.1. The Permittee shall comply with all Standard Provisions (Attachment D) related to monitoring, reporting, and recordkeeping.

10.3. **Self-Monitoring Reports (SMRs)**

10.3.1. The Permittee shall electronically submit SMRs using the State Water Board's California Integrated Water Quality System (CIWQS) Program website (http://www.waterboards.ca.gov/water_issues/programs/ciwqs/). The CIWQS website will provide additional information for SMR submittal in the event there will be a planned service interruption for electronic submittal. The Permittee shall maintain sufficient staffing and resources to ensure it submits eSMRs that are complete and timely. This includes provisions of training and supervision of individuals (e.g., Permittee personnel or consultant) on how to prepare and submit eSMRs.

10.3.2. The Permittee shall report in the SMR the results for all monitoring specified in this MRP under sections 3 through 9. The Permittee shall submit quarterly SMRs including the results of all required monitoring using U.S. EPA-approved test methods or other test methods specified in this Order. SMRs are to include all new monitoring results obtained since the last SMR was submitted. If the Permittee monitors any pollutant more frequently than required by this Order, the results of this monitoring shall be included in the calculations and reporting of the data submitted in the SMR.

10.3.3. All monitoring results reported shall be supported by the inclusion of the complete analytical report from the laboratory that conducted the analyses.

10.3.4. Monitoring periods and reporting for all required monitoring shall be completed according to the following schedule:

Table E-8. Monitoring Periods and Reporting Schedule

Sampling Frequency	Monitoring Period Begins On…	Monitoring Period	SMR Due Date
Continuous	Permit effective date	All	First day of second calendar month following the end of each quarter (February 1, May 1, August 1, November 1)
Daily	Permit effective date	(Midnight through 11:59 PM) or any 24-hour period that reasonably represents a calendar day for purposes of sampling	First day of second calendar month following the end of each quarter (February 1, May 1, August 1, November 1)
Weekly	Sunday following permit effective date or on permit effective date if on a Sunday	Sunday through Saturday	First day of second calendar month following the end of each quarter (February 1, May 1, August 1, November 1)
Monthly	First day of calendar month following permit effective date or on permit effective date if that date is first day of the month	1st day of calendar month through last day of calendar month	First day of second calendar month following the end of each quarter (February 1, May 1, August 1, November 1)
Quarterly	Closest of January 1, April 1, July 1, or October 1 following (or on) permit effective date	January 1 through March 31 April 1 through June 30 July 1 through September 30 October 1 through December 31	First day of second calendar month following the end of each quarter (February 1, May 1, August 1, November 1)
Semiannually	Closest of January 1 or July 1 following (or on) permit effective date	January 1 through June 30 July 1 through December 31	September 1, each year March 1, each year

Sampling Frequency	Monitoring Period Begins On…	Monitoring Period	SMR Due Date
Annually	January 1 following (or on) permit effective date	January 1 through December 31	March 1, each year (with annual report)
Once per permit term	Permit effective date	All	March 1, 2027

10.3.5. **Reporting Protocols**. The Permittee shall report with each sample result the applicable reported Minimum Level (reported ML, also known as the Reporting Level, or RL) and the current Method Detection Limit (MDL), as determined by the procedure in 40 C.F.R. part 136.

The Permittee shall report the results of analytical determinations for the presence of chemical constituents in a sample using the following reporting protocols:

10.3.5.1. Sample results greater than or equal to the reported ML shall be reported as measured by the laboratory (i.e., the measured chemical concentration in the sample).

10.3.5.2. Sample results less than the reported ML, but greater than or equal to the laboratory's MDL, shall be reported as "Detected, but Not Quantified," or DNQ. The estimated chemical concentration of the sample shall also be reported.

For the purposes of data collection, the laboratory shall write the estimated chemical concentration next to DNQ as well as the words "Estimated Concentration" (may be shortened to "Est. Conc."). The laboratory may, if such information is available, include numerical estimates of the data quality for the reported result. Numerical estimates of data quality may be percent accuracy (± a percentage of the reported value), numerical ranges (low to high), or any other means considered appropriate by the laboratory.

10.3.5.3. Sample results less than the laboratory's MDL shall be reported as "Not Detected," or ND.

10.3.5.4. Permittees are to instruct laboratories to establish calibration standards so that the ML value (or its equivalent if there is differential treatment of samples relative to calibration standards) is the lowest calibration standard. At no time is the Permittee to use analytical data derived from extrapolation beyond the lowest point of the calibration curve.

10.3.6. The Permittee shall submit SMRs in accordance with the following requirements:

10.3.6.1. The Permittee shall arrange all reported data in a tabular format. The data shall be summarized to clearly illustrate whether the facility is operating in compliance with interim and/or final effluent limitations. The Permittee is not required to duplicate the submittal of data that is entered in a tabular format within CIWQS. When electronic submittal of data is required and CIWQS does not provide for entry into a tabular format within the system, the Permittee shall electronically submit the data in a tabular format as an attachment.

10.3.6.2. The Permittee shall attach a cover letter to the SMR. The information contained in the cover letter shall clearly identify:

10.3.6.2.1. Facility name and address;

10.3.6.2.2. WDID number;

10.3.6.2.3. Applicable period of monitoring and reporting;

10.3.6.2.4. Violations of the waste discharge requirements (identified violations must include a description of the requirement that was violated and a description of the violation);

10.3.6.2.5. Corrective actions taken or planned; and

10.3.6.2.6. The proposed time schedule for corrective actions.

10.3.6.3. SMRs must be submitted to the Regional Water Board, signed and certified as required by the Standard Provisions (Attachment D), to the CIWQS Program Web site (http://www.waterboards.ca.gov/ciwqs/index.html).

In the event that that an alternate method for submittal of SMRs is required, the Permittee shall submit the SMR electronically via e-mail to NorthCoast@waterboards.ca.gov or on disk (CD or DVD) in Portable Document Format (PDF) file in lieu of paper-sourced documents. The guidelines for electronic submittal of documents can be found on the Regional Water Board website at http://www.waterboards.ca.gov/northcoast.

10.3.6.4. At any time during the term of this permit, the Regional Water Board may notify the Permittee to electronically submit both technical and Self-Monitoring Reports (SMRs) to the State Water Board's GeoTracker database in searchable Portable Document Format (pdf). In addition, analytical data will be required to be uploaded to the GeoTracker database under a site-specific global identification number that will be assigned to the Permittee. Information on the GeoTracker database is provided on the State Water Board website at: https://www.waterboards.ca.gov/resources/data_databases/groundwater.shtml

10.4. **Discharge Monitoring Reports (DMRs)**

10.4.1. DMRs are U.S. EPA reporting requirements. The Permittee shall electronically certify and submit DMRs together with SMRs using Electronic Self-Monitoring Reports module eSMR 2.5 or any upgraded version. Electronic DMR submittal shall be in addition to electronic SMR submittal. Information about electronic DMR submittal is available at the DMR website: (http://www.waterboards.ca.gov/water_issues/programs/discharge_monitoring).

10.5. **Other Reports**

10.5.1. **Special Study Reports and Progress Reports.** As specified in the Special Provisions contained in section 6 of the Order and in the MRP, special study and progress reports shall be submitted in accordance with the following reporting requirements.

Table E-9. Reporting Requirements for Special Provisions Reports

Order Section	Special Provision Requirement	Reporting Requirements
Special Provision 6.3.2.1	Pollutant Minimization Program	If required by the Executive Officer
Special Provision 6.3.2.2.5	Pollutant Minimization Program, Annual Facility Report	**March 1**, annually, following development of Pollutant Minimization Program
Special Provision 6.3.3.4.1	Septage Management Plan	Prior to accepting septage
Special Provision 6.3.4.5	Adequate Capacity, Technical Report	**Within 120 days** of notification that the Facility will reach capacity within 4 years
MRP, section 1.6	DMR-QA Study	**Annually**, per State Water Board instructions
MRP section 5.2.1	TRE Work Plan Review Notification	**February 1, 2025**
MRP section 5.2.1	TRE Work Plan Revisions	**Within 90 days** of review notification is revisions are necessary
MRP section 5.5.2	Detailed TRE Work Plan	**Within 30 days** of an accelerated monitoring test that results in “Fail”
MRP section 9.1	Outfall Evaluation/Inspection Work Plan	**June 1, 2024**

Order Section	Special Provision Requirement	Reporting Requirements
MRP section 9.1	Outfall Evaluation/Inspection Report	**April 1, 2026**
MRP section 9.2	Biological Survey Work Plan	**December 1, 2024**
MRP section 9.2	Biological Survey Final Report	**June 1, 2027**
MRP section 10.1.1	Sanitary Sewer Evaluation Survey Work Plan	**April 1, 2025**
MRP section 10.1.1	Sanitary Sewer Evaluation Survey Final Report	**November 30, 2027**
MRP section 10.5.2	Annual Report	**March 1**, each year
MRP section 10.5.3	Annual Pretreatment Report	**March 1**, each year
MRP section 10.6	Spills and Unauthorized Discharge Reporting	**Within 24 hours**, verbal notification **Within 5 days**, written report

10.5.2. **Annual Report.** The Permittee shall submit an annual report to the Regional Water Board for each calendar year through the CIWQS Program Web site. In the event that a paper copy of the annual report is required, the Permittee shall submit the report to the email address in section 10.3.7.3., above. The report shall be submitted by **March 1** of the following year. The report shall, at a minimum, include the following:

10.5.2.1. Where appropriate, tabular and/or graphical summaries of the monitoring data and disposal records from the previous year. If the Permittee monitors any pollutant more frequently than required by this Order, using test procedures approved under 40 C.F.R. part 136 or as specified in this Order, the results of this monitoring shall be included in the calculation and report of the data submitted SMR.

10.5.2.2. A comprehensive discussion of the Facility's compliance (or lack thereof) with all effluent limitations and other WDRs, and the corrective actions taken or planned, which may be needed to bring the discharge into full compliance with the Order.

10.5.2.3. The names and general responsibilities of all persons employed at the Facility;

10.5.2.4. The names and telephone numbers of persons to contact regarding the Facility for emergency and routine situations; and

10.5.2.5. A statement certifying when the flow meter(s) and other monitoring instruments and devices were last calibrated, including identification of who performed the calibration.

10.5.2.6. **Sludge Handling and Disposal Activity Reporting.** The Permittee shall submit, as part of its annual report to the Regional Water Board, a description of the Permittee's solids handling, disposal and reuse activities over the previous 12 months. At a minimum, the report shall contain:

10.5.2.6.1. Annual sludge production, in dry tons and percent solids;

10.5.2.6.2. Sludge monitoring results;

10.5.2.6.3. A schematic diagram showing sludge handling facilities (e.g., digesters, thickeners, drying beds, etc.), if any and a solids flow diagram;

10.5.2.6.4. Methods of final disposal of sludge:

10.5.2.6.4.1. For any portion of sludge discharged to a sanitary landfill, the Permittee shall provide the volume of sludge transported to the landfill, the names and locations of the facilities receiving sludge, the Regional Water Board's WDRs order number for the regulated landfill, and the landfill classification.

10.5.2.6.4.2. For any portion of sludge discharged through land application, the Permittee shall provide the volume of biosolids applied, the date and locations where biosolids were applied, the Regional Water Board's WDRs order number for the regulated discharge, a demonstration that the discharge was conducted in compliance with applicable permits and regulations, and, if applicable, corrective actions taken or planned to bring the discharge into compliance with WDRs.

10.5.2.6.4.3. For any portion of sludge further treated through composting, the Permittee shall provide a summary of the composting process, the volume of sludge composted, and a demonstration and signed certification statement that the composting process and final product met all requirements for Class A biosolids.

10.5.2.6.5. Results of internal or external third-party audits of the Biosolids Management System, including reported program deficiencies and recommendations, required corrective actions, and a schedule to complete corrective actions.

10.5.2.7. **Storm Water Reporting.** The Permittee shall submit, as part of its annual report to the Regional Water Board, an evaluation of the effectiveness of the Permittee's BMPs to control the run-on of storm water to the treatment facility site, as well as activities to maintain and upgrade these BMPs.

10.5.2.8. **Septage Monitoring and Reporting.** The results of septage monitoring shall be provided as follows:

10.5.2.8.1. A narrative description of all preparatory, monitoring, sampling, and analytical testing activities for the septage monitoring program. The narrative shall be sufficiently detailed to verify compliance with waste discharge requirements and this MRP.

10.5.2.8.2. A summary table of all discharges of septage to the Facility. At a minimum, the table shall include; the name, County identification number, and City identification number of each hauler discharging into the Facility over the past calendar year.

10.5.2.8.3. A summary table of analytical results for all samples of septage collected in compliance with waste discharge requirements and this MRP. When directed by the Regional Water Board, the Permittee shall also append analytical reports, chains of custody, and other documentation necessary to confirm the validity of the monitoring samples.

10.5.2.9. **DMR-QA Study Report.** The Permittee shall submit, as part of its annual report to the Regional Water Board, an electronic copy of the annual DMR-QA study report submitted to the State Water Board, Quality Assurance Program Officer pursuant to section 1.6 of this MRP.

10.5.3. **Annual Pretreatment Reporting Requirements.** The Permittee shall submit annually a report to the Regional Water Board, with copies to U.S. EPA Region 9 and the State Water Board, describing the Permittee's pretreatment activities over the previous calendar year. In the event that the Permittee is not in compliance with any conditions or requirements of this Order, including noncompliance with pretreatment audit/compliance inspection requirements, then the Permittee shall also include the reasons for noncompliance and state how and when the Permittee shall comply with such conditions and requirements.

An annual report shall be submitted by **March 1st** of the following year, and include at least the following items:

10.5.3.1. A summary of analytical results from all influent, effluent, and sludge sampling conducted during the reporting period, as specified in sections 3.1.1 (Table E-1), 4.1.1 (Table E-3), and 9.6.2 of the MRP. The Permittee shall also report results of any influent, effluent, or sludge monitoring data for nonpriority pollutants which may be causing or contributing to interference, pass-through or adversely impacting sludge quality.

10.5.3.2. A discussion of Upset, Interference, or Pass-Through incidents, if any, at the treatment plant, which the Permittee knows or suspects were caused by industrial users of the POTW or receipt of septage or other incompatible wastes. The discussion shall include the reasons why the incidents occurred,

the corrective actions taken and, if known, the name and address of, the industrial user(s) responsible. The discussion shall also include a review of the applicable pollutant limitations to determine whether any additional limitations, or changes to existing requirements, may be necessary to prevent Pass-Through, Interference, or noncompliance with sludge disposal requirements.

10.5.3.3. The cumulative number of industrial users that the Permittee has notified regarding Baseline Monitoring Reports and the cumulative number of industrial user responses.

10.5.3.4. An updated list of the Permittee's industrial users including their names and addresses, or a list of deletions and additions keyed to a previously submitted list. The Permittee shall provide a brief explanation for each deletion. The list shall identify the industrial users subject to federal categorical standards by specifying which set(s) of standards are applicable. The list shall indicate which categorical industries, or specific pollutants from each industry, are subject to local limitations that are more stringent than the federal categorical standards. The Permittee shall also list the noncategorical industrial users that are subject only to local discharge limitations. The Permittee shall characterize the compliance status through the year of record of each industrial user by employing the following descriptions:

10.5.3.4.1. complied with Baseline Monitoring Report requirements (where applicable);

10.5.3.4.2. consistently achieved compliance;

10.5.3.4.3. inconsistently achieved compliance;

10.5.3.4.4. significantly violated applicable pretreatment requirements as defined by 40 C.F.R. section 403.8(f)(2)(vii);

10.5.3.4.5. complied with schedule to achieve compliance (include the date final compliance is required);

10.5.3.4.6. did not achieve compliance and not on a compliance schedule; and

10.5.3.4.7. compliance status unknown.

10.5.3.5. A summary of the inspection and sampling activities conducted by the Permittee during the past year to gather information and data regarding the industrial users. The summary shall include:

10.5.3.5.1. The names and addresses of the industrial users subjected to surveillance and an explanation of whether they were inspected, sampled, or both and the frequency of these activities at each user; and

10.5.3.5.2. The conclusions or results from the inspection or sampling of each industrial user.

10.5.3.6. A summary of the compliance and enforcement activities during the past year. The summary shall include the names and addresses of the industrial users affected by the following actions:

10.5.3.6.1. Warning letters or notices of violation regarding the industrial users' apparent noncompliance with federal categorical standards or local discharge limitations. For each industrial user, identify whether the apparent violation concerned the federal categorical standards or local discharge limitations.

10.5.3.6.2. Administrative orders regarding the industrial users' noncompliance with federal categorical standards or local discharge limitations. For each industrial user, identify whether the violation concerned the federal categorical standards or local discharge limitations.

10.5.3.6.3. Civil actions regarding the industrial users' noncompliance with federal categorical standards or local discharge limitations. For each industrial user, identify whether the violation concerned the federal categorical standards or local discharge limitations.

10.5.3.6.4. Criminal actions regarding the industrial users' noncompliance with federal categorical standards or local discharge limitations. For each industrial user, identify whether the violation concerned the federal categorical standards or local discharge limitations.

10.5.3.6.5. Assessment of monetary penalties. For each industrial user identify the amount of the penalties.

10.5.3.6.6. Restriction of flow to the POTW.

10.5.3.6.7. Disconnection from discharge to the POTW.

10.5.3.7. A description of any significant changes in operating the pretreatment program which differ from the information in the Permittee's approved Pretreatment Program including, but not limited to, changes concerning: the program's administrative structure, local industrial discharge limitations, monitoring program or monitoring frequencies, legal authority or enforcement policy, funding mechanisms, resource requirements, or staffing levels.

10.5.3.8. A summary of the annual pretreatment budget, including the cost of pretreatment program functions and equipment purchases.

10.5.3.9. A summary of public participation activities to involve and inform the public

10.5.3.10. A brief description of any programs the POTW implements to reduce pollutants from nondomestic users that are not classified as Significant Industrial Users (SIUs); and

10.5.3.11. Duplicate signed copies of these Pretreatment Program reports shall be submitted to the North Coast Regional Water Board at NorthCoast@waterboards.ca.gov, U.S. EPA Region 9 at R9Pretreatment@epa.gov, and the State Water Board at the appropriate address below:

STANDARD MAIL	FEDEX/UPS/OTHER PRIVATE CARRIERS
State Water Resources Control Board Division of Water Quality c/o Discharge Monitoring Report Processing Center Post Office Box 100 Sacramento, CA 95812-1000	State Water Resources Control Board Division of Water Quality c/o DMR Processing Center 1001 I Street, 15th Floor Sacramento, CA 95814

10.6. **Spill Notification**

10.6.1. **Spills and Unauthorized Discharges.** Information regarding all spills and unauthorized discharges (except SSOs and recycled water) that may endanger health or the environment shall be provided orally to the Regional Water Board1[3] **within 24** hours from the time the Permittee becomes aware of the circumstances and a written report shall also be provided **within five (5) days** of the time the Permittee becomes aware of the circumstances, in accordance with Section 5.5 of Attachment D.

Information to be provided verbally to the Regional Water Board includes:

10.6.1.1. Name and contact information of caller;

10.6.1.2. Date, time, and location of spill occurrence;

10.6.1.3. Estimates of spill volume, rate of flow, and spill duration, if available and reasonably accurate;

[3] The contact number of the Regional Water Board during normal business hours is (707) 576-2220. After normal business hours, spill reporting to the California Governor's Office of Emergency Services Warning Center (CalOES) will satisfy the 24-hour spill reporting requirement for the Regional Water Board. The contact number for spill reporting for the CalOES is (800) 852-7550.

10.6.1.4. Surface water bodies impacted, if any;

10.6.1.5. Cause of spill, if known at the time of the notification;

10.6.1.6. Cleanup actions taken or repairs made at the time of the notification; and

10.6.1.7. Responding agencies.

10.6.2. **Sanitary Sewer Overflows.** Notification and reporting of sanitary sewer overflows is conducted in accordance with the requirements of Order No. WQ 2022-0103-DWQ (Statewide General WDRs for Sanitary Sewer Systems), which is not incorporated herein by reference, and any revisions thereto.

10.6.3. **Recycled Water Spills.** Notification and reporting of spills and unauthorized discharges of recycled water discharged in or on any waters of the state, as defined in Water Code section 13050, shall be conducted in accordance with the following:

10.6.3.1. **Tertiary Recycled Water**[4]

10.6.3.1.1. For unauthorized discharges of 50,000 gallons or more of tertiary recycled water, the Permittee shall immediately notify the Regional Water Board as soon as (a) the Permittee has knowledge of the discharge or probable discharge, (b) notification is possible, and (c) notification can be provided without substantially impeding cleanup or other emergency measures.

10.6.3.1.2. For unauthorized discharges of more than 1,000 gallons, but less than 50,000 gallons of tertiary recycled water, the Permittee shall notify the Regional Water Board as soon as possible, but no longer than 3 days after becoming aware of the discharge.

[4] Tertiary Recycled Water means “disinfected tertiary 2.2 recycled water” as defined by DDW or wastewater receiving advanced treatment beyond disinfected tertiary 2.2 recycled water.

ATTACHMENT F - FACT SHEET

TABLE OF CONTENTS

Table of Contents F-1
Table of Tables F-2
1. Permit Information F-3
2. Facility Description F-4
2.1. Description of Wastewater and Biosolids Treatment and Controls F-4
2.2. Discharge Points and Receiving Waters F-5
2.3. Summary of Existing Requirements and SMR Data F-6
2.4. Compliance Summary F-9
2.5. Planned Changes F-9
3. Applicable Plans, Policies, and Regulations F-9
3.1. Legal Authorities F-9
3.2. California Environmental Quality Act (CEQA) F-10
3.3. State and Federal Laws, Regulations, Policies, and Plans F-10
3.4. Impaired Water Bodies on the CWA section 303(d) List F-14
3.5. Other Plans, Polices and Regulations F-14
4. Rationale for Effluent Limitations and Discharge Specifications F-15
4.1. Discharge Prohibitions F-15
4.2. Technology-Based Effluent Limitations F-18
4.3. Water Quality-Based Effluent Limitations (WQBELs) F-20
4.4. Final Effluent Limitation Considerations F-37
4.5. Interim Effluent Limitations – Not Applicable F-40
4.6. Land Discharge Specifications – Not Applicable F-40
4.7. Recycling Specifications F-41
4.8. Other Requirements F-43
5. Rationale for Receiving Water Limitations F-45
5.1. Surface Water F-45
5.2. Groundwater F-45
6. Rationale for Provisions F-46
6.1. Federal Standard Provisions F-46
6.2. Regional Water Board Standard Provisions F-46
6.3. Special Provisions F-46
7. Rationale for Monitoring and Reporting Requirements F-50
7.1. Influent Monitoring F-50
7.2. Effluent Monitoring F-50
7.3. Whole Effluent Toxicity Testing Requirements F-51

7.4. Land Discharge Monitoring Requirements – Not Applicable F-51
7.5. Recycling Monitoring Requirements F-52
7.6. Receiving Water Monitoring F-52
7.7. Other Monitoring Requirements F-53
7.8. Special Studies and Additional Monitoring Requirements F-54
8. Public Participation F-55
8.1. Notification of Interested Persons F-55
8.2. Written Comments F-55
8.3. Public Hearing F-56
8.4. Reconsideration of Waste Discharge Requirements F-56
8.5. Information and Copying F-56
8.6. Register of Interested Persons F-57
8.7. Additional Information F-57

TABLE OF TABLES

Table F-1. Facility Information F-3
Table F-2. Historic Effluent Limitations and Monitoring Data – Discharge Point EFF-001 (April 2017 – January 2023) F-7
Table F-3. Basin Plan Beneficial Uses F-11
Table F-4. Ocean Plan Beneficial Uses F-12
Table F-5. Summary of Reasonable Potential Analysis Results F-26
Table F-6. Background Seawater Concentrations – Ocean Plan F-31
Table F-7. Water Quality Objectives – Ocean Plan F-31
Table F-8. Summary of Chronic Toxicity Results (TUc) F-33
Attachment F-1. Wastewater Treatment Facility RPA Summary F-58

ATTACHMENT F - FACT SHEET

As described in section 2.2 of this Order, the Regional Water Board incorporates this Fact Sheet as findings of the Regional Water Board supporting the issuance of this Order. This Fact Sheet includes the legal requirements and technical rationale that serve as the basis for the requirements of this Order.

This Order has been prepared under a standardized format to accommodate a broad range of discharge requirements for dischargers in California. Only those sections or subsections of this Order that are specifically identified as “not applicable” have been determined not to apply to this Permittee. Sections or subsections of this Order not specifically identified as “not applicable” are fully applicable to this Permittee.

1. PERMIT INFORMATION

The following table summarizes administrative information related to the facility.

Table F-1. Facility Information

WDID	1A84006ODN
Permittee	City of Crescent City
Name of Facility	Wastewater Treatment Facility
Facility Address	210 Battery Street Crescent City, CA 95531 Del Norte County
Facility Contact, Title and Phone	Eric Wier, City Manager, (707) 464-7483
Authorized Person to Sign and Submit Reports	Eric Wier, City Manager, (707) 464-7483
Mailing Address	377 J Street Crescent City, CA 95531
Billing Address	SAME
Type of Facility	POTW
Major or Minor Facility	Major
Threat to Water Quality	1
Complexity	A
Pretreatment Program	Yes
Recycling Requirements	Yes
Facility Permitted Flow	1.86 mgd (average dry weather flow) 6.12 mgd (average wet weather flow)

Facility Design Flow	1.86 mgd (average dry weather treatment capacity) 6.12 mgd (average wet weather treatment capacity)
Watershed	Smith River Hydrologic Unit
Receiving Water	Pacific Ocean
Receiving Water Type	Ocean Waters

1.1. The City of Crescent City (hereinafter Permittee) is the owner and operator of the Crescent City Wastewater Treatment Facility (hereinafter Facility), a Publicly-Owned Treatment Works (POTW).

For the purposes of this Order, references to the "discharger" or "permittee" in applicable federal and state laws, regulations, plans, or policy are held to be equivalent to references to the Permittee herein.

1.2. The Facility discharges wastewater to the Pacific Ocean, a water of the United States. The Permittee was previously regulated by Order No. R1- 2017-0002 and National Pollutant Discharge Elimination System (NPDES) Permit No. CA0022756 adopted on February 2, 2017 and expired on March 31, 2022. Attachment B provides a map of the area around the Facility. Attachment C provides a flow schematic of the Facility.

1.3. The Permittee filed a report of waste discharge and submitted an application for reissuance of its waste discharge requirements (WDRs) and NPDES permit on March 31, 2021. The application was deemed complete on November 24, 2021.

1.4. Regulations at 40 C.F.R. section 122.46 limit the duration of NPDES permits to a fixed term not to exceed five years. Accordingly, Table 3 of this Order limits the duration of the discharge authorization. However, pursuant to California Code of Regulations, title 23, section 2235.4, the terms and conditions of an expired permit are automatically continued pending reissuance of the permit if the Permittee complies with all federal NPDES requirements for continuation of expired permits.

2. FACILITY DESCRIPTION

The Permittee owns and operates a municipal wastewater treatment facility (WWTF) and associated wastewater disposal facility that serve a population of approximately 15,372 within Crescent City and the surrounding County Service Area (CSA). The CSA has two sub-areas: the Northwest area to the north of the City and the Bertsch Ocean View area to the east of the City.

2.1. Description of Wastewater and Biosolids Treatment and Controls

The Facility treats domestic, commercial, and industrial wastewater and has an average dry weather design treatment capacity of 1.86 mgd and a peak wet

weather flow capacity of 6.12 mgd. The Permittee has three significant industrial users, including a cheese factory and two breweries that are covered under local pretreatment permits to discharge to the Facility.

The Permittee and CSA each maintain a separate sanitary sewer collection system within the service area. Flows generated within the CSA are collected and conveyed in the CSA's satellite collection system to the limits of the Permittee's system. The Permittee's system then conveys combined City and County-generated flows to the Facility, which is owned and maintained by the Permittee.

The headworks includes a mechanically cleaned screen, a flow-measuring Parshall flume, and a wet well in which five pumps are available to lift the flow to the primary clarifiers. Primary treatment consists of two grit removal tanks followed by two rectangular primary clarifiers. Secondary treatment is provided by operating the rotating biological contactors (RBC) and membrane bioreactor (MBR) in parallel. The RBC system consists of three trains of four-stage, RBCs with a combined surface area of 1.2 million square feet. Flow from the RBCs reach three rectangular secondary clarifiers. Flows from the clarifiers and any flow from the MBR unit that is not used for recycled water use are commingled and disinfected using sodium hypochlorite and dechlorinated using sodium bisulfite prior to discharge to the Pacific Ocean at Discharge Point 001.

The Permittee has the capability of producing tertiary-2.2 recycled water utilizing flow from the MBR and an ultraviolet (UV) light disinfection system that was installed in 2010. The Permittee does not currently have any recycled water use sites, but may produce recycled water in the future if recycled water use sites are identified. The capacity of the recycled water system is 1.2 mgd; however, the MBR can treat up to 1.6 mgd.

Solids handling consists of gravity thickening primary sludge, rotary drum thickening of secondary sludge, and anaerobic digestion of thickened solids. Both digesters are heated and mixed. Digested solids are dewatered using a belt filter press and hauled to a landfill.

2.2. Discharge Points and Receiving Waters

Treated wastewater is discharged at Discharge Point 001 at 41° 44' 38" N latitude and 124° 12' 10" W longitude to the Pacific Ocean. The outfall consists of a 24-inch ductile iron pipe that has an effluent conveyance capacity of 11 mgd to 13 mgd, depending on tide conditions. The outfall structure is sloped downward and discharges into a rocky slot in the surf zone adjacent to Battery Point Lighthouse.

Treated wastewater may also be discharged to the recycled water system at Discharge Point 002.

2.3. **Summary of Existing Requirements and SMR Data**

Effluent limitations contained in Order No. R1-2017-0002 for discharges from Discharge Points 001 (Monitoring Location EFF-001) and representative monitoring data from the term of Order No. R1-2017-0002 are as follows:

Table F-2. Historic Effluent Limitations and Monitoring Data – Discharge Point EFF-001 (April 2017 – January 2023)

Parameter	Units	Average Monthly Effluent Limitation	Average Weekly Effluent Limitation	Maximum Daily Effluent Limitation	Instantaneous Maximum Effluent Limitation	Highest Average Monthly Discharge	Highest Average Weekly Discharge	Highest Daily Discharge
Biochemical Oxygen Demand 5-day @ 20°C (BOD_5)	mg/L	30	45	--	--	19.6	43.2	70.6
BOD_5	lbs/day[1]	465	700	--	--	456	614	1,106
BOD_5	% Removal	85	--	--	--	84[2]	--	--
Total Suspended Solids (TSS)	mg/L	30	45	--	--	8.5	26.5	39.3
TSS	lbs/day[1]	465	700	--	--	173	578	846
TSS	% Removal	85	--	--	--	91[2]	--	--
Settleable Solids	mL/L	1.0	1.5	--	3.0	0.1	0.9	7.0
Oil and Grease	mg/L	25	40	--	75	5.0	39.9	93.5
Ammonia Nitrogen, Total (as N)	mg/L	--	--	72	180	--	--	33.3
Turbidity	NTU	75	100		225	8.9	13.7	53
pH	s.u.	--	--	6.0 - 9.0	--	--	--	6.8 – 7.7
Copper, Total Recoverable	µg/L	--	--	300	840	--	--	1,080

Parameter	Units	Average Monthly Effluent Limitation	Average Weekly Effluent Limitation	Maximum Daily Effluent Limitation	Instantaneous Maximum Effluent Limitation	Highest Average Monthly Discharge	Highest Average Weekly Discharge	Highest Daily Discharge
Nickel, Total Recoverable	µg/L	--	--	600	1,500	--	--	116
Total Residual Chlorine	µg/L	--	--	240	1,800	--	--	15,000
Dieldrin	µg/L	0.0012	--	--	--	<0.0048	--	--
TCDD Equivalents	µg/L	1.2×10^{-7}	--	--	--	9.34×10^{-8}	--	--
Fecal Coliform Bacteria	MPN/100 mL	14[3]	--	43[4]	400	--	--	1,600

Table Notes

1. Mass-based effluent limitations for BOD_5 and TSS are performance-based, as described in the Fact Sheet (Attachment F) of Order No. R1-2017-0002.
2. Represents the lowest observed percent removal.
3. The monthly median concentration shall not exceed 14 MPN/100 mL.
4. No more than 10 percent of samples shall exceed 43 MPN/100 mL.

2.4. Compliance Summary

On November 16, 2021, the Regional Water Board issued an Invitation to Enter Settlement Prior to Issuance of Formal Administrative Civil Liability Complaint (Invitation to Settle) for 18 violations of effluent limitations for residual chlorine, oil and grease, settleable solids, copper, and fecal coliform organisms in Order No. R1-2017-0002. The Invitation to Settle assessed a penalty of $45,000 for these violations. On January 19, 2012, the Executive Officer issued a Settlement Agreement and Stipulation for Entry of Administrative Civil Liability (ACL) Order No. R1-2022-0021 that included two additional violations and suspended the ACL of $48,000 pending the completion of a Compliance Project. The Compliance Project consisted of upgrades to the Facility's SCADA computers and chlorine analyzer systems and was determined to be complete on August 1, 2023.

2.5. Planned Changes

The Permittee may commence discharges of recycled water if any recycled water use sites are identified during the term of this Order. To authorize the use of the Permittee's recycled water at new recycled water use sites, the Permittee is required to enroll the new recycled water use sites under State Water Resources Control Board Order WQ 2016-0068-DDW or submit an application for modification of this NPDES permit to identify the specific recycled water uses. In addition, the Permittee must complete testing of its UV disinfection system to demonstrate that it meets recycled water requirements in section 60301.230 of title 22 of the CCR.

No other modifications or operational changes that will cause a material change in the volume or quality of discharges from the Facility have been identified for the term of this Order.

3. APPLICABLE PLANS, POLICIES, AND REGULATIONS

The requirements contained in this Order are based on the requirements and authorities described in this section.

3.1. Legal Authorities

This Order serves as WDRs pursuant to article 4, chapter 4, division 7 of the California Water Code (commencing with section 13260). This Order is also issued pursuant to section 402 of the federal Clean Water Act (CWA) and implementing regulations adopted by the U.S. EPA and chapter 5.5, division 7 of the Water Code (commencing with section 13370). It shall serve as an NPDES permit authorizing the Permittee to discharge into waters of the United States at the discharge location described in Table 1 subject to the WDRs in this Order. This Order also serves as a Master Recycling Permit pursuant to article 4, chapter 7, division 7 of the Water Code (commencing with section 13500).

3.2. California Environmental Quality Act (CEQA)

Under Water Code section 13389, this action to adopt an NPDES permit is exempt from the provisions of Chapter 3 of CEQA, (commencing with section 21100) of Division 13 of the Public Resources Code. Additionally, the adoption of water recycling requirements for the Facility constitutes permitting of an existing facility that is exempt from the provisions of CEQA pursuant to California Code of Regulations, title 14, section 15301. If at any time the Permittee proposes to expand its recycled water system to include use sites, the Permittee will be the lead agency under CEQA.

3.3. State and Federal Laws, Regulations, Policies, and Plans

3.3.1. Water Quality Control Plan

The Regional Water Board adopted a Water Quality Control Plan for the North Coast Region (hereinafter Basin Plan) that designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the plan. In addition, the Basin Plan implements State Water Board Resolution No. 88-63, which establishes state policy that all waters, with certain exceptions, should be considered suitable or potentially suitable for municipal or domestic supply. With high concentrations of total dissolved solids, ocean waters meet an exception to State Water Board Resolution No. 88-63; and therefore, the MUN designation is not applicable to the ocean receiving water for this Permittee. Requirements in this Order implement the Basin Plan.

Beneficial uses applicable to the Pacific Ocean are as follows:

Table F-3. Basin Plan Beneficial Uses

Discharge Point	Receiving Water Name	Beneficial Use(s)
001	Pacific Ocean	Existing: Navigation (NAV); Water contact recreation (REC-1); Non-contact water recreation (REC-2); Commercial and sport fishing (COMM); Wildlife habitat (WILD); Rare, threatened, or endangered species (RARE); Marine habitat (MAR); Migration of aquatic organisms (MIGR); Spawning, reproduction, and/or early development (SPAWN); Shellfish harvesting (SHELL); and Aquaculture (AQUA). Potential: Industrial water supply (IND); Industrial process supply (PRO); and Preservation of Areas of Special Biological Significance (ASBS).
002	Groundwater	Existing: Municipal and domestic supply (MUN); Agricultural supply (AGR); Industrial service supply (IND); and Native American Culture (CUL). Potential: Industrial Process Supply (PRO); and Aquaculture (AQUA).

3.3.2. **Thermal Plan**

The State Water Board adopted the Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California (Thermal Plan) on January 7, 1971, and amended this plan on September 18, 1975. This plan contains temperature objectives for coastal waters. The Permittee does not discharge thermal waste; therefore, the Order does not include effluent limitations for temperature in response to the requirements of the Thermal Plan.

3.3.3. California Ocean Plan

The State Water Board adopted the Water Quality Control Plan for Ocean Waters of California, California Ocean Plan (Ocean Plan) in 1972 and amended it in 1978, 1983, 1988, 1990, 1997, 2000, 2005, 2009, 2012, and 2019. The State Water Board adopted the latest amendment on August 7, 2018, and it became effective on February 4, 2019. The Ocean Plan is applicable, in its entirety, to point source discharges to the ocean. The Ocean Plan identifies beneficial uses of ocean waters of the state to be protected as summarized below:

Table F-4. Ocean Plan Beneficial Uses

Discharge Point	Receiving Water	Beneficial Uses
001	Pacific Ocean	Industrial water supply; Water contact and non-contact recreation, including aesthetic enjoyment; Navigation; Commercial and sport fishing; Mariculture; Preservation and enhancement of designated Areas of Special Biological Significance (ASBS); Rare and endangered species; Marine habitat; Fish spawning; and Shellfish harvesting

In order to protect the beneficial uses, the Ocean Plan establishes water quality objectives and a program of implementation. Requirements of this Order implement the Ocean Plan.

3.3.4. Compliance Schedules and Interim Requirements

The State Water Board adopted Resolution No. 2008-0025 on April 15, 2008, titled Policy for Compliance Schedules in National Pollutant Discharge Elimination System Permits, which includes compliance schedule policies for pollutants that are not addressed by the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Policy or SIP). This Policy became effective on August 27, 2008.

This Order does not include any compliance schedules or interim effluent limitations.

3.3.5. Antidegradation Policy

Federal regulation 40 C.F.R. section 131.12 requires that the state water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy in State Water Board Resolution 68-16 ("Statement of Policy with Respect to Maintaining High Quality of Waters in California"). Resolution 68-16 is deemed to incorporate the federal antidegradation policy where the federal policy applies under federal law. Resolution 68-16 requires that existing water quality be maintained unless degradation is justified based on specific findings. The Regional Water Board's Basin Plan implements, and incorporates by reference, both the state and federal antidegradation policies. The permitted discharge must be consistent with the antidegradation provision of section 131.12 and State Water Board Resolution 68-16.

3.3.6. Anti-Backsliding Requirements

Sections 402(o) and 303(d)(4) of the CWA and federal regulations at 40 C.F.R. section 122.44(l) restrict backsliding in NPDES permits. These anti-backsliding provisions require that effluent limitations in a reissued permit must be as stringent as those in the previous permit, with some exceptions in which limitations may be relaxed.

3.3.7. Endangered Species Act Requirements

This Order does not authorize any act that results in the taking of a threatened or endangered species or any act that is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (Fish and Game Code, §§ 2050 to 2097) or the Federal Endangered Species Act (16 U.S.C.A. §§ 1531 to 1544). This Order requires compliance with effluent limits, receiving water limits, and other requirements to protect the beneficial uses of waters of the state, including protecting rare and endangered species. The Permittee is responsible for meeting all requirements of the applicable Endangered Species Act.

3.3.8. Sewage Sludge and Biosolids

This Order does not authorize any act that results in violation of requirements administered by U.S. EPA to implement 40 C.F.R. Part 503, Standards for the Use or Disposal of Sewage Sludge. These standards regulate the final use or disposal of sewage sludge that is generated during the treatment of domestic sewage in a municipal wastewater treatment facility. The Permittee is responsible for meeting all applicable requirements of 40 C.F.R. Part 503 that are under U.S. EPA's enforcement authority.

3.4. Impaired Water Bodies on the CWA section 303(d) List

Section 303(d) of the federal CWA requires states to identify waterbodies that do not meet water quality standards and are not supporting their beneficial uses after implementation of technology-based effluent limitations on point sources. Each state must submit an updated list, the 303(d) List of Impaired Waterbodies every two years. In addition to identifying the waterbodies that are not supporting beneficial uses, the 303(d) list also identifies the pollutant or stressor causing impairment and establishes a schedule for developing a control plan to address the impairment. The CWA requires development of a total maximum daily load (TMDL) or alternate program of implementation for each 303(d) listed pollutant and water body to remedy the impairment. TMDLs establish the maximum quantity of a given pollutant that can be added to a water body from all sources without exceeding the applicable water quality standard for that pollutant and determine wasteload allocations (the portion of a TMDL allocated to existing and future point sources) and load allocations (the portion of a TMDL attributed to existing and future nonpoint sources).

On June 9, 2021, the U.S. EPA provided final approval of the 2018 303(d) list of impaired water bodies prepared by the state. The Pacific Ocean, in the vicinity of the discharge, is not listed as an impaired waterbody on the 303(d) list.

3.5. Other Plans, Polices and Regulations

3.5.1. On December 6, 2022, the State Water Board adopted State Water Board Order No. WQ 2022-0103-DWQ, Statewide Waste Discharge Requirements, General Order for Sanitary Sewer Systems (Sanitary Sewer General Order). This Order became effective on June 5, 2023, and replaced Order No. 2006-0003-DWQ and all associated amendments thereof. Order No. 2022-0103-DWQ requires that all public agencies that currently own or operate sanitary sewer systems electronically certify the Continuation of Existing Coverage form in the CIWQS Sanitary Sewer System Database within 60 days prior to the effective date of the Sanitary Sewer General Order. The Permittee certified their existing coverage and is subject to the requirements of Order No. 2022-0103-DWQ and any future revisions thereto for operation of its wastewater collection system.

3.5.2. All areas within the Facility drain to the headworks. State Water Board Water Quality Order No. 2014-0057-DWQ, NPDES General Permit No. CAS000001, General Permit for Storm Water Discharges Associated with Industrial Activities (Industrial Storm Water General Permit) does not require facilities to obtain coverage if storm water is captured and treated and/or disposed of within the facility's NPDES permitted process wastewater or if storm water is disposed of evaporation ponds, percolation ponds, or combined sewer systems. Therefore, coverage under the Industrial Storm Water General Permit is not required for this Facility.

4. RATIONALE FOR EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS

The CWA requires point source dischargers to control the amount of conventional, non-conventional, and toxic pollutants that are discharged into the waters of the United States. The control of pollutants discharged is established through effluent limitations and other requirements in NPDES permits.

There are two principal bases for effluent limitations in the Code of Federal Regulations: 40 C.F.R. section 122.44(a) requires that permits include applicable technology-based limitations and standards; and 40 C.F.R. section 122.44(d) requires that permits include water quality-based effluent limitations (WQBELs) to attain and maintain applicable numeric and narrative water quality criteria to protect the beneficial uses of the receiving water where a reasonable potential to exceed those criteria exists.

4.1. Discharge Prohibitions

4.1.1. **Discharge Prohibition 3.1.** The discharge of any waste not disclosed by the Permittee or not within the reasonable contemplation of the Regional Water Board is prohibited.

This prohibition has been retained from Order No. R1-2017-0002 and is based on the Basin Plan and State Water Board Order No. WQO 2002-0012 regarding the petition of WDRs Order No. 01-072 for the East Bay Municipal Utility District and Bay Area Clean Water Agencies. In State Water Board Order No. WQO 2002-0012, the State Water Board found that this prohibition is acceptable in orders, but should be interpreted to apply only to constituents that are either not disclosed by the Permittee, or are not reasonably anticipated to be present in the discharge but have not been disclosed by the Permittee. It specifically. does not apply to constituents in the discharge that do not have “reasonable potential” to exceed water quality objectives.

The State Water Board has stated that the only pollutants not covered by this prohibition are those which were “*disclosed to the permitting authority and…can be reasonably contemplated.*” [In re the Petition of East Bay Municipal Utilities District et al., (State Water Board, 2002) Order No. WQO 2002-0012, p. 24]. In that Order, the State Water Board cited a case which held the Permittee is liable for the discharge of pollutants “*not within the reasonable contemplation of the permitting authority…whether spills or otherwise*…” [*Piney Run Preservation Assn. v. County Commissioners of Carroll County, Maryland* (4th Cir. 2001) 268 F. 3d 255, 268.] Thus the State Water Board authority provides that, to be permissible, the constituent discharged (1) must have been disclosed by the Permittee and (2) can be reasonably contemplated by the Regional Water Board.

Whether or not the Permittee reasonably contemplates the discharge of a constituent is not relevant. What matters is whether the Permittee disclosed the constituent to the Regional Water Board or whether the presence of the pollutant in the discharge can otherwise be reasonably contemplated by the Regional Water Board at the time of Order adoption.

4.1.2. **Discharge Prohibition 3.2.** Creation of pollution, contamination, or nuisance, as defined by section 13050 of the Water Code is prohibited.

This prohibition has been retained from Order No. R1-2017-0002 and is based on section 13050 of the Water Code and section 5411 of the California Health and Safety Code.

4.1.3. **Discharge Prohibition 3.3.** The discharge of sludge or digester supernatant is prohibited, except as authorized under section 6.3.4.2 of this Order (Sludge Disposal and Handling Requirements).

This prohibition has been retained from Order No. R1-2017-0002 and is based on restrictions on the disposal of sewage sludge found in federal regulations [40 C.F.R. part 503 (Biosolids), Part 527, and Part 258] and title 27 of the CCR.

4.1.4. **Discharge Prohibition 3.4.** The discharge or recycling use of untreated or partially treated waste (receiving a lower level of treatment than described in section 2.1 of the Fact Sheet) from anywhere within the collection, treatment, or disposal systems is prohibited, except as provided for in Attachment D, Standard Provisions 1.7 (Bypass) and 1.8 (Upset).

This prohibition has been retained from Order No. R1-2017-0002 and is based on the Basin Plan to protect the beneficial uses of the receiving water from unpermitted discharges, and the intent of the Water Code sections 13260 through 13264 relating to the discharge of waste to waters of the state without filing for and being issued an Order. This prohibition applies to spills not related to sanitary sewer overflows (SSOs) and other unauthorized discharges of wastewater within the collection, treatment, and disposal facilities. The discharge of untreated or partially treated wastewater from the collection, treatment, or disposal facility represents an unauthorized bypass pursuant to 40 C.F.R. section 122.41(m) or an unauthorized discharge which poses a threat to human health and/or aquatic life, and therefore is explicitly prohibited by this Order.

4.1.5. **Discharge Prohibition 3.5.** The discharge of waste to land that is not owned by the Permittee, governed by City ordinance, or under agreement to use by the Permittee, or for which the Permittee has explicitly permitted such use, is prohibited, except for use for non-structural fire suppression as provided in title 22, sections 60307(a) and 60307(b) of the CCR.

This prohibition is retained from Order No. R1-2017-0002 with minor modifications. Land used for the application of wastewater must be owned by

the Permittee or be under the control of the Permittee by contract so that the Permittee maintains a means for ultimate disposal of treated wastewater.

4.1.6. **Discharge Prohibition 3.6.** The discharge of waste at any point not described in Finding 2.2 of the Fact Sheet or authorized by a permit issued by the State Water Board or another Regional Water Board is prohibited.

This prohibition is retained from Order No. R1-2017-0002. This prohibition is a general prohibition that allows the Permittee to discharge waste only in accordance with WDRs. It is based on sections 301 and 402 of the federal CWA and section 13263 of the Water Code.

4.1.7. **Prohibition 3.7.** The average dry weather flow of waste through the Facility shall not exceed 1.86 mgd, measured daily and averaged over a calendar month. The peak daily wet weather flow of waste through the Facility shall not exceed 6.12 mgd, measured daily. Compliance with this prohibition shall be determined as defined in sections 7.10 and 7.11 of this Order.

The prohibition is retained from Order No. R1-2017-0002. These prohibitions are based on the average dry weather and peak wet weather discharge treatment capacity of the Facility. Exceedance of this capacity on a daily basis may result in effluent violations and/or the need to by-pass untreated effluent blended with treated effluent, which is prohibited.

4.1.8. **Prohibition 3.8.** The discharge of any radiological, chemical, or biological warfare agent or high-level radioactive waste into waters of the state is prohibited.

This prohibition is retained from Order No. R1-2017-0002 and is based on the discharge prohibitions contained in section III.I of the Ocean Plan and section 13375 of the Water Code.

4.1.9. **Prohibition 3.9.** The discharge of sludge directly into the ocean or into a waste stream that discharges to the ocean is prohibited.

This prohibition is retained from Order No. R1-2017-0002 and is based on the discharge prohibitions contained in section III.I of the 2019 Ocean Plan.

4.1.10. **Prohibition 3.10.** The by-passing of untreated wastes containing concentrations of pollutants in excess of those of Ocean Plan Tables 3 and 4 (2019) is prohibited.

This prohibition is retained from Order No. R1-2017-0002 and is based on the discharge prohibitions contained in section III.I. of the Ocean Plan.

4.1.11. **Prohibition 3.11.** The acceptance of septage to a location other than an approved septage receiving station is prohibited.

This prohibition is retained from Order No. R1-2017-0002 and is necessary to ensure that the Permittee is aware of all discharges of septage into the treatment system so that pollutants associated with domestic septage do not pass through or interfere with the operation or performance of the Facility.

4.2. **Technology-Based Effluent Limitations**

4.2.1. **Scope and Authority**

Section 301(b) of the CWA and implementing U.S. EPA permit regulations at 40 C.F.R. section 122.44 require that permits include conditions meeting applicable technology-based requirements at a minimum, and any more stringent effluent limitations necessary to meet applicable water quality standards. The discharge authorized by this Order must meet minimum federal technology-based requirements based on Secondary Treatment Standards at 40 C.F.R. part 133 and/or Best Professional Judgment (BPJ) in accordance with 40 C.F.R. section 125.3.

In addition, 40 C.F.R. section 122.45(d)(2) states that technology-based permit limits shall be stated as average weekly and average monthly discharge limitations, unless impracticable, for POTWs. 40 C.F.R. section 103.102 provides detailed specifications for establishing effluent limitations for the technology-based constituents, BOD_5, TSS, and pH. Effluent limitations for BOD_5, TSS, and pH in section 4.1, Effluent Limitations, of this Order were established as required by 40 C.F.R. section 103.102 and have been retained in this Order.

Regulations promulgated in 40 C.F.R. section 125.3(a)(1) require technology-based effluent limitations for municipal dischargers to be placed in NPDES permits based on Secondary Treatment Standards or Equivalent to Secondary Treatment Standards.

The Federal Water Pollution Control Act Amendments of 1972 (PL 92-500) established the minimum performance requirements for POTWs [defined in section 304(d)(1)]. Section 301(b)(1)(B) of that Act requires that such treatment works must, as a minimum, meet effluent limitations based on secondary treatment as defined by the U.S. EPA Administrator.

Based on this statutory requirement, U.S. EPA developed secondary treatment regulations, which are specified in 40 C.F.R. part 133. These technology-based regulations apply to all municipal wastewater treatment plants and identify the minimum level of effluent quality attainable by secondary treatment in terms of BOD5, TSS, and pH, as follows:

4.2.1.1. **BOD_5 and TSS**

4.2.1.1.1. The 30-day average shall not exceed 30 mg/L.

4.2.1.1.2. The 7-day average shall not exceed 45 mg/L.

4.2.1.1.3. The 30-day average percent removal shall not be less than 85%.

4.2.1.2. **pH**

4.2.1.2.1. The pH shall be maintained within the limits of 6.0 to 9.0.

4.2.1.2.2. The effluent limitation for pH is also required to meet the water quality objective for hydrogen ion concentration (pH) contained in the Basin Plan, Table 3-1.

In addition, 40 C.F.R. section 122.45(f) requires the establishment of mass-based effluent limitations for all pollutants limited in Orders, except for 1) pH, temperature, radiation, or other pollutants, which cannot be appropriately expressed by mass, 2) when applicable standards and limitations are expressed in terms of other units of measure.

4.2.2. **Applicable Technology-Based Effluent Limitations**

4.2.2.1. **Secondary Treatment Standards (BOD_5, TSS, and pH).** As described above, the secondary treatment standards at 40 C.F.R. part 133 establish the minimum level of effluent quality attainable by secondary treatment in terms of BOD_5, TSS, and pH. Numeric effluent limitations for BOD_5, TSS, and pH, including the percent removal requirement for TSS, are retained from Order No. R1-2017-0002 and reflect the secondary treatment standards at 40 C.F.R. part 133.

4.2.2.2. **Ocean Plan Table 4 Effluent Limitations (Ammonia, Oil and Grease, TSS, Settleable Solids, Turbidity, and pH).** The State Water Board, in Table 4 of the Ocean Plan, has established technology-based requirements for oil and grease, TSS, settleable solids, turbidity, and pH. Table 4 effluent limitations apply to POTWs, and also to industrial discharges for which Effluent Limitations Guidelines have not been established pursuant to Sections 301, 302, 304, or 306 of the federal CWA. Compliance with Table 4 effluent limitations shall be the minimum level of treatment acceptable under the Ocean Plan, and shall define reasonable treatment and waste control technology. The Facility is a POTW; therefore, technology-based limitations contained in Table 4 of the Ocean Plan are applicable to the Permittee.

Consistent with Order No. R1-2017-0002, this Order includes effluent limitations for oil and grease, settleable solids, turbidity, and pH based on Table 4 of the Ocean Plan.

The percent removal requirements for TSS in the secondary treatment requirements (i.e., 85 percent) are more stringent than the percent removal requirements in Table 4 of the Ocean Plan (i.e., 75 percent); therefore, consistent with Order No. R1-2017-0002, this Order includes percent removal

requirements for TSS based on the secondary treatment standards at 40 C.F.R. part 133.

4.2.2.3. **Mass-Based Effluent Limitations.** Federal regulations at 40 C.F.R. section 122.45(f) require that, except under certain conditions, all permit limits, standards, or prohibitions be expressed in terms of mass units. Among the conditions exempting the application of mass-based limitations is section 40 C.F.R. section 122.45(f)(1)(i), which states "for pH, temperature, and radiation, or other pollutants which cannot appropriately be expressed by mass" and 40 C.F.R. section 122.45(f)(1)(ii), which states "when applicable standards and limitations are expressed in terms of other units of measure."

This Order does not include mass-based effluent limitations for the following pollutants pursuant to the exception in 40 C.F.R, section 122.45(f)(1)(i) and (ii):

4.2.2.3.1. Settleable solids, turbidity, and pH because these parameters cannot appropriately be expressed by mass; and

4.2.2.3.2. Oil and grease, because the applicable standards for oil and grease in Table 4 of the Ocean Plan are expressed in terms of concentration.

4.2.2.3.3. BOD_5 and TSS, because these two parameters are expressed in terms of concentration and percent removal; and

4.3. Water Quality-Based Effluent Limitations (WQBELs)

4.3.1. Scope and Authority

CWA Section 301(b) and 40 C.F.R. section 122.44(d) require that permits include limitations more stringent than applicable federal technology-based requirements where necessary to achieve applicable water quality standards.

Section 122.44(d)(1)(i) of 40 C.F.R. requires that permits include effluent limitations for all pollutants that are or may be discharged at levels that have the reasonable potential to cause or contribute to an exceedance of a water quality standard, including numeric and narrative objectives within a standard. Where reasonable potential has been established for a pollutant, but there is no numeric criterion or objective for the pollutant, water quality-based effluent limitations (WQBELs) must be established using: (1) U.S. EPA criteria guidance under CWA section 304(a), supplemented where necessary by other relevant information; (2) an indicator parameter for the pollutant of concern; or (3) a calculated numeric water quality criterion, such as a proposed state criterion or policy interpreting the state's narrative criterion, supplemented with other relevant information, as provided in section 122.44(d)(1)(vi).

The process for determining reasonable potential and calculating WQBELs when necessary is intended to protect the designated uses of the receiving

water as specified in the Basin Plan, and achieve applicable water quality objectives and criteria that are contained in other state plans and policies, or any applicable water quality criteria contained in the Ocean Plan.

4.3.2. Applicable Beneficial Uses and Water Quality Criteria and Objectives

4.3.2.1. **Beneficial Uses.** Beneficial use designations for receiving waters for discharges from the Facility are presented in section 3.3.1 and 3.3.3 of this Fact Sheet.

4.3.2.2. **Ocean Plan Water Quality Objectives.** Water quality criteria applicable to ocean waters of the Region are established by the Ocean Plan, which includes general provisions and water quality objectives for bacterial characteristics, physical characteristics, chemical characteristics, biological characteristics, and radioactivity. These water quality objectives from the Ocean Plan are incorporated as receiving water limitations in section 5.1 of the Order. Table 3 of the Ocean Plan contains numeric water quality objectives for 83 toxic pollutants for the protection of marine aquatic life and human health. Pursuant to NPDES regulations at 40 C.F.R. section 122.44(d)(1), and in accordance with procedures established by the Ocean Plan, the Regional Water Board has performed an Ocean Plan reasonable potential analysis (RPA) to determine the need for effluent limitations for the Table 3 toxic pollutants.

4.3.2.3. **Minimum Initial Dilution.** In accordance with the Ocean Plan, WQBELs reflect the minimum initial dilution of the effluent as it reaches the receiving water. The minimum initial dilution can be estimated by experimental observation (e.g., dye studies, etc.) and/or computer simulation. The Ocean Plan requires that dilution estimates be based on the assumption of no currents; unless an alternative method of calculating dilution is found to be acceptable to the Regional Water Board. For the purpose of this and previous Orders, minimum initial dilution was determined with a dye study in 1982 and a mixing model in 2004 to conservatively estimate dilution in the rocky slot where the Permittee's ocean outfall discharges.

The dilution evaluation is described in a March 26, 2004, Brown and Caldwell Technical Memorandum with the subject line "Slot Dilution Model". This Technical Memorandum describes a flushing model developed by Brown and Caldwell to evaluate and determine dilution in the rocky slot by modeling mixing that results from wave action within the rocky slot. The model also considered median wind velocities to estimate a re-entrainment factor for previously mixed effluent that could wash back into the slot. Water within the slot was assumed to be completely mixed by the action of breaking waves. The Technical Memorandum also summarizes the results of the model and dilution ratio calculations and provides calibration against the results of the 1982 dye study to verify the adequacy of the model. The results of this evaluation were used to reduce the dilution ratio from 50:1 (the dilution ratio

granted in Orders prior to 2006) to 29:1. The 29:1 dilution ratio is conservatively based on a maximum daily flow of 9.9 mgd, the Permittee's projected 2027 maximum daily design flow. Between May 2011 and September 2016, the Permittee's maximum daily flow was 6.2 mgd, calculated as an average over a 24-hour period. The maximum daily flow is not expected to increase above 9.9 mgd by 2027 based on population estimates. The Regional Water Board finds that the 29:1 dilution ratio is valid for use in this Order because the Permittee's discharge is well under the flows used for estimating the dilution ratio.

This Order uses a minimum initial dilution of 29:1 (i.e., 29 parts ocean water to 1 part effluent) for its reasonable potential analysis and effluent limitation calculations.

4.3.3. **Determining the Need for WQBELs**

NPDES regulations at 40 C.F.R. section 122.44 (d) require effluent limitations to control all pollutants which are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any state water quality standard.

4.3.3.1. **Ocean Plan Reasonable Potential Analysis (RPA).** Procedures for performing an RPA for ocean dischargers are described in Section III.C. and Appendix VI of the Ocean Plan. In general, the procedure is a statistical method that projects an effluent data set while taking into account the averaging period of water quality objectives, the long term variability of pollutants in the effluent, limitations associated with sparse data sets, and uncertainty associated with censored data sets. The procedure assumes a lognormal distribution of the effluent data set, and compares the 95th percentile concentration at 95 percent confidence of each Table 3 pollutant, accounting for dilution, to the applicable water quality criterion. The RPA results in one of three following endpoints.

Endpoint 1 – There is "reasonable potential," and a WQBEL and monitoring are required.

Endpoint 2 – There is "no reasonable potential." WQBELs are not required, and monitoring is required at the discretion of the Regional Water Board.

Endpoint 3 – The Ocean Plan RPA is inconclusive. Existing WQBELs are retained, and monitoring is required.

The State Water Resources Control Board has developed a reasonable potential calculator, which is available at on the State Water Board's webpage (http://www.waterboards.ca.gov/plnspols/docs/oplans/rpcalc.zip). The calculator (RPcalc 2.2) was used in conducting the RPA and considers several pathways in the determination of reasonable potential.

4.3.3.1.1. **First Path**

If available information about the receiving water or the discharge supports a finding of reasonable potential without analysis of effluent data, the Regional Water Board may decide that WQBELs are necessary after a review of such information. Such information may include: the facility or discharge type, solids loading, lack of dilution, history of compliance problems, potential toxic effects, fish tissue data, 303(d) status of the receiving water, or the presence of threatened or endangered species or their critical habitat, or other information.

4.3.3.1.2. **Second Path**

If any pollutant concentration, adjusted to account for dilution, is greater than the most stringent applicable water quality objective, there is reasonable potential for that pollutant.

4.3.3.1.3. **Third Path**

If the effluent data contains three or more detected and quantified values (i.e., values that are at or above the ML), and all values in the data set are at or above the ML, a parametric RPA is conducted to project the range of possible effluent values. The 95th percentile concentration is determined at 95 percent confidence for each pollutant and compared to the most stringent applicable water quality objective to determine reasonable potential. A parametric analysis assumes that the range of possible effluent values is distributed log normally. If the 95th percentile value is greater than the most stringent applicable water quality objective, there is reasonable potential for that pollutant.

4.3.3.1.4. **Fourth Path**

If the effluent data contains three or more detected and quantified values (i.e., values that are at or above the ML), but at least one value in the data set is less than the ML, a parametric RPA is conducted according to the following steps.

4.3.3.1.4.1. If the number of censored values (those expressed as a “less than” value) account for less than 80 percent of the total number of effluent values, calculate the ML (the mean of the natural log of transformed data) and SL (the standard deviation of the natural log of transformed data) and conduct a parametric RPA, as described above for the Third Path.

4.3.3.1.4.2. If the number of censored values accounts for 80 percent or more of the total number of effluent values, conduct a non-parametric RPA, as described below for the Fifth Path. (A non-parametric analysis becomes necessary when the effluent data is limited, and no assumptions can be made regarding its possible distribution.)

4.3.3.1.5. **Fifth Path**

A non-parametric RPA is conducted when the effluent data set contains less than three detected and quantified values, or when the effluent data set contains three or more detected and quantified values but the number of censored values accounts for 80 percent or more of the total number of effluent values. A non-parametric analysis is conducted by ordering the data, comparing each result to the applicable water quality objective, and accounting for ties. The sample number is reduced by one for each tie, when the dilution adjusted method detection limit (MDL) is greater than the water quality objective. If the adjusted sample number, after accounting for ties, is greater than 15, the pollutant has no reasonable potential to exceed the water quality objective. If the sample number is 15 or less, the RPA is inconclusive, monitoring is required, and any existing effluent limitations in the expiring permit are retained.

4.3.3.2. **Reasonable Potential Determination**

The RPA for the effluent was conducted using effluent monitoring data generated from annual monitoring events for all Ocean Plan Table 3 parameters in October 2018, October 2019, October 2020, October 2021, and October 2022 and from routine monitoring events conducted between January 2018 through February 2023 for ammonia, copper, nickel, chlorine residual, dieldrin, TCDD equivalents, ammonia, and chronic toxicity as required by the Monitoring and Reporting Program for Order No. R1-2017-0002. Results from the RPA have been used to determine the need for effluent limitations for Table 3 parameters given in the Ocean Plan.

For the RPA conducted for this permit renewal, pollutant concentrations were adjusted to account for the calculated initial dilution of 29 parts seawater per part wastewater. The adjustment for dilution is consistent with previous orders for this Facility.

The table below identifies the RPA endpoint for each Table 3 parameter detected in the effluent and shows the analysis reached an Endpoint 3 for most of the parameters analyzed. An Endpoint 3 RPA is inconclusive and results when a majority of the effluent data is reported as ND (not detected). In these circumstances, the Regional Water Board views the “inconclusive” result as an indication of no concern for a particular pollutant; however, additional monitoring will be required for those parameters during the term of the permit.

The RPA conducted for the Facility demonstrated reasonable potential (Endpoint 1) for discharges from the Facility to cause or contribute to exceedances of applicable water quality criteria for ammonia, chlorine residual, copper, DDT, endosulfan, endrin, heptachlor, and silver.

Order No. R1-2017-0002 established effluent limitations for dieldrin based on the numeric water quality criteria from the Ocean Plan. As shown in the table below, the RPA conducted for the Facility was inconclusive (Endpoint 3) for dieldrin. For RPA results of Endpoint 3, the Ocean Plan specifies that existing effluent limitations for the pollutant shall remain in the permit. Therefore, this Order retains the effluent limitations for dieldrin from Order No. R1-2017-0002.

The following table summarizes the RPA for each priority pollutant that was reported in detectable concentrations in the effluent. The MECs, most stringent water quality objectives (WQO), and background concentrations (B) used in the RPA are presented, along with the RPA results for each toxic pollutant analyzed. No other pollutants with applicable numeric water quality criteria from the Ocean Plan were measured above detectable concentrations or analyzed for during the monitoring events conducted by the Permittee.

Attachment F-1 to this Order summarizes the RPA for all priority toxic pollutants with water quality criteria/objectives that are applicable to the Pacific Ocean.

Table F-5. Summary of Reasonable Potential Analysis Results

Table 3 Pollutant	Most Stringent WQO (µg/L)	No. of Samples	No. of Non-Detects	Background Conc. (µg/L) Cs[1]	Max Effluent Conc. (µg/L) Ce	Calculated Max Conc. (µg/L)[2] X-obs	RPA Results, Comment[3]
Arsenic	8	12	7	3	82.6	5.6533	Endpoint 2
Cadmium	1	12	7	0	15.5	0.5167	Endpoint 2
Chromium VI	2	5	3	0	6.3	0.21	Endpoint 3
Copper	3	71	2	2	1080	37.9333	Endpoint 1
Nickel	5	71	8	0	116	3.8667	Endpoint 2
Silver	0.7	12	7	0.16	139	4.7880	Endpoint 1
Zinc	20	12	0	8	311	18.1000	Endpoint 2
Cyanide	1	11	10	0	1.2	0.04	Endpoint 3
Total Chlorine Residual	2	1855	1849	0	15000	500	Endpoint 1
Ammonia (as N)	600	538	0	0	33300	1110	Endpoint 1
Endosulfan	0.009	12	10	0	0.32	0.0107	Endpoint 1
Endrin	0.002	12	10	0	2.84	0.0947	Endpoint 1
Antimony	1200	5	4	0	21	0.700	Endpoint 3
Chromium (III)	190000	5	4	0	1.75	0.0583	Endpoint 3
Toluene	85000	5	0	0	7.69	0.2563	Endpoint 2
Bis(2-ethlyhexyl) Phthalate	3.5	12	9	0	7.7	0.2567	Endpoint 2

Table 3 Pollutant	Most Stringent WQO (µg/L)	No. of Samples	No. of Non-Detects	Background Conc. (µg/L) Cs[1]	Max Effluent Conc. (µg/L) Ce	Calculated Max Conc. (µg/L)[2] X-obs	RPA Results, Comment[3]
Chloroform	130	5	0	0	2.44	0.0813	Endpoint 2
DDT	0.00017	12	10	0	0.21	0.007	Endpoint 1
Dieldrin	0.00004	12	12	0	<0.0048	<0.0002	Endpoint 3[4]
Heptachlor	0.00005	12	11	0	0.14	0.0047	Endpoint 1
TCDD equivalents	3.9E-09	5	0	0	9.34E-08	3.10E-09	Endpoint 2

Table Notes:

1. Background (Cs) is zero (0) for all pollutants except those with background concentrations specified in Table 5 of the Ocean Plan.
2. Represents the maximum concentration after complete mixing, calculated according to Step 4 of Appendix VI of the Ocean Plan using the permitted dilution ratio (Dm) of 35 as follows: X-obs = (Ce + Dm * Cs)/(Dm + 1), unless otherwise noted. The calculated maximum concentration is compared to the most stringent water quality objective to determine if effluent limitations are required. Effluent limitations are then calculated as described in Fact Sheet section 4.3.4, below.
3. RPA Results:

   Endpoint 1 = An effluent limitation must be developed for the pollutant. Monitoring is required.

   Endpoint 2 = An effluent limitation is not required for the pollutant. Monitoring may be required as appropriate.

   Endpoint 3 = RPA is inconclusive. Less than 3 detects or greater than 80% ND.
4. The Effluent Limitation for dieldrin shall be retained from Order No. R1-2017-0002, as suggested for an Endpoint 3 result, per the Ocean Plan.

4.3.3.3. Non-Table 3 Water Quality Objectives

4.3.3.3.1. Bacteria (Fecal Coliform Bacteria, Enterococci, and Total Coliform Bacteria)

The Ocean Plan was amended in 2019 to revise the bacterial objectives for ocean waters used for water contact recreation and shellfish harvesting. Receiving water limitations based on the revised objectives in the Ocean Plan have been established in this Order, as further discussed in sections 4.3.3.3.2.1 and 4.3.3.2.2, below. Receiving water monitoring data between April 2017 and January 2023 demonstrates that water quality objectives for bacteria are regularly exceeded, thus effluent limitations for bacteria are necessary to protect the water contact recreation and shellfish harvesting beneficial uses of the receiving water.

4.3.3.3.1.1. Water Contact Standards (Fecal Coliform and Enterococci)

The Ocean Plan includes bacterial standards for fecal coliform bacteria and enterococci for protection of ocean waters used for water contact recreation. The enterococci objectives are based on an estimated illness rate of 32 per 1,000 primary contact recreators in U.S. EPA's 2012 Recreational Water Quality Criteria. The fecal coliform objectives were retained in the Ocean Plan, in addition to the enterococci objectives, based on California-specific epidemiological studies that suggest fecal coliform may be a better indicator of gastrointestinal illness than enterococci during certain types of exposure and environmental conditions. As a result, both objectives for enterococci and fecal coliform are applicable.

The water contact standards must be met within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline. The Facility's outfall structure consists of a 24-inch ductile iron pipe and discharges into a rocky slot in the surf zone adjacent to Battery Point Lighthouse and public access to offshore areas surrounding the Facility's outfall is open and unrestricted. Therefore, the water contact standards are applicable to the receiving water in the vicinity of the outfall.

Although the Facility provides disinfection, inadequate or incomplete disinfection of municipal wastewater creates the potential for pathogens to be discharged. Therefore, the Regional Water Board finds the discharge has reasonable potential for pathogens and WQBELs are required.

New effluent limitations for fecal coliform and enterococci bacteria at Discharge Point 001, described below, are included in this Order.

Because receiving water bacterial monitoring has demonstrated regular exceedances of water quality objectives for bacteria, the Permittee is required to meet the most stringent water quality standards for water contact recreation at the end of the discharge outfall:

4.3.3.3.1.1.1. **Enterococci**

4.3.3.3.1.1.1.1. The 6-week rolling geometric mean of enterococci shall not exceed 30 colony forming units (CFU) per 100 mL; and

4.3.3.3.1.1.1.2. No sample shall exceed a CFU of 110 per 100 mL.

4.3.3.3.1.1.2. **Fecal Coliform**

4.3.3.3.1.1.2.1. The 30-day geometric mean of fecal coliform density not to exceed 200 per 100 mL;

4.3.3.3.1.1.2.2. No single sample shall exceed an MPN of 400 per 100 mL.

4.3.3.3.1.2. **Shellfish Standards (Total Coliform Bacteria)**

The Ocean Plan includes bacterial standards for total coliform bacteria for protection of ocean waters used for water contact recreation. Shellfish harvesting standards for total coliform bacteria must be maintained throughout the water column. The median concentration of total coliform bacteria shall not exceed an MPN of 70 organisms per 100 mL in a calendar month; and not more than 10 percent of samples shall exceed an MPN of 230 organisms per 100 mL.

Regional Water Board staff has determined that there is a reasonable potential that the discharge can cause or contribute to exceedances of bacterial water quality objectives for shellfish harvesting. This determination is based on the following factors:

4.3.3.3.1.2.1. The Ocean Plan specifies that shellfish standards shall be maintained through the water column (i.e., without dilution credit).

4.3.3.3.1.2.2. Total coliform bacteria have been shown to be present in the receiving water. For the period from April 2017 through January 2023, the maximum reported receiving water concentration of total coliform was 2,400 MPN/100 mL at Monitoring Location RSW-001.

4.3.3.3.1.2.3. Effluent water monitoring data for total coliform are not available to evaluate cause and culpability of receiving water quality objective exceedances, and

4.3.3.3.1.2.4. Public access to offshore areas surrounding the Facility's outfall is open and unrestricted. Members of the public wishing to harvest shellfish in

the area can approach by boat and collect shellfish in accordance with state regulations.

4.3.3.3.1.3. New effluent limitations for total coliform bacteria at Discharge Point 001, described below, are included in this Order. Because receiving water bacterial monitoring has demonstrated regular exceedances of water quality objectives for bacteria, the Permittee is required to meet the applicable water quality standards for shellfish harvesting at the end of the discharge outfall.

4.3.3.3.1.3.1. **Total Coliform**

4.3.3.3.1.3.1.1. The median concentration shall not exceed an MPN of 70 organisms per 100 mL in a calendar month.

4.3.3.3.1.3.1.2. Not more that 10 percent of the samples shall exceed an MPN of 230/100 mL. Although the Ocean Plan specifies compliance with this objective using the results of 10 consecutive samples, this Order applies the limitation as a single sample limitation for ease of determining compliance with the limitation.

4.3.4. WQBEL Calculations

Based on results of the RPA, performed in accordance with methods of the Ocean Plan for discharges to the Pacific Ocean, the Regional Water Board is establishing WQBELs for ammonia, copper, silver, chlorine residual, endosulfan, endrin, DDT, dieldrin, heptachlor, and TCDD equivalents, at Discharge Point No. 001.

As described by Section III.C of the Ocean Plan, effluent limits for Table 3 pollutants are calculated according to the following equation.

$$Ce = Co + Dm (Co – Cs)$$

Where …

Ce = the effluent limitation (µg/L)

Co = the concentration (the water quality objective) to be met at the completion of initial dilution (µg/L)

Cs = background seawater concentration (µg/L)

Dm = minimum probable initial dilution expressed as parts seawater per part wastewater (here, Dm = 29)

For the Facility, the Dm of 29 is retained from Order No. R1-2017-0002. Initial dilution is the process that results in the rapid and irreversible turbulent mixing of

wastewater with ocean water around the point of discharge. In accordance with Table 3 implementing procedures, Cs equals zero for all parameters, except the following:

Table F-6. Background Seawater Concentrations – Ocean Plan

Pollutant	Background Seawater Concentration (µg/L)
Arsenic	3
Copper	2
Mercury	0.0005
Silver	0.016
Zinc	8

Applicable water quality objectives from Table 3 of the Ocean Plan are as follows.

Table F-7. Water Quality Objectives – Ocean Plan

Pollutant	Units	6-Month Median	Daily Maximum	Instantaneous Maximum	30-Day Average
Ammonia	(µg/L)	600	2400	6000	--
Copper	(µg/L)	3	12	30	--
Silver	(µg/L)	0.7	2.8	7	--
Total Residual Chlorine	(µg/L)	2	8	60	--
Endosulfan	(µg/L)	0.009	0.018	0.027	--
Endrin	(µg/L)	0.002	0.002	0.006	--
DDT	(µg/L)	--	--	--	0.00017
Dieldrin	(µg/L)	--	--	--	0.00004
Heptachlor	(µg/L)	--	--	--	0.00005
TCDD Equivalents	(µg/L)	--	--	--	3.9×10^{-7}

Using the equation, Ce = Co + Dm (Co – Cs), effluent limitations are calculated as follows. Here, Dm is equal to 29 for each effluent limitation calculation. The effluent limitations established in this Order have been rounded to two significant figures.

Ammonia

Ce = (600 + 29 (600-0))/1000 = 18 mg/L (6-Month Median)

Ce = (2400 + 29 (2400-0))/1000 = 72 mg/L (Daily Maximum)

Ce = (6000 + 29 (6000-0))/1000 = 180 mg/L (Instantaneous Maximum)

Copper

Ce = 3 + 29 (3 – 2) = 32 µg/L (6-Month Median)

Ce = 12 + 29 (12 – 2) = 300 µg/L (Daily Maximum)

Ce = 30 + 29 (30 – 2) = 840 µg/L (Instantaneous Maximum)

Silver

Ce = 0.7 + 29 (0.7 – 0) = 16 µg/L (6-Month Median)

Ce = 2.8 + 29 (2.8 – 0) = 79 µg/L (Daily Maximum)

Ce = 7 + 29 (7 – 0) = 200 µg/L (Instantaneous Maximum)

Total Residual Chlorine

Ce = 2 + 29 (2 – 0) = 60 µg/L (6-Month Median)

Ce = 8 + 29 (8 – 0) = 240 µg/L (Daily Maximum)

Ce = 60 + 29 (60 – 0) = 1,800 µg/L (Instantaneous Maximum)

Endosulfan

Ce = 0.009* + 29 (0.009 – 0) = 0.27 µg/L (6-Month Median)

Ce = 0.018 + 29 (0.018 – 0) = 0.54 µg/L (Daily Maximum)

Ce = 0.027 + 29 (0.027 – 0) = 0.81 µg/L (Instantaneous Maximum)

Endrin

Ce = 0.002 + 29 (0.002 – 0) = 0.06 µg/L (6-Month Median)

Ce = 0.004 + 29 (0.004 – 0) = 0.12 µg/L (Daily Maximum)

Ce = 0.006 + 29 (0.006 – 0) = 0.18 µg/L (Instantaneous Maximum)

DDT

Ce = 0.00017 + 29 (0.00017 – 0) = 0.0051 µg/L (30-day Average)

Dieldrin

Ce = 0.00004 + 29 (0.00004 – 0) = 0.0012 µg/L (30-day Average)

Heptachlor

Ce = 0.00005 + 29 (0.00005 – 0) = 0.0015 µg/L (30-day Average)

This Order does not include mass-based effluent for the WQBELs because the applicable standards for Table 3 pollutants of the Ocean Plan are expressed in terms of concentration.

4.3.5. **Whole Effluent Toxicity (WET)**

Monitoring triggers for chronic toxicity protect the receiving water from the aggregate effect of a mixture of pollutants that may be present in effluent. There are two types of WET tests – acute and chronic. An acute toxicity test is conducted over a short time period and measures mortality. A chronic test is conducted over a longer period of time and may measure mortality, reproduction, and/or growth.

WET requirements are derived from the CWA and the Basin Plan. The Basin Plan establishes a narrative water quality objective for toxicity that states "*All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, or aquatic life.*" Detrimental responses may include, but are not limited to, decreased growth rate, decreased reproductive success of resident or indicator species, and/or significant alterations in population, community ecology, or receiving water biota. For compliance with the Basin Plan's narrative toxicity objective, this Order requires the Permittee to conduct WET testing for chronic toxicity, as specified in the MRP (Attachment E, section 5).

The Permittee conducted chronic toxicity testing using *Macrocystis pyrifera*, *Mytilus spp.* and *Atherinops affinis*. The following table summarizes the chronic toxicity testing results collected between August 2017 and September 2022.

Table F-8. Summary of Chronic Toxicity Results (TUc)

Date	*Macrocystis pyrifera*		*Mytilus spp*	*Atherinops affinis*	
	Germination (TUc)	**Growth (TUc)**	**Larval Development (TUc)**	**Survival (TUc)**	**Growth (TUc)**
08/03/2017	Pass -0.27%	Pass 0.98%	Pass -0.08%	Pass 0.00%	Pass 8.29 %
08/21/2018	--	--	--	Pass -9.52%	Pass -35.92%

Date	*Macrocystis pyrifera*		*Mytilus spp*	*Atherinops affinis*	
	Germination (TUc)	**Growth (TUc)**	**Larval Development (TUc)**	**Survival (TUc)**	**Growth (TUc)**
08/20/2019	--	--	--	Pass 0.00%	Pass 12.43%
08/18/2020	--	--	--	Pass 0.00%	Pass 1.50 %
08/17/2021	--	--	--	Pass 0.00%	Pass -11.72%
09/13/2022	--	--	--	Pass -9.13%	Pass -3.00%

The Ocean Plan contains toxicity testing requirements based on minimum initial dilution (Dm) factors in section III.C.4.c. Following the implementation procedures of the Ocean Plan, dischargers with Dm factors that fall below 100:1 are required to conduct chronic toxicity testing. This Order allows for a Dm of 29 for the chronic condition. The RPA conducted for the Facility does not demonstrate reasonable potential (Endpoint 1) for discharges from the Facility to cause or contribute to exceedances of applicable water quality criteria for chronic toxicity. However, the Ocean Plan, Appendix VI, states, “The Regional Water Board may use an alternative approach for assessing reasonable potential such as an appropriate stochastic dilution model that incorporates both ambient and effluent variability. The permit fact sheet or statement of basis will document the justification or basis for the conclusions of the reasonable potential assessment.” As discussed further below, the discharge does not exhibit reasonable potential to cause or contribute to an exceedance of the water quality objective for chronic toxicity based on the Test of Significant Toxicity (TST) approach in National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document (EPA 833-R-10-003, 2010). Therefore, this Order does not contain WET limitations. However, in accordance with the Ocean Plan (section III.C, Implementation Provisions for Table 3), this Order retains chronic toxicity monitoring requirements for the discharge at Discharge Point 001.

4.3.5.1. **Test of Significant Toxicity**

The Ocean Plan establishes a daily maximum chronic toxicity objective of 1.0 TUc = 100/NOEC, using a five-concentration hypothesis test, and a daily maximum acute toxicity objective of 0.3 TUa = 100/LC50, using a point estimate model. In 2010, U.S. EPA endorsed the peer-reviewed Test of Significant Toxicity (TST) two-concentration hypothesis testing approach in National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document (EPA 833-R-10-003, 2010) as an improved

hypothesis-testing tool to evaluate data from U.S. EPA's toxicity test methods. The TST hypothesis testing approach more reliably identifies toxicity—in relation to the chronic (0.25 or more) and acute (0.20 or more) mean responses of regulatory management concern—than the current NOEC hypothesis-testing approach used in the Ocean Plan.

This Order does not include effluent limitations for toxicity based on the TST approach. However, this Order does require the Permittee to monitor and report results in a manner that will allow the Regional Water Board to conduct an RPA in accordance with the TST approach at the time of the next permit renewal.

On December 1, 2020, the State Water Board adopted the Toxicity Provisions, which standardizes the regulation of aquatic toxicity for all non-oceanic surface waters. U.S. EPA's TST approach is an essential component of this adopted toxicity amendment as it forms the basis for utilizing numeric water quality objectives and acts as the primary means of determining compliance with the proposed effluent limitations. U.S. EPA provided its final approval of the Toxicity Provisions on May 1, 2023.

In a letter dated February 12, 2014, the State Water Board submitted an alternative test process (ATP) request to U.S. EPA Region 9 for the statewide use of a two-concentration toxicity test design when using the TST approach. This two-concentration test design is composed of a single effluent concentration and a control concentration. U.S. EPA approved the ATP request on March 17th, 2014. In June 2014, the approval was challenged in court on procedural grounds under the Administrative Procedures Act by the Southern California Alliance of Publicly Owned Treatment Works (SCAP) and the Central Valley Clean Water Association (CVCWA). The U.S. EPA withdrew the approval and notified State Water Board in a memo dated February 11, 2015. In a letter dated November 25, 2020, the State Water Board submitted a new ATP request to U.S. EPA Region 9. At the time this permit is being developed, the State Water Board is awaiting a response from U.S. EPA. The permit may be modified, if necessary, to incorporate new statewide toxicity criteria established by the toxicity amendment.

It is important to note that U.S. EPA's rescission of its approval of the ATP is not based on the substantive TST statistical analysis or the scientific validity of a two-concentration test design. The withdrawal letter also states that currently there is a proposed rulemaking to change the language in the ATP regulations at 40 C.F.R. part 136.

The benefits of requiring the TST in new or amended permits include improving the statistical power of the toxicity test, and simplifying the analysis as compared to the traditional hypothesis statistical approaches or point estimates. The calculations are straightforward and provide a clear pass/fail

result. With the withdrawal of the two-concentration test design approval, an NPDES permit can still require the TST for statistical analyses.

If the two-concentration test design is approved at a future date, the MRP may be modified to remove the need for a five-concentration test. Toxicity tests shall be run using a multi-concentration test design in accordance with 40 C.F.R. section 136.3, and the TST shall be utilized with the biological responses from the permitted in-stream waste concentration (IWC) and the control (effluent concentration of zero). However, even with only two of the five concentration biological responses being used, cost savings in the form of time and effort are still realized for the statistical analysis and data interpretation carried out by the Permittee, lab, and permit manager. This Order requires application of the TST for statistical analysis of whole effluent toxicity data.

Test of Significant Toxicity Design

The TST's null hypothesis for chronic toxicity is:

H_0: Mean response (In-stream Waste Concentration (IWC) in % effluent) ≤ 0.75 mean response (control)

Results are analyzed using the TST approach and an acceptable level of chronic toxicity is demonstrated by rejecting the null hypothesis and reporting "Pass" or "P".

The chronic IWC (in % effluent) for Discharge Point 001 is 3.45%1. The chronic toxicity trigger for Discharge Point 001 is expressed as a null hypothesis (H_0) and regulatory management decision (b value) of 0.75 for the chronic toxicity methods in the MRP. The null hypothesis for this discharge is:

H_0: Mean response (3.45% effluent) ≤ 0.75 mean response (control)

The Permittee conducted chronic toxicity testing at the IWC of 3.45% during the term of Order No. R1-2017-0002. As shown in Table F-8, all chronic toxicity tests collected between August 2017 and September 2022 resulted in "Pass" at the IWC of 3.45%, indicating that the discharge does not exhibit reasonable potential to cause or contribute to an exceedance of water quality objectives for chronic toxicity using the TST approach. Therefore, this Order does not include an effluent limitation for chronic toxicity.

This Order requires annual monitoring for chronic toxicity at Monitoring Location EFF-001. Results shall be analyzed using the TST hypothesis testing approach in section 5.1.6.1 of the MRP. Compliance with this chronic toxicity limitation is demonstrated by rejecting the null hypothesis and reporting "Pass" or "P".

When the chronic toxicity test results in a “Fail” or “F,” the Permittee must initiate accelerated monitoring as specified in the MRP (Attachment E, section 5). After accelerated monitoring, if conditions of chronic toxicity are found to persist, the Permittee will be required to conduct a TRE, as described in section 5.2 of the MRP.

Notification requirements for chronic WET testing include a 72-hour verbal notification requirement and a 14-day written report requirement, if test results indicate toxicity. The 14-day written notification is established in the U.S. EPA WET Guidance documents cited in the MRP. The 72-hour verbal notification requirement is being added to provide the Regional Water Board with knowledge of the toxicity in advance of the written report. The 72-hour requirement is intended to give the Permittee sufficient time to make a telephone call to Regional Water Board staff and accounts for non-working days (e.g., weekends). Verbal notification of WET test exceedances may be left by voice mail if the Regional Water Board staff person is not immediately available by telephone.

This Order retains the requirement for the Permittee to conduct a screening test using at least one vertebrate, invertebrate, and plant species. After the screening test is completed, monitoring can be reduced to the most sensitive species.

Chronic WET limitations will be established if future monitoring results demonstrate that discharges from the Facility are causing or contributing to chronic toxicity in the receiving water.

4.4. Final Effluent Limitation Considerations

4.4.1. Anti-Backsliding Requirements

Sections 402(o) and 303(d)(4) of the CWA and federal regulations at 40 C.F.R. section 122.44(l) prohibit backsliding in NPDES permits. These anti-backsliding provisions require effluent limitations in a reissued permit to be as stringent as those in the previous permit, with some exceptions where limitations may be relaxed. The effluent limitations in this Order are at least as stringent as the effluent limitations in the previous Order, with the exception of mass-based effluent limitations for BOD_5 and TSS, and effluent limitations for nickel and TCDD equivalents, as explained below.

Order No. R1-2017-0002 established final mass-based effluent limitations for BOD_5 and TSS. Historically, the Regional Water Board routinely incorporated mass-based limits (in addition to concentration-based limits) for BOD_5 and TSS in NPDES permits to encourage correction of I&I. Applied in this way, mass-based limitations effectively restrict a POTW’s wet weather influent flows to less than or equal to the Facility’s design capacity in situations where POTWs experience excessive I&I as a result of climate conditions and/or aging

infrastructure. The application of mass-based effluent limitations for BOD_5 and TSS is not necessary to limit wet weather inflow to the Facility because the Order includes flow limitations (Discharge Prohibition 3.7) that require the Permittee to control influent flow to stay below the design capacity of the Facility.

Mass limitations for BOD_5 and TSS for discharges of treated wastewater have been removed because Regional Water Board staff misinterpreted the exception of 40 C.F.R. section 122.45(f)(2), which states that mass limitations are not required "when applicable standards and limitations are expressed in terms of other units of measure." Secondary treatment standards for BOD_5 and TSS in 40 C.F.R. section 133.102, on which the effluent limitations in previous permits were based, are expressed in terms of concentration and percent removal (i.e., other units of measure). The relaxation of effluent limitations for BOD_5 and TSS in this Order is permissible under 40 C.F.R. sections 122.44(l)(1) and 122.62(a)(15), because Regional Water Board staff has determined that mass-based limitations for BOD_5 and TSS were applied in the previous permits as a result of a mistaken interpretation of law when issuing those previous permits.

In addition, Regional Water Board staff previously held that anti-backsliding regulations prevented the removal of mass-based limitations for BOD_5 and TSS because they were appropriate and necessary to protect water quality and prevent water quality degradation in receiving waters. While it is conceivable that the absence of mass-based limitations for these pollutants may result in an increased pollutant loading to surface waters, recent self-monitoring reports indicate that compliance with concentration-based effluent limitations for BOD_5 and TSS effectively maintain the Permittee's mass emission rates for BOD_5 and TSS well below permitted mass-based limitations. In addition, even if there is a resulting increase in pollutant loading, there is no evidence that the increase will result in degradation of water quality. Therefore, relaxation of effluent limitations for BOD_5 and TSS in this Order is also permissible under 40 C.F.R. sections 122.44(l)(1) and 122.62(a)(15), based on new information available to the Regional Water Board.

Order No. R1-2017-0002 established final effluent limitations for nickel and TCDD equivalents. As shown in Table F-5 of this Fact Sheet, effluent data demonstrate that the discharge no longer demonstrates reasonable potential to cause or contribute to an exceedance of the water quality objective for nickel and TCDD equivalents. The updated effluent data for nickel and TCDD equivalents constitutes new information, which permits the removal of effluent limitations consistent with CWA section 402(o)(2)(B). Additionally, for attainment waters, CWA section 303(d)(4)(B) specifies that a limitation based on a water quality standard may be relaxed where the action is consistent with the antidegradation policy. The Pacific Ocean is considered an attainment water for nickel and TCDD because the receiving water is not listed as impaired on the 303(d) list for these constituents. As discussed in Fact Sheet section 4.4.2 below, removal of the effluent limits complies with federal and state

antidegradation requirements. Thus, removal of these effluent limitations meets the exception in CWA section 303(d)(4)(B).

Order No. R1-2017-0002 also retained final effluent limitations for fecal coliform for the protection of shellfish harvesting. The National Shellfish Sanitation Program (NSSP) is the federal/state cooperative program recognized by the U. S. Food and Drug Administration (FDA) and the Interstate Shellfish Sanitation Conference (ISSC) for the sanitary control of shellfish produced and sold for human consumption. The NSSP Guide for the Control of Molluscan Shellfish allows for the use of either fecal coliform or total coliform in protecting shellfish harvesting areas. Additionally, the Ocean Plan contains total coliform water quality objectives for the protection of shellfish harvesting. These total coliform water quality objectives have been established as effluent limitations in this Order in place of the historical fecal coliform effluent limitations. The Pacific Ocean, in the vicinity of the discharge, is not listed as an impaired waterbody on the 303(d) list. As discussed in Fact Sheet section 4.4.2 below, relaxation of this limit complies with federal and state antidegradation requirements. Thus, relaxation of this effluent limitation meets the exception in CWA section 303(d)(4)(B).

4.4.2. **Antidegradation Policies**

State Water Board Resolution 68-16, the Statement of Policy with Respect to Maintaining High Quality Waters in California (the Antidegradation Policy) requires that disposal of waste into waters of the state be regulated to achieve the highest water quality consistent with the maximum benefit to the people of the state. The quality of some waters is higher than established by adopted policies and that higher quality water shall be maintained to the maximum extent possible consistent with the Antidegradation Policy. The Antidegradation Policy requires that (1) higher quality water will be maintained until it has been demonstrated to the state that any change will be consistent with the maximum benefit to the people of the state, will not unreasonably affect present and anticipated beneficial use of the water, and will not result in water quality less than that prescribed in the policies; and (2) any activity that produces a waste or may produce waste or increased volume or concentration of waste and discharges to existing high quality water will be required to meet waste discharge requirements that will result in the best practicable treatment or control (BPTC) of the discharge necessary to assure pollution or nuisance will not occur, and the highest water quality consistent with the maximum benefit to the people of the state will be maintained.

Discharges from the Facility are required to maintain protection of the beneficial uses of the receiving water and comply with applicable provisions of the Basin Plan.

This Order is consistent with applicable federal and state antidegradation policies, as it does not authorize the discharge of increased concentrations of

pollutants or increased volumes of treated wastewater beyond that which was permitted to discharge in accordance with Order No. R1-2017-0002.

4.4.3. Stringency of Requirements for Individual Pollutants

This Order contains both technology-based and water quality-based effluent limitations for individual pollutants. The technology-based effluent limitations consist of restrictions on BOD_5, oil and grease, pH, settleable solids, TSS, and turbidity. Restrictions on these pollutants are discussed in section 4.2 of this Fact Sheet. This Order's technology-based pollutant restrictions implement the minimum, applicable federal technology-based requirements.

In addition, this Order contains effluent limitations for chlorine residual that are more stringent than the minimum, federal technology-based requirements but are necessary to meet water quality standards. These requirements are discussed in section 4.3.3.3.1 of the Fact Sheet.

Water quality-based effluent limitations have been derived to implement water quality objectives that protect beneficial uses. Both the beneficial uses and the water quality objectives have been approved pursuant to federal law and are the applicable federal water quality standards. The procedures for calculating the individual water quality-based effluent limitations are based on the Ocean Plan, which was approved by U.S. EPA on February 14, 2006 and has since been further amended. Most beneficial uses and water quality objectives contained in the Basin Plan were approved under state law and submitted to and approved by U.S. EPA prior to May 30, 2000. Any water quality objectives and beneficial uses submitted to U.S. EPA prior to May 30, 2000, but not approved by U.S. EPA before that date, are nonetheless "applicable water quality standards for purposes of the CWA" pursuant to 40 C.F.R. section 131.21(c)(1). The remaining water quality objectives and beneficial uses implemented by this Order were approved by U.S. EPA and are applicable water quality standards pursuant to section 131.21(c)(2). Collectively, this Order's restrictions on individual pollutants are no more stringent than required to implement the requirements of the CWA.

The Regional Water Board has considered the factors in Water Code section 13263, including the provisions of Water Code 13241, in establishing these requirements.

4.5. Interim Effluent Limitations – Not Applicable

This Order does not establish interim effluent limitations or schedules for compliance with final limitations.

4.6. Land Discharge Specifications – Not Applicable

This Order does not authorize discharges of waste to land.

4.7. Recycling Specifications

This Order includes recycled water production requirements in section 4.3.1 of the Order and Water Recycling Specifications and Requirements contained in section 4.3.2. of the Order. The Permittee currently has no recycled water use sites. Prior to initiating recycled water use at recycled water use sites identified in the future, the Permittee must obtain permitting, either through a modification of this Order or by enrolling under State Water Board Order DWQ 2016-0068-DDW (or any subsequent revision) and submit a title 22 Recycled Water Engineering Report that has been approved by DDW.

4.7.1. Scope and Authority

Section 13263 of the Water Code requires the Regional Water Board to prescribe requirements for proposed discharges, existing discharges, or material change in an existing discharge based upon the conditions of the disposal area or receiving waters upon or into which the discharge is made or proposed. The prescribed requirements shall implement any relevant water quality control plans that have been adopted, and shall take into consideration the beneficial uses to be protected, the water quality objectives reasonably required for that purpose, other waste discharges, the need to prevent nuisance, and the provisions of Water Code section 13241. In prescribing requirements, the Regional Water Board is not obligated to authorize the full waste assimilation capacities of the receiving water.

Water Code section 13241 requires the Regional Water Board to establish water quality objectives in water quality control plans as in its judgment will ensure the reasonable protection of beneficial uses and prevention of nuisance, recognizing that it may be possible for the quality of water to be changed to some degree without unreasonably affecting beneficial uses. The Basin Plan establishes water quality objectives specific to the North Coast Region for the protection of past, present, and probable future beneficial uses of water. Factors required for consideration during development of applicable water quality objectives, such as the characteristics of the hydrographic unit under consideration, economic considerations, and other factors required in accordance with section 13241 were considered during the Basin Planning and adoption process.

Here, the Regional Water Board considered all of these factors when developing waste discharge requirements for the recycled water discharge. Limitations for BOD_5, TSS, total coliform, and pH were derived based upon the treatment capability of the Facility in order to implement water quality objectives that protect the beneficial uses of both surface and groundwater. Both beneficial uses and the water quality objectives have been approved pursuant to state law, and then submitted to and approved by U.S. EPA. In addition, discharge prohibitions were included to prohibit the reclamation use of untreated or partially treated wastewater.

The Regional Water Board considered the factors set forth in Water Code section 13241, including the consideration of past, present, and probable future beneficial uses of the receiving water, which the Regional Water Board anticipates to be the same as set forth in the Basin Plan. The Regional Water Board considered the environmental characteristics, including water quality of the Smith River Hydrologic Unit, the coordinated control of all factors, which affect water quality in the area, and the need to develop and use recycled water, which this Order supports. The Permittee did not submit any evidence regarding whether the waste discharge requirements for recycled water discharges would interfere with the development of needed housing within the region or the costs of compliance, particularly anything to show that the costs of compliance with the Order would be unmanageable.

4.7.2. **Applicable Beneficial Uses and Water Quality Criteria and Objectives**

4.7.2.1. **Beneficial Uses.** Beneficial use designations for groundwater established in the Basin Plan include MUN, AGR, IND, and PRO.

4.7.2.2. **Basin Plan Water Quality Objectives.** The Basin Plan contains narrative objectives for tastes and odors, bacteria, radioactivity, and chemical constituents (including those chemicals that adversely affect agricultural water supply) that apply to groundwater.

4.7.3. **Determining the Need for Requirements for Water Recycling**

Section 4.3. of this Order contains Water Recycling Specifications and Requirements to ensure that recycled water is used in a manner that is protective of groundwater and surface water quality. The Water Recycling Specifications and Requirements are established in this Order to conform to requirements contained in title 22, division 4, chapter 3 of the CCR for recycled water use of disinfected tertiary-2.2 recycled water. The Permittee is required to comply with applicable state and local requirements regarding the production and use of recycled wastewater, including requirements of Water Code sections 13500 – 13577 (Water Reclamation) and DDW regulations at title 22, sections 60301 – 60357 of the CCR (Water Recycling Criteria).

The Water Recycling Specifications and Requirements are established in this Order to conform to requirements contained in title 22, division 4, chapter 3 of the CCR for the recycled water use of disinfected tertiary effluent. Specific water recycling requirements are enumerated in section 4.3 of this Order. The requirement to comply with title 22 requirements is retained from Order No. R1-2017-0002.

4.7.3.1. **BOD_5 and TSS.** This Order retains discharge limitations for BOD_5 and TSS from Order No. R1-2017-0002 and are based on technology-based effluent limitations that consist of a monthly average of 10 mg/L and a weekly average of 15 mg/L. These levels are technically achievable based on the capability of

the wastewater treatment system. These limits are included in the Order to ensure that discharges to the recycled water system receive proper treatment.

4.7.3.2. **Coliform Bacteria.** Consistent with Order No. R1-2017-0002, this Order includes recycling specifications for coliform bacteria that reflect standards for tertiary treated recycled water adopted by the DDW in title 22 of the CCR and are included to ensure that recycled water quality is protective of human health. Recycled water from this Facility meets the highest title 22 treatment and disinfection standards and is suitable for the broad range of recycled water uses identified in title 22, including urban land uses.

4.7.3.3. **pH.** This Order retains instantaneous minimum and maximum effluent limitations for pH of 6.0 and 9.0, respectively, from Order No. R1-2017-0002 and are based on the technology-based effluent limitations required by U.S. EPA pursuant to 40 C.F.R. part 133. These pH limitations are included in the Order to ensure that pH levels are appropriate for protection of groundwater when discharging to the recycled water system.

4.7.4. **Satisfaction of Antidegradation Policy**

The permitted discharge is consistent with the antidegradation provisions of State Water Board Resolution No. 68-16. This Order does not provide for an increase in the volume and mass of pollutants discharged. The discharge will not have significant impacts on the beneficial uses of groundwater because the Order does not authorize the discharge of treated wastewater to groundwater.

4.8. **Other Requirements**

The Order contains additional specifications that apply to the Facility when discharging to the recycled water system, including:

4.8.1. **Filtration System Requirements.** The turbidity requirement in section 4.3.3.2 of the Order and section 9.3 of the MRP are in accordance with the definition of filtered wastewater found in title 22 section 60301.320 of the CCR. The title 22 definition is used as a reasonable performance standard to ensure adequate removal of turbidity upstream of disinfection facilities. Properly designed and operated effluent filters will meet this standard. The point of compliance for the turbidity requirements is a point following filtration and before discharge to the UV disinfection system.

4.8.2. **Disinfection Process Requirements for the Chlorine Disinfection System.** Internal monitoring at the end of the chlorine contact tank is required to measure chlorine residual in lieu of daily coliform monitoring to assure adequate disinfection on a daily basis. Section 4.4.1 of the Order and section 9.4 of the MRP require the Permittee monitor and report chlorine residual on a continuous basis at Monitoring Location INT-002A as a means to demonstrate that an appropriate chlorine residual concentration is maintained in the effluent at Monitoring Location INT-002A at all times.

4.8.3. **Disinfection Process Requirements for the UV Disinfection System.** The Order contains monitoring requirements for the UV disinfection system in section 4.3.4 of the Order and section 9.5 of the MRP. These requirements are needed to determine compliance with requirements for recycled wastewater systems, established at CCR title 22, division 4, chapter 3 and to ensure that the disinfection process achieves effective pathogen reduction. Prior to initiation of any water recycling, the Permittee must complete an evaluation of the UV disinfection system to demonstrate that it meets the requirement in title 22, section 60301.230(a)(2) that the disinfection process, when combined with the filtration process, inactivates and/or removes 99.999 percent of the plaque-forming units of F-specific bacteriophage MS2, or polio virus in the wastewater.

UV system operation requirements are necessary to ensure that adequate UV dosage is applied to the wastewater to inactivate pathogens (e.g., viruses, bacteria) in the wastewater. UV dosage is dependent on several factors such as UV transmittance, UV power setting, and wastewater flow through the UV system. Minimum dosage requirements are based on recommendations by DDW and guidelines established by the National Water Research Institute (NWRI) and American Water Works Association Research (AWWARF) "Ultraviolet Disinfection Guidelines for Drinking Water and Water Reuse" first published in December 2000 revised as a Third Edition dated August 2012 (NWRI/AWWARF UV Disinfection Guidelines). Furthermore, a Memorandum dated November 1, 2004 issued by DDW to Regional Water Board Executive Officers recommended that provisions be included in permits for water recycling treatment plants employing UV disinfection requiring permittees to establish fixed cleaning frequency of quartz sleeves as well as include provisions that specify minimum delivered UV dose that must be maintained (as recommended by the NWRI/AWWARF UV Disinfection Guidelines). Minimum UV dosage requirements specified in section 4.3.4.3 of the Order ensures that adequate disinfection of wastewater will be achieved.

Section 4.3.4.16 of the Order restricts the flow of discharges to the recycled water system. Based upon the equations developed, at the highest flow of 830 gallons per minute (gpm), one reactor cannot provide the required UV dose if the UV transmittance (UVT) drops below 78 percent. A third UV reactor is needed to address all operational conditions, including any flow up to 830 gpm and any UVT down to 65%, while still providing adequate redundancy. The NWRI/AWWARF UV Disinfection Guidelines state, “At a minimum, two reactors must be simultaneously operated in any on-line reactor train.” It continues by requiring a redundant reactor in a single treatment train, “Standby UV equipment must be provided: A standby reactor per train. [OR] A standby reactor train.” Further the NWRI/AWWARF UV Disinfection Guidelines state the system must be capable of applying the required dose “with any failed or out-of-service reactor.” Examples include failure of the power supply, cleaning mechanism, cooling system, SCADA system, or a damaged UV intensity sensor. Until this reliability issue is sufficiently addressed, this Order restricts the flow to the

recycled water system to 0.6 mgd, which is one-half of the design flow of the 1.2 mgd.

5. RATIONALE FOR RECEIVING WATER LIMITATIONS

5.1. Surface Water

CWA section 303(a-c) requires states to adopt water quality standards, including criteria where they are necessary to protect beneficial uses. The State Water Board adopted water quality criteria as water quality objectives in the Ocean Plan. Receiving water limitations within this Order reflect all applicable, general water quality objectives of the Ocean Plan.

The Ocean Plan includes numeric and narrative water quality objectives for various beneficial uses. This Order contains receiving water limitations for discharges to the Pacific Ocean based on the Ocean Plan numerical and narrative water quality objectives for bacteria, dissolved oxygen, floating particulates, oil and grease, pH, discoloration, natural lighting, deposition of solids, dissolved sulfides, organic materials in sediments, Table 3 parameters, nutrient materials, radioactive wastes, and biological characteristics.

5.2. Groundwater

5.2.1. Groundwater limitations in this Order have been retained from the previous Order with minor modification to reflect revised sections of title 22. Groundwater limitations are included in the Order to protect the beneficial uses of the underlying groundwater. The beneficial uses of the underlying groundwater are municipal and domestic supply, industrial service supply, industrial process supply, agricultural supply, and freshwater replenishment to surface waters. Discharges from the Facility shall not cause exceedance of applicable water quality objectives or create adverse impacts to beneficial uses of groundwater. Groundwater data must be evaluated using appropriate statistical tools to determine when groundwater degradation is occurring.

The Order includes a new groundwater toxicity limitation that was adopted by the Regional Water Board on June 18, 2015, and effective beginning July 18, 2016 after receiving approval from the California Office of Administrative Law. This new Basin Plan limit requires that groundwaters shall not contain toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in humans, or that adversely affects beneficial uses. This limitation applies regardless of whether the toxicity is caused by a single substance or the synergistic effect of multiple substances..

6. RATIONALE FOR PROVISIONS

6.1. Federal Standard Provisions

Standard Provisions, which apply to all NPDES permits in accordance with 40 C.F.R. section 122.41, and additional conditions applicable to specified categories of permits in accordance with 40 C.F.R. section 122.42, are provided in Attachment D to the order. The Permittee must comply with all standard provisions and with those additional conditions that are applicable under 40 C.F.R. section 122.42. The rationale for the special conditions contained in the Order is provided in section 6.2, below.

Sections 122.41(a)(1) and (b) through (n) of 40 C.F.R. establish conditions that apply to all State-issued NPDES permits. These conditions must be incorporated into the permits either expressly or by reference. If incorporated by reference, a specific citation to the regulations must be included in the Order. Section 123.25(a)(12) allows the state to omit or modify conditions to impose more stringent requirements. In accordance with 40 C.F.R. section 123.25, this Order omits federal conditions that address enforcement authority specified in 40 C.F.R. sections 122.41(j)(5) and (k)(2) because the enforcement authority under the Water Code is more stringent. In lieu of these conditions, this Order incorporates by reference Water Code section 13387(e).

6.2. Regional Water Board Standard Provisions

In addition to the Federal Standard Provisions (Attachment D), the Permittee shall comply with the Regional Water Board Standard Provisions provided in Standard Provisions 6.1.2 of the Order.

6.2.1. Order Provision 6.1.2.1 identifies the state's enforcement authority under the Water Code, which is more stringent than the enforcement authority specified in the federal regulations (e.g., 40 C.F.R. sections 122.41(j)(5) and (k)(2)).

6.2.2. Order Provision 6.1.2.2 requires the Permittee to notify Regional Water Board staff, orally and in writing, in the event that the Permittee does not comply or will be unable to comply with any Order requirement. This provision requires the Permittee to make direct contact with a Regional Water Board staff person.

6.3. Special Provisions

6.3.1. Reopener Provisions

6.3.1.1. **Standard Revisions (Special Provision 6.3.1.1).** Conditions that necessitate a major modification of a permit are described in 40 C.F.R. section 122.62, which include the following:

6.3.1.1.1. When standards or regulations on which the permit was based have been changed by promulgation of amended standards or regulations or by judicial

decision. Therefore, if revisions of applicable water quality standards are promulgated or approved pursuant to Section 303 of the CWA or amendments thereto, the Regional Water Board will revise and modify this Order in accordance with such revised standards.

6.3.1.1.2. When new information that was not available at the time of permit issuance would have justified different permit conditions at the time of issuance.

6.3.1.2. **Reasonable Potential (Special Provision 6.3.1.2).** This provision allows the Regional Water Board to modify, or revoke and reissue, this Order if present or future investigations demonstrate that the Permittee governed by this Permit is causing or contributing to excursions above any applicable priority pollutant criterion or objective, or adversely impacting water quality and/or the beneficial uses of receiving waters.

6.3.1.3. **Whole Effluent Toxicity (Special Provision 6.3.1.3).** This Order requires the Permittee to investigate the causes of, and identify corrective actions to reduce or eliminate effluent toxicity through a TRE. This Order may be reopened to include a numeric acute and/or chronic toxicity limitation, and/or a limitation for a specific toxicant identified in the TRE.

6.3.1.4. **303(d)-Listed (Special Provision 6.3.1.4).** This provision allows the Regional Water Board to reopen this Order to modify existing effluent limitations or add effluent limitations for pollutants that are subject of any future TMDL action.

6.3.1.5. **Zone of Initial Dilution/Mixing Zone (Special Provision 6.3.1.5).** This provision allows the Regional Water Board to reopen this Order to modify effluent limitations based on a revised minimum initial dilution based on the results of an effluent discharge evaluation.

6.3.2. **Best Management Practices and Pollution Prevention**

6.3.2.1. **Pollutant Minimization Program (Special Provision 6.3.2.1).** This provision is included in this Order pursuant to section III.C.9 of the Ocean Plan. The Regional Water Board includes standard provisions in all NPDES permits requiring development of a Pollutant Minimization Program when there is evidence that a toxic pollutant is present in the effluent at a concentration greater than an applicable effluent limitation.

6.3.3. **Construction, Operation, and Maintenance Specifications**

6.3.3.1. **Operation and Maintenance (Special Provision 6.3.3.1, 6.3.3.2, and 6.3.3.3).** 40 C.F.R. section 122.41(e) requires proper operation and maintenance of permitted wastewater systems and related facilities to achieve compliance with permit conditions. An up-to-date operation and maintenance manual, as required by Provision 6.3.3.2 of this Order, is an integral part of a well-operated and maintained facility.

6.3.3.2. **Septage Handling Requirements (Special Provision 6.3.3.4).** The Permittee was not permitted to accept or treat septage at the Facility in the previous permit, but is contemplating whether to develop a program for receiving septage into the Facility to satisfy the need for local septage disposal. Domestic septage is defined as the liquid or solid material removed from a septic tank, cesspool, portable toilet, type III marine sanitation device, recreational vehicle's sanitation tank, or similar storage or treatment works that receives only domestic septage. Septage is characterized by high organic strength, high solids content, high odor potential, high vector attraction potential, and high potential to pollute groundwater. Septage may be 6 to 80 times more concentrated than typical municipal wastewater and may also contain heavy metals and illicitly dumped hazardous materials. Septage has the potential to upset plant treatment operations or process performance or both if the plant is not designed to handle septage. Some of the impacts of septage addition to facilities include: potential toxic shock to biological processes; increased odor emissions; increased volume of grit, scum, screenings, and sludge; increased organic loading to biological processes; and increased housekeeping requirements. Prior to accepting septage, this Order requires the Permittee to submit a Septage Management Plan for approval by the Regional Water Board Executive Officer. This Order also requires the Permittee to manage septage accepted at the Facility in a manner that ensures that pollutants associated with domestic septage do not pass through or interfere with the operation or performance of the Facility, and to monitor septage as specified in section 9.7 of the MRP.

6.3.4. **Special Provisions for Publicly-Owned Treatment Works (POTWs)**

6.3.4.1. **Pretreatment of Industrial Waste (Special Provision 6.3.4.1)** Section 402(b)(8) of the CWA requires that POTWs receiving pollutants from significant industrial sources subject to section 307(b) standards establish an industrial pretreatment program to ensure compliance with these standards. The implementing regulations at 403.8(a) state, "any POTW (or combination of POTWs operated by the same authority) with a total design flow greater than 5 million gallons per day (mgd) and receiving from industrial users pollutants which pass through or interfere with the operation of the POTW or are otherwise subject to pretreatment standards will be required to establish a POTW pretreatment program unless the NPDES State exercises its option to assume local responsibilities as provided in 403.10(e)." The Facility receives industrial wastewater from three non-categorical significant industrial users; Rumiano Cheese Company, SeaQuake Brewery, and Port O' Pints Brewery. Consistent with Order No. R1-2017-0002, this Order requires the Permittee to comply with pretreatment standards as described in section 307(b) of the CWA and section 403.8(a).

6.3.4.2. **Sludge Disposal and Handling Requirements (Special Provision 6.3.4.2)** The disposal or reuse of wastewater treatment screenings, sludges, or other solids removed from the liquid waste stream is regulated by 40 C.F.R. parts

257, 258, 501, and 503, and the State Water Board promulgated provisions of title 27 of the CCR. Sludge generated at the Facility is currently disposed of in a landfill.

This provision also requires the Permittee to comply with the state's regulations relating to the discharge of biosolids to the land. The discharge of biosolids through land application is not currently regulated under this Order. In the event that the Permittee wishes to discharge biosolids to land, the Permittee is required to either submit a report of waste discharge or dispose of biosolids at another permitted facility.

6.3.4.3. **Wastewater Collection System (Special Provision 6.3.4.3)** On December 6, 2022, the State Water Board adopted State Water Board Order No. WQ 2022-0103-DWQ, Statewide Waste Discharge Requirements, General Order for Sanitary Sewer Systems. This Order becomes effective on June 5, 2023 and shall replace Order No. 2006-0003-DWQ. The General Order requires public agencies that own or operate sanitary sewer systems with sewer lines one mile of pipe or greater to enroll for coverage and comply with the General Order. The General Order requires agencies to develop sanitary sewer management plans and report all sanitary sewer overflows, among other requirements and prohibitions.

6.3.4.4. **Operator Certification (Special Provision 6.3.4.4).** This provision requires the Facility to be operated by supervisors and operators who are certified as required by title 23, section 3680 of the CCR.

6.3.4.5. **Ensuring Adequate Capacity (Special Provision 6.3.4.5).** The goal of this provision is to ensure appropriate and timely planning by the Permittee to ensure adequate capacity for the protection of public health and water quality.

6.3.5. **Other Special Provisions**

6.3.5.1. **Storm Water (Special Provision 6.3.5.1).** This provision requires the Permittee, if applicable, to obtain coverage under the State Water Board's Water Quality Order No. 2014-0057-DWQ, NPDES General Permit No. CAS000001, General Permit for Storm Water Discharges Associated with Industrial Activities (or subsequent renewed versions of the NPDES General Permit CAS000001). Currently, the Facility is exempted from these requirements because all storm water is captured and treated and/or disposed of within the Facility's NPDES permitted process wastewater.

6.3.6. **Compliance Schedules – Not Applicable**

This Order does not establish interim effluent limitations or schedules of compliance for final numeric effluent limitations.

7. RATIONALE FOR MONITORING AND REPORTING REQUIREMENTS

CWA section 308 and 40 C.F.R. sections 122.41(h), (j)-(l), 122.44(i), and 122.48 require that all NPDES permits specify monitoring and reporting requirements. Water Code sections 13267 and 13383 also authorize the Regional Water Board to establish monitoring, inspection, entry, reporting, and recordkeeping requirements. The Monitoring and Reporting Program (MRP), Attachment E of this Order establishes monitoring, reporting, and recordkeeping requirements that implement federal and state requirements. The following provides the rationale for the monitoring and reporting requirements contained in the MRP for this facility.

7.1. Influent Monitoring

7.1.1. Influent monitoring requirements at Monitoring Location INF-001 for BOD5 and TSS are retained from Order No. R1-2017-0002 and are necessary to determine compliance with the Order's 85 percent removal requirement for these parameters.

7.1.2. Influent monitoring requirements for flow at Monitoring Location INF-001 are retained from Order No. R1-2017-0002 and are necessary to determine compliance with Discharge Prohibition 3.7.

7.1.3. Influent monitoring requirements for priority pollutants at Monitoring Location INF-001 are retained from Order No. R1-2017-0002 and are necessary to satisfy U.S. EPA pretreatment requirements.

7.2. Effluent Monitoring

7.2.1. Effluent monitoring requirements are necessary to determine compliance with prohibitions and/or effluent limitations established by the Order. Monitoring at Monitoring Location EFF-001 is necessary to demonstrate compliance with effluent limitations and demonstrate whether or not the discharge poses reasonable potential for a pollutant to exceed any numeric or narrative water quality objectives for discharges to the Pacific Ocean.

7.2.1.1. Effluent monitoring requirements for flow, BOD_5, TSS, settleable solids, oil and grease, turbidity, pH, fecal coliform, ammonia, and copper have been retained from Order No. R1-2017-0002.

7.2.1.2. Effluent monitoring and sample type for chlorine residual has been changed to continuous monitoring with a meter. Continuous monitoring to demonstrate that the discharge at Monitoring Location EFF-001 at all times meets the chlorine residual effluent limitations in section 4.1.1, Table 4 of the Order is necessary due to the toxicity of chlorine to aquatic life.

7.2.1.3. Monitoring data collected during the term of Order No. R1-2017-0002 indicates that the discharge does not exhibit reasonable potential to cause or contribute to an exceedance of the Ocean Plan water quality objectives for

nickel and TCDD equivalents. Therefore, this Order discontinues monthly effluent monitoring requirements for nickel and annual effluent monitoring requirements for TCDD equivalents from Order No. R1-2017-0002.

7.2.1.4. Monitoring data collected over the term of Order No. R1-2017-0002 demonstrated that the discharge exhibits reasonable potential to cause or contribute to an exceedance of water quality criteria for silver, endosulfans, endrin, DDT, and heptachlor. Therefore, this Order establishes new monitoring requirements for silver, endosulfans, endrin, DDT, and heptachlor to determine compliance with applicable effluent limitations.

7.2.1.5. Monitoring data collected during the term of Order No. R1-2017-0002 indicates that water quality objectives for bacteria are regularly exceeded in the receiving waters. Therefore, this Order establishes new effluent monitoring requirements for total coliform and enterococci to evaluate cause and culpability of the discharge to these exceedances.

7.2.1.6. Consistent with Order No. R1-2017-0002, effluent monitoring requirements for Ocean Plan Table 3 pollutants are required annually to generate adequate data to perform an RPA.

7.3. Whole Effluent Toxicity Testing Requirements

Whole effluent toxicity (WET) monitoring requirements are established for discharges to the Pacific Ocean from Discharge Point 001 at Monitoring Location EFF-001 and are included in the Order to protect the receiving water quality from the aggregate effect of a mixture of pollutants in the effluent. Acute toxicity testing measures mortality in 100 percent effluent over a short test period and chronic toxicity testing is conducted over a longer time period and may measure mortality, reproduction, and/or growth. The Ocean Plan (section III.C.4.c.(4)) requires only chronic testing where the minimum initial dilution of the effluent is below 100:1. Because this Order allows for a Dm of 29 for the Facility, WET monitoring shall consist of chronic toxicity testing. This Order includes monitoring requirements for chronic toxicity to assess whether there is reasonable potential to exceed the Ocean Plan's narrative water quality objectives for toxicity. Consistent with Order No. R1-2017-0002, this Order requires annual chronic toxicity testing.

In addition to routine toxicity monitoring, this Order requires the Permittee to maintain and update their TRE Work Plan, in accordance with appropriate U.S. EPA guidance to ensure that the Permittee has a plan to immediately move forward with the initial tiers of a TRE in the event effluent toxicity is encountered in the future. The TRE is initiated by evidence of a pattern of toxicity demonstrated through the additional effluent monitoring provided as a result of an accelerated monitoring program.

7.4. Land Discharge Monitoring Requirements – Not Applicable

This Order does not authorize discharges to land.

7.5. Recycling Monitoring Requirements

This Order requires that the Permittee comply with applicable state and local requirements regarding the production of recycled wastewater. Recycled water requirements will apply if and when the Permittee establishes a recycled water system. Recycled water monitoring requirements for flow, BOD_5, TSS, pH, total coliform bacteria, nitrate, nitrite, ammonia, organic nitrogen, and total dissolved solids have been retained from Order No. R1-2017-0002.

Section 13523.1(b)(4) of the Water Code requires quarterly recycled water reporting.

7.5.1. When discharging recycled water to the recycled water system, the Permittee must monitor its treated effluent for BOD_5, TSS, pH, and total coliform bacteria to demonstrate compliance with water recycling specifications in section 4.3.1 of the Order. If the Permittee is discharging concurrently to the ocean and to the recycled water system, the same sample may satisfy monitoring and reporting requirements for both discharge points.

7.5.2. Recycled water monitoring requirements for nitrate, nitrite, ammonia and organic nitrogen are included to determine the total nitrogen concentration for the agronomic rate calculations that will be required for use of recycled water.

7.5.3. Recycled water monitoring requirements for total dissolved solids (TDS) are used to assess the salt concentration of the recycled water. This data will be evaluated to evaluate whether or not salt concentrations in the recycled water pose a threat to groundwater quality.

7.6. Receiving Water Monitoring

7.6.1. Surface Water

7.6.1.1. Receiving water monitoring is required to demonstrate compliance with the Receiving Water Limitations.

7.6.1.2. Consistent with Order No. R1-2017-0002, this Order requires weekly monitoring for fecal coliform bacteria, total coliform bacteria, and Enterococcus bacteria at Monitoring Location RSW-001.

7.6.2. Groundwater – Not Applicable

This Order does not require groundwater monitoring at this time.

7.7. Other Monitoring Requirements

7.7.1. Discharge Monitoring Report-Quality Assurance (DMR-QA) Study Program

Under the authority of section 308 of the CWA (33 U.S.C. § 1318), U.S. EPA requires major and selected minor dischargers under the NPDES Program to participate in the annual DMR-QA Study Program. The DMR-QA Study evaluates the analytical ability of laboratories that routinely perform or support self-monitoring analyses required by NPDES permits. There are two options to satisfy the requirements of the DMR-QA Study Program: (1) The Permittee can obtain and analyze a DMR-QA sample as part of the DMR-QA Study; or (2) Per the waiver issued by U.S. EPA to the State Water Board, the Permittee can submit the results of the most recent Water Pollution Performance Evaluation Study from its own laboratories or its contract laboratories. A Water Pollution Performance Evaluation Study is similar to the DMR-QA Study. Thus, it also evaluates a laboratory's ability to analyze wastewater samples to produce quality data that ensure the integrity of the NPDES Program. The Permittee shall ensure that the results of the DMR-QA Study or the results of the most recent Water Pollution Performance Evaluation Study are submitted annually to the State Water Board. The State Water Board's Quality Assurance Program Officer will send the DMR-QA Study results or the results of the most recent Water Pollution Performance Evaluation Study to U.S. EPA's DMR-QA Coordinator and Quality Assurance Manager.

7.7.2. **Accelerated Monitoring Requirements.** Table E-3 includes accelerated monitoring requirements for parameters that are required to be monitored daily, weekly, monthly, and annually.

7.7.3. **Outfall Inspection. (MRP section 9.1).** Consistent with Order No. R1-2017-0002, this Order requires the Permittee to inspect and evaluate the outfall to determine the structural integrity and operational status of the outfall pipeline and structure once during the term of the permit. This requirement is necessary to demonstrate proper operation and maintenance of the POTW as required by 40 C.F.R. section 122.4, and to ensure that the calculated minimum probable initial dilution is not compromised as a result of unanticipated structural or operational changes in the outfall structure. The Permittee must submit an outfall evaluation/inspection work plan for Executive Officer approval in advance of conducting the evaluation/inspection. The work plan must identify methodologies for conducting the inspection which may include visual, camera, dye study, and/or other available methodologies.

7.7.4. **Biological Survey. (MRP section 9.2).** Consistent with Order No. R1-2017-0002, this Order requires the Permittee to perform a biological survey of the outfall location once every 5 years.

7.7.5. **Filtration Process Requirements (Monitoring Locations INT-001A and INT-001B).** Monitoring of the surface loading rate at Monitoring Location INT-001A is

necessary to demonstrate compliance with technology requirements set forth in DDW's Alternative Treatment Technology Report for Recycled Water (September 2014 or subsequent). Monitoring of effluent turbidity of the tertiary filters at Monitoring Location INT-001B is required to demonstrate compliance with section 60301.320 of title 22 CCR filtration requirements for disinfected tertiary recycled water. These requirements are applicable if the Permittee produces and distributes recycled water.

7.7.6. **Disinfection Process Monitoring for the Chlorine Disinfection System (Monitoring Location INT-002A).** Chlorine disinfection system monitoring requirements at Monitoring Location INT-002A are included to assess compliance with the requirements specified in section 4.4.1 of the Order.

7.7.7. **Disinfection Process Monitoring for UV Disinfection System (Monitoring Location INT-002B).** UV disinfection system monitoring requirements at Monitoring Location INT-002B are included to assess compliance of the UV disinfection system with title 22 and the NWRI/AWWARF UV Disinfection Guidelines. These requirements apply if and when the Permittee establishes recycled water use site(s).

7.7.8. **Sludge Monitoring (Monitoring Location BIO-001).** New sludge monitoring requirements at Monitoring Location BIO-001 serve as a basis for the Permittee to develop the Sludge Handling and Disposal Activity Report that is required as part of the Annual Report pursuant to section 10.5.2.6 of the MRP. In addition, This Order establishes annual sludge monitoring requirements for priority pollutants to satisfy U.S. EPA pretreatment requirements.

7.7.9. **Septage Station Monitoring.** The Permittee does not currently accept or treat septage at the Facility, but is contemplating whether to develop a program for receiving septage at the Facility to satisfy the need for local septage disposal. This Order includes monitoring requirements to characterize discharges of septage into the treatment system and to ensure that pollutants associated with domestic septage do not pass through or interfere with the operation or performance of the Facility. These requirements apply if and when the Permittee establishes a septage receiving program.

7.7.10. **Notification and Reporting for Recycled Water Spills.** Section 10.6.3 of the MRP includes reporting requirements for spills of tertiary treated water in excess of 50,000 gallons. This requirement implements Water Code section 13529.2 and applies if the Permittee produces and distributes recycled water.

7.7.11. **Flow Monitoring.** Section 1.4 of the MRP requires proper installation, calibration, operation, and maintenance of flow metering devices.

7.8. Special Studies and Additional Monitoring Requirements

7.8.1. **Sanitary Sewer Evaluation Survey (MRP section 10.1.1).** This Order requires the Permittee to evaluate the condition of its collection system and determine

where and what rehabilitation and replacement efforts need to be completed to reduce inflow and infiltration (I/I) and flood risk. Treatment system flow data from the term of Order No. R1-2017-0002 indicates that I/I occurs at a rate greater than what is expected for the population size of the Crescent City and County Service Area collection system service areas. Furthermore, the Permittee identified within the *Crescent City Climate Change Readiness Study* (March 2021) that extreme precipitation events, increases in annual average precipitation, and more intense storm surge could exacerbate flooding and overflow frequency in the City's collection system and negatively impact the WWTF treatment system. In order to ensure that Facility operations are not impacted, compliance with conditions of this Order are achieved, and receiving waters are not adversely impacted by permitted and unpermitted discharges, this Order requires the Permittee to submit a Sanitary Sewer Evaluation Survey.

8. PUBLIC PARTICIPATION

The Regional Water Board has considered the issuance of WDRs that will serve as an NPDES permit for the City of Crescent City, Wastewater Treatment Facility. As a step in the WDR adoption process, the Regional Water Board staff has developed tentative WDRs and has encouraged public participation in the WDR adoption process.

8.1. Notification of Interested Persons

In addition to the outreach identified in WDRs Section 2.6, the California Regional Water Quality Control Board, North Coast Region notified the Permittee and interested agencies and persons of its intent to prescribe WDRs for the discharge and provided an opportunity to submit written comments and recommendations. Notification was provided through the following posting on the Regional Water Board's Internet site at: http://www.waterboards.ca.gov/northcoast/public_notices/public_hearings/npdes_permits_and_wdrs.shtml on **September 1, 2023**.

The public had access to the agenda and any changes in dates and locations through the Regional Water Board's website at: http://www.waterboards.ca.gov/northcoast/public_notices/public_hearings/npdes_permits_and_wdrs.shtml.

8.2. Written Comments

Interested persons were invited to submit written comments concerning these tentative WDRs as provided through the notification process. Comments were due to the Regional Water Board Executive Office electronically via e-mail to NorthCoast@waterboards.ca.gov or on disk (CD or DVD) in Portable Document Format (PDF) file in lieu of paper-sourced documents. The guidelines for electronic submittal of documents can be found on the Regional Water Board website at http://www.waterboards.ca.gov/northcoast.

To be fully responded to by staff and considered by the Regional Water Board, the written comments were due at the Regional Water Board office by 5:00 p.m. on September 1, 2023

8.3. Public Hearing

The Regional Water Board held a public hearing on the tentative WDRs during its regular Board meeting on the following date and time and at the following location:

Date: **December 12-13, 2023**
Time: **9:00 a.m. or as announced in the Regional Water Board's agenda**
Location: **Regional Water Board Hearing Room**
5550 Skylane Boulevard, Suite A
Santa Rosa, CA 95403

Interested persons were invited to attend. At the public hearing, the Regional Water Board heard testimony, pertinent to the discharge, WDRs, and permit. For accuracy of the record, important testimony was requested in writing.

8.4. Reconsideration of Waste Discharge Requirements

Any person aggrieved by this action of the Regional Water Board may petition the State Water Board to review the action in accordance with Water Code section 13320 and California Code of Regulations, title 23, sections 2050 and following. The State Water Board must receive the petition by 5:00 p.m., within 30 calendar days of the date of adoption of this Order at the following address, except that if the thirtieth day following the date of this Order falls on a Saturday, Sunday, or state holiday, the petition must be received by the State Water Board by 5:00 p.m. on the next business day:

State Water Resources Control Board
Office of Chief Counsel
P.O. Box 100, 1001 I Street
Sacramento, CA 95812-0100

Or by email at waterqualitypetitions@waterboards.ca.gov

For instructions on how to file a petition for review, see the Water Quality Petitions Website at http://www.waterboards.ca.gov/public_notices/petitions/water_quality/wqpetition_instr.shtml.

8.5. Information and Copying

The Report of Waste Discharge, other supporting documents, and comments received are on file and may be inspected at the address above at any time between 8:30 a.m. and 4:45 p.m., Monday through Friday. Copying of documents may be arranged through the Regional Water Board by calling (707) 576-2220.

8.6. Register of Interested Persons

Any person interested in being placed on the mailing list for information regarding the WDRs and NPDES permit should contact the Regional Water Board, reference this facility, and provide a name, address, and phone number.

8.7. Additional Information

Requests for additional information or questions regarding this order should be directed to Matthew Herman at matthew.herman@waterboards.ca.gov or (707) 576-2683.

Attachment F-1. Wastewater Treatment Facility RPA Summary

Pollutant	Units	Qualifier	MEC[1]	No. Samples	No. ND[2]	Co[3]	Cs[4]	X-obs[5]	Endpoint
Arsenic	µg/L	=	82.6	12	7	8	3	5.6533	2
Cadmium	µg/L	=	15.5	12	7	1	0	0.5167	2
Chromium VI	µg/L	=	6.3	5	3	2	0	0.21	3
Copper	µg/L	=	1,080	71	2	3	2	37.9333	1
Lead	µg/L	<	5	12	12	2	0	<0.1667	3
Mercury	µg/L	<	1	12	12	0.04	0.0005	<0.0338	3
Nickel	µg/L	=	116	71	8	5	0	3.8667	2
Selenium	µg/L	<	10	12	8	15	0	<0.3333	3
Silver	µg/L	=	139	12	712	0.7	0.16	4.7880	1
Zinc	µg/L	=	311	12	0	20	8	18.1000	2
Cyanide	µg/L	=	1.2	11	10	1	0	0.04	3
Total Chlorine Residual	µg/L	=	15,000	1,855	1,849	2	0	500	1
Ammonia (as N)	µg/L	=	33,300	538	0	600	0	1,110	1
Phenolic Compounds (non-chlorinated)	µg/L	<	11	5	5	30	0	<0.3667	3
Chlorinated Phenolics	µg/L	<	11	5	5	1	0	<0.3667	3
Endosulfan	µg/L	=	0.32	12	10	0.009	0	0.0107	1
Endrin	µg/L	=	2.84	12	10	0.002	0	0.0947	1
HCH	µg/L	<	0.0096	12	12	0.004	0	<0.0003	3
Acrolein	µg/L	<	2	5	5	220	0	<0.0667	3

Pollutant	Units	Qualifier	MEC[1]	No. Samples	No. ND[2]	Co[3]	Cs[4]	X-obs[5]	Endpoint
Antimony	µg/L	=	21	5	4	1,200	0	0.700	3
Bis(2-chloroethoxy) methane	µg/L	<	11	5	5	4.4	0	<0.3667	3
Bis(2-chloroisopropyl) ether	µg/L	<	11	5	5	1,200	0	<0.3667	3
Chlorobenzene	µg/L	<	1	5	5	570	0	<0.0333	3
Chromium (III)	µg/L	=	1.75	5	4	190,000	0	0.0583	3
Di-n-butyl Phthalate	µg/L	<	11	12	12	3,500	0	<0.3667	3
Dichlorobenzenes	µg/L	<	1	5	5	5,100	0	<0.0333	3
Diethyl Phthalate	µg/L	<	11	12	12	33,000	0	<0.3667	3
Dimethyl Phthalate	µg/L	<	11	12	12	820,000	0	<0.3667	3
4,6-dinitro-2-methylphenol	µg/L	<	55	5	5	220	0	<1.8333	3
2,4-dinitrophenol	µg/L	<	55	5	5	4	0	<1.8333	3
Ethylbenzene	µg/L	<	1	5	5	4,100	0	<0.0333	3
Fluoranthene	µg/L	<	11	5	5	15	0	<0.3667	3
Hexachlorocyclopentadiene	µg/L	<	28	5	5	58	0	<0.9333	3
Nitrobenzene	µg/L	<	28	5	5	4.9	0	<0.9333	3
Thallium	µg/L	<	10	5	5	2	0	<0.3333	3
Toluene	µg/L	=	7.69	5	0	85,000	0	0.2563	2
Tributylin	µg/L	<	0.003	5	5	0.0014	0	<0.0001	3
1,1,1-trichloroethane	µg/L	<	1	5	5	540,000	0	<0.0333	3
Acrylonitrile	µg/L	<	2	5	2	0.1	0	<0.0667	3

Pollutant	Units	Qualifier	MEC[1]	No. Samples	No. ND[2]	Co[3]	Cs[4]	X-obs[5]	Endpoint
Aldrin	µg/L	<	0.0048	12	12	0.000022	0	<0.0002	3
Benzene	µg/L	<	1	5	5	5.9	0	<0.0333	3
Benzidine	µg/L	<	55	5	5	0.000069	0	<1.8334	3
Beryllium	µg/L	<	1	6	6	0.033	0	<0.0333	3
Bis(2-chloroethyl) Ether	µg/L	<	28	5	5	0.045	0	<0.9333	3
Bis(2-ethlyhexyl) Phthalate	µg/L	=	7.7	12	9	3.5	0	0.2567	2
Carbon Tetrachloride	µg/L	<	1	5	5	0.9	0	<0.0333	3
Chlordane	µg/L	<	0.05	12	12	0.000023	0	<0.0017	3
Chlorodibromomethane	µg/L	<	1	5	5	8.6	0	<0.0333	3
Chloroform	µg/L	=	2.44	5	0	130	0	0.0813	2
DDT	µg/L	=	0.21	12	10	0.00017	0	0.007	1
1,4-Dichlorobenzene	µg/L	<	1	5	5	18	0	<0.0333	3
3,3'-Dichlorobenzidine	µg/L	<	28	5	5	0.0081	0	<0.9333	3
1,2-Dichloroethane	µg/L	<	1	5	5	28	0	<0.0333	3
1,1-Dichloroethylene	µg/L	<	1	5	5	0.9	0	<0.0333	3
Dichlorobromomethane	µg/L	<	1	5	5	6.2	0	<0.0333	3
Dichloromethane	µg/L	<	2	5	5	450	0	<0.0667	3
1,3-Dichloropropene	µg/L	<	1	5	5	8.9	0	<0.0333	3
Dieldrin	µg/L	<	0.0048	12	12	0.00004	0	<0.0002	3
2,4-Dinitrotoluene	µg/L	<	11	5	5	2.6	0	<0.3667	3
1,2-Diphenylhydrazine	µg/L	<	11	5	5	0.16	0	<0.3667	3

Pollutant	Units	Qualifier	MEC[1]	No. Samples	No. ND[2]	Co[3]	Cs[4]	X-obs[5]	Endpoint
Halomethanes	µg/L	<	1	5	5	130	0	<0.0333	3
Heptachlor	µg/L	=	0.14	12	11	0.00005	0	0.0047	1
Heptachlor Epoxide	µg/L	<	0.0096	12	12	0.00021	0	<0.0003	3
Hexachlorobenzene	µg/L	<	11	5	5	14	0	<0.3667	3
Hexachlorobutadiene	µg/L	<	11	5	5	2.5	0	<0.3667	3
Hexachloroethane	µg/L	<	11	5	5	730	0	<0.3667	3
Isophorone	µg/L	<	11	5	5	730	0	<0.3667	3
N-Nitrosodimethylamine	µg/L	<	11	5	5	7.3	0	<0.3667	3
N-Nitrosodi-N-Propylamine	µg/L	<	11	5	5	0.38	0	<0.3667	3
N-Nitrosodiphenylamine	µg/L	<	11	5	5	2.5	0	<0.3667	3
PAHs	µg/L	<	12	5	5	0.0088	0	<0.3668	3
PCBs	µg/L	<	0.5	5	5	0.000019	0	<0.0167	3
TCDD equivalents	µg/L	=	9.34E-08	5	0	3.9E-09	0	3.10E-09	2
1,1,2,2-Tetrachloroethane	µg/L	<	1	5	5	2.3	0	<0.0333	3
Tetrachloroethylene	µg/L	<	1	5	5	2	0	<0.0333	3
Toxaphene	µg/L	<	0.3	12	12	0.00021	0	<0.0100	3
Trichloroethylene	µg/L	<	1	5	5	27	0	<0.0333	3
1,1,2-Trichloroethane	µg/L	<	1	5	5	9.4	0	<0.0333	3
2,4,6-Trichlorophenol	µg/L	<	11	5	5	0.29	0	<0.3667	3
Vinyl Chloride	µg/L	<	1	5	5	36	0	<0.0333	3

Pollutant	Units	Qualifier	MEC[1]	No. Samples	No. ND[2]	Co[3]	Cs[4]	X-obs[5]	Endpoint

Table Notes

1. MEC = Maximum Effluent Concentration
2. ND = Non-Detects
3. Co = The concentration (water quality objective) to be met at the completion of initial dilution (from Table 3 of the 2019 Ocean Plan).
4. Cs = The background seawater concentrations (from Table 5 of the 2019 Ocean Plan).
5. X-obs = The maximum concentration after complete mixing, calculated according to Step 4 of Appendix VI of the Ocean Plan using the permitted dilution ratio (Dm) of 50 as follows: X-obs = (Ce + Dm * Cs)/(Dm + 1), unless otherwise noted.

Appendix B
Time Schedule Order

California Regional Water Quality Control Board
North Coast Region

TIME SCHEDULE ORDER No. R1-2025-0015
TO PROVIDE TIME SCHEDULES TO COMPLY WITH
ORDER No. R1-2023-0039

CITY OF CRESCENT CITY
WASTEWATER TREATMENT FACILITY
NPDES No. CA0022576

Del Norte County
WDID No. 1A84006ODN

The California Regional Water Quality Control Board, North Coast Region (hereafter Regional Water Board), finds:

1. The City of Crescent City (Permittee) is the owner of the City of Crescent City Wastewater Treatment Facility (Facility) located in Crescent City, California. Operations Management International, Inc (OMI), a member of Jacobs Engineering Group took over responsibility for operations and maintenance of the Facility in September 2019.

2. The Facility discharges treated domestic, commercial, and industrial wastewater and wastewater to the Pacific Ocean, a water of the United States, in accordance with Waste Discharge Requirements (WDRs) Order No. R1-2023-0039 (Permit), adopted on December 12, 2023. The Permit also serves as the National Pollutant Discharge Elimination System (NPDES) permit (NPDES No. CA0022576). The Permit contains discharge prohibitions, effluent and receiving water limitations, compliance provisions and monitoring and reporting requirements.

3. The Permit established new bacteria effluent limitations related to enterococci and total coliform that apply to the discharge of treated wastewater from the Facility. The Permittee has been unable to comply with these final effluent limitations.

4. The Facility serves a population of approximately 15,372 within Crescent City and the surrounding County Service Area (CSA). The CSA has two sub-areas: the Northwest area to the north of the City and the Bertsch Ocean View area to the east of the City.

The Facility is designed to treat an average dry weather flow of 1.86 million gallons per day (mgd), and a peak wet weather flow of 6.12 mgd of secondary treated wastewater. The Permittee has three significant industrial users, including a cheese factory and two breweries that are covered under local pretreatment permits to discharge to the Facility.

The treatment system consists of a mechanically cleaned screen, a flow-measuring Parshall flume, and a wet well in which five pumps are available to lift the flow to the primary clarifiers. Primary treatment consists of two grit removal tanks followed by two rectangular primary clarifiers. Secondary treatment is provided by operating the rotating biological contactors (RBC) and membrane bioreactor (MBR) in parallel. The RBC system consists of three trains of four-stage, RBCs with a combined surface area of 1.2 million square feet. Flow from the RBCs reach three rectangular secondary clarifiers. Flows from the clarifiers and flow from the MBR unit are commingled and disinfected using sodium hypochlorite and dechlorinated using sodium bisulfite prior to discharge to the Pacific Ocean at Discharge Point 001.

5. The Permittee was previously regulated under WDR Order No. R1-2017-0002 (previous permit), adopted by the Regional Water Board on February 2, 2017, which also contained discharge prohibitions, effluent and receiving water limitations, compliance provisions, and monitoring and reporting requirements. In this previous permit, effluent limitations for fecal coliform bacteria were established based on U.S. EPA's National Recommended Criteria for shellfish harvesting waters and are included in the National Shellfish Sanitation Program's Guide for the Control of Molluscan Shellfish, 2015 Revision. (U. S. Department of Health and Human Services, Food and Drug Administration).

6. Historically, the Facility's compliance monitoring for disinfection relied solely on fecal coliform and the Permittee was generally able to comply with these requirements. Six violations of effluent limitations for disinfection were identified during the term of Order No. R1-2017-0002. Under the new Order, disinfection effluent limitations are now based on requirements related to fecal coliform, enterococci, and total coliform. The Permittee reported 29 violations of disinfection effluent limits in the 2024 calendar year and has demonstrated that they cannot consistently comply with the enterococci and total coliform effluent limitations in their NPDES permit (Order No. R1-2023-0039). The Permittee's initial evaluation of their treatment system indicates that bacteria exceedances are related to operation of the RBCs during periods of treatment flows greater than 1.1 million gallons per day (MGD).

7. On July 29, 2024, the Permittee submitted a Time Schedule Order Request for the Facility that expressed a concern that the Facility would continue to exceed the effluent limits for enterococci and total coliform bacteria and requested

interim effluent limitations for the remainder of the current permit term to allow time for the Permittee to determine what corrective actions are necessary to ensure adequate disinfection of the wastewater is occurring at the Facility. Regional Water Board staff identified that in order to provide the requested TSO, the Permittee must further provide the Regional Water Board a general task list that identifies the anticipated steps and a corresponding time schedule that will allow the Facility to come into compliance with the effluent limitations. The Permittee provided this additional information on March 5, 2025.

8. The Regional Water Board concurs that, based on the monitoring results from calendar year 2024, it is infeasible for the Permittee to immediately comply with final effluent imitations for enterococci and total coliform bacteria during periods of treatment flows greater than 1.1 MGD.

9. Terms in the Permit that the Permittees violate and/or threaten to violate are:

   4.1.1.3. **Disinfection:** Disinfected effluent discharged from the wastewater treatment plant through Discharge Point 001 to the Pacific Ocean shall not contain fecal coliform bacteria exceeding the following concentrations, as measured at Monitoring Location EFF-001:

   4.1.1.3.1. **Enterococci**

   4.1.1.3.1.1. The 6-week rolling geometric mean of enterococci shall not exceed 30 colony forming units (CFU) per 100 mL; and

   4.1.1.3.1.2. No sample shall exceed a CFU of 110 per 100 mL.

   4.1.1.3.2. **Total Coliform Organisms**

   4.1.1.3.2.1. The median value of total coliform bacteria shall not exceed an MPN of 70 per 100 mL in a calendar month; and

   4.1.1.3.2.2. Not more than 10 percent of the samples collected in a calendar month shall exceed an MPN of 230 per 100 mL.

10. Water Code section 13300 states: "Whenever a regional board finds that a discharge of waste is taking place or threatening to take place that violates or will violate requirements prescribed by the regional board, or the state board, or that the waste collection, treatment, or disposal facilities of a discharger are approaching capacity, the board may require the discharger to submit for approval of the board, with such modifications as it may deem necessary, a detailed time schedule of specific actions the discharger shall take in order to correct or prevent a violation of requirements."

11. Water Code section 13267, subdivision (a) provides that the Regional Water Board may investigate the quality of any waters of the state within its region. Water Code section 13267, subdivision (b) provides that the Regional Water Board, in conducting an investigation, may require a discharger to furnish, under penalty of perjury, technical or monitoring program reports. The reports required by this Order, pursuant to Water Code section 13267, are necessary to ensure that the future threat to water quality created by activities at the Facility are properly assessed and controlled. Due to the importance of protecting water resources as explained herein, the costs associated with developing the required reports and work plans bear a reasonable relationship to the benefits that will be obtained from having the necessary information for the Regional Water Board to properly regulate and monitor the Facility.

12. Water Code section 13383, subdivision (a) provides the Regional Water Board may establish monitoring, inspection, entry reporting, and record keeping requirements, as authorized by section 13160, 13376, or 13377 for any person who discharges, or proposes to discharge to navigable waters. Subdivision (b) provides that the Regional Water Board may require any person subject to this section to establish and maintain monitoring equipment or methods, including, where appropriate, biological monitoring methods, sample effluent as prescribed, and provide other information as may be reasonably required.

13. Pursuant to Water Code section 13385(j)(3), mandatory minimum penalties (MMPs) will not apply to future violations of the final effluent limitations for enterococci and total coliform bacteria, during the term of this Order, if:
    a. A cease and desist or time schedule order is issued on or after July 1, 2000, and specifies the actions that the Permittee is required to take in order to correct the violations that would otherwise be subject to MMPs;
    b. The Regional Water Board finds that the Permittee is not able to consistently comply with one or more of the effluent limitations established in the waste discharge requirements applicable to the waste discharge because the effluent limitation is a new or more stringent regulatory requirement that has become applicable to the waste discharge after the effective date of the waste discharge requirements and after July 1, 2000, new or modified control measures are necessary in order to comply with the effluent limitation, and the new or modified control measures cannot be designed, installed, and put into operation within 30 calendar days;
    c. The Regional Water Board establishes a time schedule for bringing the waste discharge into compliance with the effluent limitations that is as short as possible, taking into account the technological, operational, and economic factors that affect the design, development, and implementation of the control measures that are necessary to comply with the effluent limitations, and where the time schedule exceeds one year, the time

schedule includes interim requirements and actions and milestones leading to compliance.

14. This Order establishes compliance schedules below that address anticipated future violations of final effluent limitations for enterococci and total coliform bacteria. In accordance with Water Code section 13385 (j)(3)(B) and the terms of this Order, MMPs will not be assessed for violations of the final effluent limitations for enterococci and total coliform bacteria during periods of treatment plant flows greater than 1.1 MGD as stipulated in Finding 11 above. Specifically, the Regional Water Board finds that:

    a. This Order is being issued after July 1, 2000 and specifies the actions the Permittees are required to take to correct the violations of Order No. R1-2023-0039.

    b. The Permittee is unable to consistently comply with the new disinfection effluent limitations related to enterococci and total coliform bacteria because new or modified control measures are needed to achieve compliance, and the new or modified control measures are necessary and dependent on the completion of a series of studies, thus the new or modified control measures cannot be designed, installed, and put into operation within 30 calendar days.

    c. This Order establishes interim effluent limitations for disinfection criteria and establishes a compliance schedule for bringing the Facility into compliance with final effluent limitations for enterococci and total coliform bacteria in the Permit that are as short as possible.

    d. Provisions 6.3.2.1 of the Permit require the Permittees to develop and conduct a Pollution Minimization Program to identify and control pollutant sources including, but not limited to, enterococci and total coliform bacteria at the Facility.

15. Accordingly, the Regional Water Board finds that MMPs for violations of final effluent limitations when discharging to the Pacific Ocean at Discharge Point 001, as measured at Monitoring Location EFF-001 and as specified in Effluent Limitations sections 4.1.1.3.1 and 4.1.1.3.2 of the Permit do not apply for enterococci and total coliform bacteria during months when the Facility's flow exceeds 1.1 MGD and requires operation of the rotating biological contactors. This exception applies through April 1, 2030, provided the Permittee complies with the interim effluent limitations contained in this Order. If an interim effluent limitation contained in this Order is exceeded, then the Permittee is subject to MMPs for that particular exceedance, as it will no longer meet the exception in Water Code section 13385(j)(3)(B)(i)(ii).

16. The compliance schedule established in this Order is intended to be as short as possible. This Order provides a compliance schedule for the Permittee to investigate why they have been unable to comply with their effluent limitations for enterococci and total coliform bacteria and identify and implement corrective actions to come into compliance with the final effluent limitations for these parameters.

17. This Order requires the Permittee to comply with interim effluent limitations for disinfection. The SIP requires that interim effluent limitations for pollutants be based on past performance or limits in previous orders, whichever is more stringent. Interim effluent limitations for total coliform and Enterococci established in this Order were derived based on Facility performance using available effluent monitoring data at Monitoring Location EFF-001, the point of discharge to the Pacific Ocean. These performance-based interim effluent limitations were calculated using statistical methodology described in the U.S. EPA Technical Support Document for Water Quality-based Toxics Control (TSD) and a statistical tool, RPCalc, developed by State Water Resources Control Board staff to assist State and Regional Water Board staff in the development of interim effluent limitations. The 95th percentile concentrations of each pollutant were calculated at the 95 percent confidence level to determine interim Maximum Weekly Effluent Limitations. The calculated limitations were rounded to the nearest whole number:

Table 1: 95th Percentile Concentrations for Interim Effluent Limitations

Parameter	Units	Maximum Weekly Effluent Limitation
Total Coliform Bacteria	MPN/100 mL	939
Enterococci	MPN/100 mL	610

The interim limitations in this Order are intended to ensure that the Permittee maintains at least its existing performance while investigating the necessary means and implementation of prevention measures to improve performance of their disinfection system to the extent possible and completing all tasks required by the compliance schedules. The Permittee remains subject to the permit's final effluent limitation for fecal coliform, thereby ensuring that current performance for this parameter is maintained.

18. The Regional Water Board has notified the Permittee, interested agencies and persons, of its intent to issue a Time Schedule Order in accordance with Water Code section 13167.5.

19. Issuance of this Order is exempt from the provisions of the California Environmental Quality Act (Pub. Resources Code, § 21000 et seq.) ("CEQA") pursuant to CWC section 13389, since the adoption or modification of a NPDES permit for an existing source is statutorily exempt and this Order only serves to

implement a NPDES permit. (Pacific Water Conditioning Ass'n, Inc. v. City Council of City of Riverside (1977) 73 Cal.App.3d 546, 555-556.).

IT IS HEREBY ORDERED, pursuant to Water Code section 13300, 13267 and 13383, the Permittee shall comply with the following requirements and schedule of actions to comply with the Permit:

1. The Permittee shall comply with the following interim effluent limitations in the interim period established by this Order:

Disinfection. During months where the total monthly Facility flow has exceeded 1.1 MGD and has required the operation of the rotating biological contactors, disinfected effluent discharged from the wastewater treatment plant through Discharge Point 001 to the Pacific Ocean shall not contain total coliform bacteria and enterococci exceeding the following concentrations, as measured at Monitoring Location EFF-001:

a. The maximum value of total coliform bacteria shall not exceed an MPN of 939 per 100 mL in a calendar week; and

b. The maximum value of enterococci shall not exceed an MPN of 610 per 100 mL in a calendar week;

2. All required reports and documents shall be submitted to the Regional Water Board. The Pollutant Minimization Program requires Executive Officer approval prior to its implementation.

3. The Permittee shall implement the tasks in the following compliance schedule in order to achieve compliance with the final effluent limitations for disinfection in sections 4.1.1.3.1 and 4.1.1.3.2 of the Permit at the earliest possible date in accordance with the following schedule:

Table 4: Compliance Schedule, Tasks and Dates to Achieve Compliance with the Proposed Permit

Task	Task Description	Compliance Date
A	Submit a Treatment System Evaluation Work Plan for Executive Officer review and approval. The Work Plan shall outline a method to evaluate the Facility's disinfection system and identify alternative means to compliance, such as procedural changes, additional process infrastructure, or alternative treatment, to achieve compliance with the final effluent limitations for enterococci and total coliform bacteria.	June 1, 2025

Task	Task Description	Compliance Date
B	Submit a Treatment System Evaluation Technical Report for Executive Officer review and approval. The Technical Report shall identify all methods evaluated, results of the Discharger's technical evaluation, the corrective action that has been chosen to achieve compliance with all effluent limitations related to the disinfection of the Facility's wastewater, and include a schedule that identifies all necessary tasks to comply with the final limitations that is a short as practicable.	October 31, 2025
C	Submit Semi-Annual Assessment Reports identifying the status of the Disinfection System Evaluation and any current or planned projects that are intended to bring the Permittee into compliance with the final effluent limitations for enterococci and total coliform bacteria. The reports shall include: i. Summary of data collected to date. ii. Evaluation of the Facility performance with regard to disinfection and compliance with final effluent limitations. iii. Evaluation of the potential for operational modifications to achieve desired effluent disinfection. iv. Summary of any implemented operational modifications.	Semi-Annually (January 1 and July 1 of each year)
D	The Permittee shall submit to the Regional Water Board Executive Officer the complete preliminary design specifications and identify funding sources for the selected corrective action.	December 31, 2027
E	The Permittee shall submit written verification and an electronic copy of the complete design plans and specifications for construction of the corrective action to the Regional Water Board Executive Officer.	December 31, 2028
F	The Permittee shall complete construction of the chosen corrective action and submit a final report to the Regional Water Board Executive Officer, including as-built plans of the completed corrective action.	December 31, 2029
G	Achieve full compliance with final effluent limitations for enterococci and total coliform bacteria.	May 1, 2030

4. Until the Permittee can achieve full compliance with the Permit, the Permittee shall operate and maintain, as efficiently as possible, all facilities and systems necessary to comply with all prohibitions, effluent limitations and requirements

identified in the Proposed Permit or any future waste discharge requirements issued for the Facility.

5. If the Permittee is unable to perform any activity or submit any documentation in compliance with the deadlines set forth in this Order, the Permittee may request, in writing, that the Regional Water Board Executive Officer grant an extension of the time. The extension request shall include justification for the delay and shall be submitted at least 21 days prior to the respective deadline to be considered timely. A minor extension may be granted by the Regional Water Board Executive Officer for good cause.

6. If the Regional Water Board finds that the Permittee fails to comply with the provisions of this Order, the Regional Water Board may take all actions authorized by law, including referring the matter to the Attorney General for judicial enforcement or issuing a complaint for administrative civil liability pursuant to Water Code sections 13268, 13350, and/or 13385. The Regional Water Board reserves the right to take any enforcement actions authorized by law.

Any person aggrieved by this action of the North Coast Regional Water Board may petition the State Water Resources Control Board (State Water Board) to review the action in accordance with Water Code section 13320 and California Code of Regulations, title 23, sections 2050. The State Water Board must receive the petition by 5:00 p.m., 30 days after the date of this Order, except that if the thirtieth day following the date of this Order falls on a Saturday, Sunday, or state holiday, the petition must be received by the State Water Board by 5:00 p.m. on the next business day. Copies of the law and regulations applicable to filing petitions may be found on the Internet or will be provided upon request.

Ordered by: _____
Valerie Quinto
Executive Officer

25_0015_CrescentCity_TSO

Appendix C
Administrative Civil Liability Claim

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
NORTH COAST REGION

ADMINISTRATIVE CIVIL LIABILITY COMPLAINT NO. R1-2025-0034

IN THE MATTER OF
THE CITY OF CRESCENT CITY
WASTEWATER TREATMENT FACILITY
DEL NORTE COUNTY

This Administrative Civil Liability Complaint (Complaint) is issued by the Assistant Executive Officer of the North Coast Regional Water Quality Control Board (Regional Water Board) to the City of Crescent City (Discharger) for violations of effluent limitations contained in Waste Discharge Requirements (WDRs) Order Nos. R1-2017-0002 and R1-2023-0039, National Pollutant Discharge Elimination System (NPDES) Permit No. CA0022756, for which the Regional Water Board may impose civil liability pursuant to Water Code section 13385. The Regional Water Board's Executive Officer has delegated their authority under Water Code section 13323 to issue this Complaint to the Assistant Executive Officer.

1. The City of Crescent City Wastewater Treatment Facility (Facility) is a publicly owned treatment works (POTW), located at 210 Battery Street in Crescent City, Del Norte County, California. The Facility is currently regulated under WDRs Order No. R1-2023-0039, replacing Order No. R1-2017-0002[1]. The orders serve as both NPDES permits and as waste discharge requirements for discharges from the facility.

2. The Regional Water Board adopted WDRs Order No. R1-2017-0002 (2017 Order) on February 2, 2017, and it became effective on April 1, 2017. The Regional Water Board adopted WDRs Order No. R1-2023-0039 (2023 Order) on December 12, 2023, and it became effective on February 2, 2024. The 2017 Order and 2023 Order established, among other things, final effluent limitations for the discharges from the Discharger's permitted discharge location, Discharge Point 001.

3. Section IV.A. of the 2017 Order and Section 4.1 of the 2023 Order contain, in part, the following effluent limitations for Total Coliform, Enterococci, Ammonia Nitrogen, Total (as N), and Chlorine, Total Residual with which the Discharger is required to maintain compliance at Discharge Point 001:

[1] WDRs Order No. R1-2017-0002 is still active for enforcement purposes.

Parameter	Units	Instantaneous Maximum	6-Month Median	Maximum Daily
Chlorine, Total Residual	µg/L	1800	60	240
Ammonia Nitrogen, Total (as N)	mg/L	180	18	72
Settleable Solids	ml/L	3.0	--	--

Parameter	Units	30-Day/ Monthly Median	Instantaneous	10% for 30 days	6-Week Rolling
Total Coliform	MPN/100 mL	70	--	230	--
Enterococci	MPN/100 mL	--	110	--	30

ALLEGATIONS:

4. Self-monitoring reports submitted by the Discharger between January 1, 2024, through August 1, 2025, show that the Discharger violated the above-referenced limitations 76 times, all of which were classified as chronic violations, including: Chlorine, Total Residual effluent limitation on one (1) occasion; Settleable Solids effluent limitation on one (1) occasion; Ammonia, Total as N, effluent limitation on three (3) occasions; Enterococci effluent limitation on fifty-three (53) occasions; and Total Coliform effluent limitation on twenty-one (21) occasions as identified in Exhibit A. Exhibit A is attached hereto and is incorporated herein by this reference. This Complaint only addresses administrative civil liability for the violations specifically identified in Exhibit A, which are subject to mandatory minimum penalties (MMPs) under Water Code section 13385, subdivisions (h) and/or (i).

LEGAL PROVISIONS UPON WHICH LIABILITY IS BASED:

5. Water Code section 13376 prohibits the discharge of pollutants in violation of effluent limitations set forth in WDRs.

6. Water Code section 13385, subdivision (h)(1), requires the Regional Water Board to assess an MMP of three thousand dollars ($3,000) for each serious violation.

7. Water Code section 13385, subdivision (h)(2), defines a “serious violation” as “any waste discharge that violates the effluent limitations contained in the applicable [WDRs] for a Group II pollutant, as specified in Appendix A to Section

123.45 of Title 40 of the Code of Federal Regulations, by 20 percent or more or for a Group I pollutant, as specified in Appendix A to Section 123.45 of Title 40 of the Code of Federal Regulations, by 40 percent or more."

8. Water Code section 13385, subdivision (i)(1), also requires the Regional Water Board to assess an MMP of three thousand dollars ($3,000) for each violation, not counting the first three violations, if the Discharger does any of the following four or more times in a period of six consecutive months:

    a. Violates a waste discharge requirement effluent limitation;
    b. Fails to file a report pursuant to section 13260;
    c. Files an incomplete report pursuant to section 13260; or
    d. Violates a toxicity effluent limitation contained in the applicable WDRs where the WDRs do not contain pollutant-specific effluent limitations for toxic pollutants.

9. Water Code section 13385, subdivision (i)(2), defines a "period of six consecutive months" to mean "the period commencing on the date that one of the violations described in this subdivision occurs and ending 180 days after that date."

PROPOSED ADMINISTRATIVE CIVIL LIABILITY ASSESSMENT:

10. The Assistant Executive Officer proposes that the Discharger be assessed an MMP of two hundred twenty-eight thousand dollars ($228,000) for exceeding the effluent limitations for Total Coliform, Enterococci, Ammonia, Settleable Solids, Total as N, and Chlorine, Total Residual specifically identified in Exhibit A.

THE DISCHARGER IS HEREBY GIVEN NOTICE THAT:

11. The Regional Water Board will hold a hearing on this Complaint on a date proposed by the Regional Water Board Advisory Team, likely on December 4-5, 2025. The meeting is tentatively scheduled to take place in the town of Santa Rosa in Sonoma County, California, at a location to be announced, or at a location posted on the Regional Water Board's website, unless the Discharger does one of the following by the deadline to submit the Waiver Form (Attachment B), which will be specified in the Notice of Public Hearing and Hearing Procedures that will subsequently be issued by the Advisory Team:

    a. Waive the right to a hearing before the Regional Water Board and pay the proposed MMP of **$228,000** in full;

    b. Waive the right to a hearing-within-90-days before the Regional Water Board after service of this Complaint to engage the Regional Water Board Prosecution Team in settlement negotiations; or

c. Waive the right to a hearing-within-90-days before the Regional Water Board after service of this Complaint to extend the hearing date and/or hearing deadlines and allow additional time to prepare for hearing.

12. To select one of the waiver options identified above, the Discharger must complete the enclosed Waiver Form and submit it to the Regional Water Board Advisory Team. If the Discharger has questions about the Waiver Form or wishes to request an extension to the deadline, it should contact the Regional Water Board Advisory Team.

    All submittals and communications to the Advisory Team shall be sent to:

    Advisory Team
    Valerie Quinto
    Executive Officer
    Regional Water Quality Control Board
    North Coast Region
    Valerie.Quinto@waterboards.ca.gov

    Bayley Toft-Dupuy
    Attorney IV
    Office of Chief Counsel
    State Water Resources Control Board
    (916) 341-5165
    bayley.toft-dupuy@waterboards.ca.gov

    Nathan Jacobsen
    Attorney IV
    Office of Chief Counsel
    State Water Resources Control Board
    (916) 341-5181
    Nathan.Jacobsen@waterboards.ca.gov

13. If a hearing takes place, it will be governed by the Notice of Public Hearing and Hearing Procedures that will be provided by the Regional Water Board Advisory Team.

14. During the hearing, the Regional Water Board will hear testimony and arguments and affirm, reject, or modify the proposed MMP amount, or determine whether to refer the matter to the Attorney General for recovery of judicial civil liability.

15. Issuance of this Complaint is an enforcement action and is, therefore, exempt from the California Environmental Quality Act (Pub. Resources and Code section 21000 *et seq*.), pursuant to California Code of Regulations, title 14, section 15321, subdivision (a)(2).

Digitally signed by
Claudia E. Villacorta
Date: 2025.08.26
11:44:27 -07'00'

Water Boards

Claudia E. Villacorta, P.E.
Assistant Executive Officer

Attachments:

A. Exhibit A: List of Violations Requiring Mandatory Minimum Penalties
B. Hearing Waiver Form for Administrative Civil Liability Compliant

MANDATORY PENALTY ADMINISTRATIVE CIVIL LIABILITY

Crescent City

Crescent City WWTF

WDID No. 1A84006ODN NPDES No. CA0022756

EXHIBIT "A"

Effluent Limitation Violations Requiring Mandatory Minimum Penalties

#	Violation Number	Violation Date	Constituent	Pollutant Group	Limitation Period	Limit	Result/ Average	Units	Exempted from MMP?	Exempt Reason	% Over Limit	Date 180 Days Prior	Serious or Chronic Violation?	No. of Violations within 180 days	Mandatory Fine?	Water Code	Penalty
1	1126819	01/01/2024	Chlorine, Total Residual	Group 2	Instantaneous	1800	1808	mg/L	Y	a	0.4%	07/05/2023	C	1	N		$ 0
2	1126816	02/05/2024	Enterococci	Other	Instantaneous	110	549	CFU/100	Y	a	N/A	08/09/2023	C	2	N		$ 0
3	1126817	02/29/2024	Total Coliform	Other	Monthly Median	70	110	MPN/100	Y	a	N/A	09/02/2023	C	3	N		$ 0
4	1126820	03/04/2024	Enterococci	Other	Instantaneous	110	1200	CFU/100	N		N/A	09/06/2023	C	4	Y	13385(i)	$ 3,000
5	1126813	03/11/2024	Enterococci	Other	6-Week Rolling	30	115	CFU/100	N		N/A	09/13/2023	C	5	Y	13385(i)	$ 3,000
6	1126814	03/18/2024	Enterococci	Other	6-Week Rolling	30	72	CFU/100	N		N/A	09/20/2023	C	6	Y	13385(i)	$ 3,000
7	1126815	03/25/2024	Enterococci	Other	6-Week Rolling	30	81	CFU/100	N		N/A	09/27/2023	C	7	Y	13385(i)	$ 3,000
8	1126822	03/27/2024	Enterococci	Other	Instantaneous	110	292	CFU/100	N		N/A	09/29/2023	C	8	Y	13385(i)	$ 3,000
9	1126823	03/27/2024	Enterococci	Other	6-Week Rolling	30	98	CFU/100	N		N/A	09/29/2023	C	9	Y	13385(i)	$ 3,000
10	1130318	04/01/2024	Enterococci	Other	6-Week Rolling	30	79	MPN/100	N		N/A	10/04/2023	C	10	Y	13385(i)	$ 3,000
11	1130316	04/04/2024	Enterococci	Other	6-Week Rolling	30	71	MPN/100	N		N/A	10/07/2023	C	11	Y	13385(i)	$ 3,000
12	1130317	04/08/2024	Enterococci	Other	6-Week Rolling	30	60	MPN/100	N		N/A	10/11/2023	C	12	Y	13385(i)	$ 3,000
13	1130319	04/15/2024	Enterococci	Other	6-Week Rolling	30	33	MPN/100	N		N/A	10/18/2023	C	13	Y	13385(i)	$ 3,000
14	1130320	05/31/2024	Total Coliform	Other	30-Day Median	70	81	MPN/100	N		N/A	12/03/2023	C	14	Y	13385(i)	$ 3,000
15	1135161	07/31/2024	Total Coliform	Other	10% for 30 days	10	20	%	N		N/A	02/02/2024	C	14	Y	13385(i)	$ 3,000
16	1135163	07/31/2024	Total Coliform	Other	Monthly Median	70	94	MPN/100	N		N/A	02/02/2024	C	15	Y	13385(i)	$ 3,000
17	1135160	09/30/2024	Total Coliform	Other	10% for 30 days	10	20	%	N		N/A	04/03/2024	C	7	Y	13385(i)	$ 3,000
18	1135162	09/30/2024	Ammonia, Total (as N)	Group 1	6-Month Median	18	19.1	mg/L	N		6%	04/03/2024	C	8	Y	13385(i)	$ 3,000
19	1139688	10/31/2024	Ammonia, Total (as N)	Group 1	6-Month Median	18	18.9	mg/L	N		5%	05/04/2024	C	6	Y	13385(i)	$ 3,000
20	1139689	10/31/2024	Total Coliform	Other	Monthly Median	70	120	MPN/100	N		N/A	05/04/2024	C	7	Y	13385(i)	$ 3,000
21	1139678	11/30/2024	Total Coliform	Other	10% for 30 days	10	50	%	N		N/A	06/03/2024	C	7	Y	13385(i)	$ 3,000
22	1139690	11/30/2024	Total Coliform	Other	Monthly Median	70	295	MPN/100	N		N/A	06/03/2024	C	8	Y	13385(i)	$ 3,000
23	1139691	11/30/2024	Ammonia, Total (as N)	Group 1	6-Month Median	18	18.8	mg/L	N		4%	06/03/2024	C	9	Y	13385(i)	$ 3,000
24	1139680	12/30/2024	Enterococci	Other	Instantaneous	110	201	MPN/100	N		N/A	07/03/2024	C	10	Y	13385(i)	$ 3,000
25	1139679	12/31/2024	Total Coliform	Other	10% for 30 days	10	40	%	N		N/A	07/04/2024	C	11	Y	13385(i)	$ 3,000
26	1139692	12/31/2024	Total Coliform	Other	Monthly Median	70	220	MPN/100	N		N/A	07/04/2024	C	12	Y	13385(i)	$ 3,000
27	1142874	01/01/2025	Enterococci	Other	Instantaneous	110	120	MPN/100	N		N/A	07/05/2024	C	13	Y	13385(i)	$ 3,000
28	1142888	01/03/2025	Enterococci	Other	Instantaneous	110	1410	MPN/100	N		N/A	07/07/2024	C	14	Y	13385(i)	$ 3,000
29	1142892	01/03/2025	Enterococci	Other	6-Week Rolling	30	47	MPN/100	N		N/A	07/07/2024	C	15	Y	13385(i)	$ 3,000
30	1142883	01/06/2025	Enterococci	Other	6-Week Rolling	30	57	MPN/100	N		N/A	07/10/2024	C	16	Y	13385(i)	$ 3,000
31	1142889	01/06/2025	Enterococci	Other	Instantaneous	110	298	MPN/100	N		N/A	07/10/2024	C	17	Y	13385(i)	$ 3,000
32	1142884	01/08/2025	Enterococci	Other	6-Week Rolling	30	54	MPN/100	N		N/A	07/12/2024	C	18	Y	13385(i)	$ 3,000
33	1142881	01/13/2025	Enterococci	Other	6-Week Rolling	30	66	MPN/100	N		N/A	07/17/2024	C	19	Y	13385(i)	$ 3,000
34	1142882	01/15/2025	Enterococci	Other	6-Week Rolling	30	57	MPN/100	N		N/A	07/19/2024	C	20	Y	13385(i)	$ 3,000
35	1142885	01/20/2025	Enterococci	Other	6-Week Rolling	30	63	MPN/100	N		N/A	07/24/2024	C	21	Y	13385(i)	$ 3,000
36	1142913	01/27/2025	Enterococci	Other	6-Week Rolling	30	69.4	MPN/100	N		N/A	07/31/2024	C	22	Y	13385(i)	$ 3,000
37	1142904	01/31/2025	Total Coliform	Other	10% for 30 days	10	25	%	N		N/A	08/04/2024	C	21	Y	13385(i)	$ 3,000
38	1142916	01/31/2025	Total Coliform	Other	Monthly Median	70	150	MPN/100	N		N/A	08/04/2024	C	22	Y	13385(i)	$ 3,000
39	1142886	02/03/2025	Enterococci	Other	6-Week Rolling	30	77.4	MPN/100	N		N/A	08/07/2024	C	23	Y	13385(i)	$ 3,000
40	1142915	02/03/2025	Enterococci	Other	Instantaneous	110	208	MPN/100	N		N/A	08/07/2024	C	24	Y	13385(i)	$ 3,000
41	1142914	02/10/2025	Enterococci	Other	6-Week Rolling	30	36	MPN/100	N		N/A	08/14/2024	C	25	Y	13385(i)	$ 3,000
42	1142875	02/24/2025	Enterococci	Other	Instantaneous	110	365	MPN/100	N		N/A	08/28/2024	C	26	Y	13385(i)	$ 3,000
43	1142887	02/24/2025	Enterococci	Other	6-Week Rolling	30	50.8	MPN/100	N		N/A	08/28/2024	C	27	Y	13385(i)	$ 3,000
44	1142891	02/28/2025	Total Coliform	Other	10% for 30 days	10	50	%	N		N/A	09/01/2024	C	28	Y	13385(i)	$ 3,000
45	1142900	02/28/2025	Total Coliform	Other	Monthly Median	70	190	MPN/100	N		N/A	09/01/2024	C	29	Y	13385(i)	$ 3,000
46	1142893	03/03/2025	Enterococci	Other	Instantaneous	110	178	MPN/100	N		N/A	09/04/2024	C	30	Y	13385(i)	$ 3,000
47	1142896	03/03/2025	Enterococci	Other	6-Week Rolling	30	69	MPN/100	N		N/A	09/04/2024	C	31	Y	13385(i)	$ 3,000
48	1142897	03/05/2025	Enterococci	Other	6-Week Rolling	30	62	MPN/100	N		N/A	09/06/2024	C	32	Y	13385(i)	$ 3,000
49	1142907	03/10/2025	Enterococci	Other	6-Week Rolling	30	75	MPN/100	N		N/A	09/11/2024	C	33	Y	13385(i)	$ 3,000
50	1142894	03/12/2025	Enterococci	Other	Instantaneous	110	199	MPN/100	N		N/A	09/13/2024	C	34	Y	13385(i)	$ 3,000
51	1142908	03/12/2025	Enterococci	Other	6-Week Rolling	30	86	MPN/100	N		N/A	09/13/2024	C	35	Y	13385(i)	$ 3,000
52	1142901	03/17/2025	Enterococci	Other	6-Week Rolling	30	108	MPN/100	N		N/A	09/18/2024	C	36	Y	13385(i)	$ 3,000
53	1142909	03/17/2025	Enterococci	Other	Instantaneous	110	1300	MPN/100	N		N/A	09/18/2024	C	37	Y	13385(i)	$ 3,000
54	1142890	03/19/2025	Enterococci	Other	6-Week Rolling	30	106	MPN/100	N		N/A	09/20/2024	C	38	Y	13385(i)	$ 3,000
55	1142876	03/24/2025	Enterococci	Other	6-Week Rolling	30	160	MPN/100	N		N/A	09/25/2024	C	39	Y	13385(i)	$ 3,000
56	1142910	03/24/2025	Enterococci	Other	Instantaneous	110	548	MPN/100	N		N/A	09/25/2024	C	40	Y	13385(i)	$ 3,000
57	1142906	03/26/2025	Enterococci	Other	Instantaneous	110	164	MPN/100	N		N/A	09/27/2024	C	41	Y	13385(i)	$ 3,000
58	1142911	03/26/2025	Enterococci	Other	6-Week Rolling	30	160	MPN/100	N		N/A	09/27/2024	C	42	Y	13385(i)	$ 3,000
59	1142895	03/31/2025	Enterococci	Other	Instantaneous	110	1050	MPN/100	N		N/A	10/02/2024	C	41	Y	13385(i)	$ 3,000
60	1142902	03/31/2025	Total Coliform	Other	Monthly Median	70	110	MPN/100	N		N/A	10/02/2024	C	42	Y	13385(i)	$ 3,000
61	1142905	03/31/2025	Total Coliform	Other	10% for 30 days	10	40	%	N		N/A	10/02/2024	C	43	Y	13385(i)	$ 3,000
62	1142912	03/31/2025	Enterococci	Other	6-Week Rolling	30	207	MPN/100	N		N/A	10/02/2024	C	44	Y	13385(i)	$ 3,000
63	1145356	04/02/2025	Enterococci	Other	Instantaneous	110	921	MPN/100	N		N/A	10/04/2024	C	45	Y	13385(i)	$ 3,000
64	1145357	04/02/2025	Enterococci	Other	6-Week Rolling	30	237	MPN/100	N		N/A	10/04/2024	C	46	Y	13385(i)	$ 3,000
65	1145353	04/07/2025	Enterococci	Other	Instantaneous	110	461	MPN/100	N		N/A	10/09/2024	C	47	Y	13385(i)	$ 3,000

66	1145358	04/07/2025	Enterococci	Other	6-Week Rolling	30	242	MPN/100	N		N/A	10/09/2024	C	48	Y	13385(i)	$ 3,000
67	1145359	04/09/2025	Enterococci	Other	6-Week Rolling	30	222	MPN/100	N		N/A	10/11/2024	C	49	Y	13385(i)	$ 3,000
68	1145360	04/14/2025	Enterococci	Other	6-Week Rolling	30	236	MPN/100	N		N/A	10/16/2024	C	50	Y	13385(i)	$ 3,000
69	1145349	04/16/2025	Enterococci	Other	6-Week Rolling	30	200	MPN/100	N		N/A	10/18/2024	C	51	Y	13385(i)	$ 3,000
70	1145350	04/21/2025	Enterococci	Other	6-Week Rolling	30	189	MPN/100	N		N/A	10/23/2024	C	52	Y	13385(i)	$ 3,000
71	1145352	04/28/2025	Enterococci	Other	6-Week Rolling	30	123	MPN/100	N		N/A	10/30/2024	C	53	Y	13385(i)	$ 3,000
72	1145361	04/30/2025	Total Coliform	Other	Monthly Median	225	70	MPN/100	N		N/A	11/01/2024	C	52	Y	13385(i)	$ 3,000
73	1145362	04/30/2025	Total Coliform	Other	10% for 30 days	10	50	%	N		N/A	11/01/2024	C	53	Y	13385(i)	$ 3,000
74	1145364	05/04/2025	Enterococci	Other	6-Week Rolling	30	80	MPN/100	N		N/A	11/05/2024	C	55	Y	13385(i)	$ 3,000
75	1145354	05/11/2025	Settleable Solids	Group 1	Instantaneous	3	4	ml/L	N		33%	11/12/2024	C	56	Y	13385(i)	$ 3,000
76	1145365	05/12/2025	Enterococci	Other	6-Week Rolling	30	37	MPN/100	N		N/A	11/13/2024	C	57	Y	13385(i)	$ 3,000
77	1145545	05/31/2025	Total Coliform	Other	10% for 30 days	10	25	%	N		N/A	12/02/2024	C	53	Y	13285 (i)	$ 3,000
78	1145351	06/30/2025	Total Coliform	Other	10% for 30 days	10	80	%	N		N/A	01/01/2025	C	52	Y	13385(i)	$ 3,000
79	1145355	06/30/2025	Total Coliform	Other	Monthly Median	70	350	MPN/100	N		N/A	01/01/2025	C	53	Y	13385(i)	$ 3,000

Total Penalty: **$228,000**

Legend of Table

a. The first three violations in a 180-day period shall not receive MMP assessment unless serious.

Ct. Count – The number that follows represents the number of exceedances in the past 180 days. A count > than Ct. 3 means that a penalty under Water Code Section 13385 (i) applies.

6-Week Rolling – Six-week Rolling Geometric Mean. The rolling geometric mean shall be calculated using at least 5 sample results over a 6-week period from a site using the formula demonstrated in section 7.8.3 of the 2023 Order.

10% for 30 days – Not more than 10 percent of the samples collected in a calendar month shall exceed effluent limitations defined in section 4.1 of the 2023 Order.

- Violation occurs on sample date or last date of averaging period.
- For Group I pollutants, a violation is serious when the limit is exceeded by 40% or more
- For Group II pollutants, a violation is serious when the limit is exceeded by 20% or more
- When a serious violation occurs on the same day as a chronic, the serious violation is only assessed an MMP once and is counted last for the day when determining the number of chronic violations to be assessed a penalty.

Violation Period Between January 1, 2024, and August 1, 2025

Group I Violations Assessed MMP:	4
Group II Violations Assessed MMP:	0
Other Effluent Violations Assessed MMP:	72
Violations Exempt from MMP:	3
Total Violations Assessed MMP:	76

Mandatory Minimum Penalty = (0 Serious Violations + 76 Non-Serious Violations) x $3,000 = $228,000

WAIVER FORM
FOR ADMINISTRATIVE CIVIL LIABILITY COMPLAINT

By signing this waiver, I affirm and acknowledge the following:

I am duly authorized to represent The City of Crescent City (Discharger) in connection with Administrative Civil Liability Complaint No. R1-2025-0034 (Complaint). I am informed that California Water Code section 13323, subdivision (b), states that, "a hearing before the regional board shall be conducted within 90 days after the party has been served [with the complaint]. The person who has been issued a complaint may waive the right to a hearing."

OPTION 1: Check here if the Discharger waive the hearing requirement and will pay the liability in full.

a. I hereby waive any right the Discharger may have to a hearing before the North Coast Regional Water Quality Control Board (Regional Water Board).

b. I certify that the Discharger will remit payment for the proposed civil liability in the full amount of **two hundred twenty-eight thousand ($228,000)** by submitting a check that references "ACL Complaint No. R1-2025-0034" made payable to the Accounting Office, Attn: ACL Payment Accounting Office, PO Box 1888, Sacramento, California, 95812-1888, and a copy of the check to the Regional Water Board within 30 days from the date on which this waiver is executed.

c. I understand the payment of the above amount constitutes a proposed settlement of the Complaint, and that any settlement will not become final until after a 30-day public notice and comment period. Should the Regional Water Board receive significant new information or comments from any source (excluding the Regional Water Board's Prosecution Team) during this comment period, the Regional Water Board's Assistant Executive Officer may withdraw the Complaint, return payment, and issue a new Complaint. I understand that this proposed settlement is subject to approval by the Regional Water Board, and that the Regional Water Board may consider this proposed settlement in a public meeting or hearing. I also understand that approval of the settlement will result in the Discharger having waived the right to contest the allegations in the Complaint and the imposition of civil liability.

d. I understand that payment of the above amount is not a substitute for compliance with applicable laws and that continuing violations of the type alleged in the Complaint may subject the Discharger to further enforcement, including additional civil liability.

OPTION 2: Check here if the Discharger waive the 90-day hearing requirement in order to engage in settlement discussions.

a. I hereby waive any right the Discharger may have to a hearing before the Regional Water Board within 90 days after service of the Complaint, but I reserve the ability to request a hearing in the future. I certify that the Discharger will promptly engage the Regional Water Board Prosecution Team in settlement discussions to attempt to resolve the outstanding violation(s). By checking this box, the Discharger requests that the Regional Water Board delay the hearing so that the Discharger and the Prosecution Team can discuss settlement. It remains within the discretion of the Regional Water Board to agree to delay the hearing. Any proposed settlement is subject to the conditions described above under "Option 1." In these discussions, the Discharger may raise settlement options, including a Supplemental Environmental Project(s), that meet the State Water Resources Control Board's requirements. Copies of the State Water Resources Control Board's 2017 Water Quality Enforcement Policy and 2018 Policy on Supplemental Environmental Projects, are available at:

https://www.waterboards.ca.gov/water_issues/programs/enforcement/docs/2024/2024-enforcement-policy.pdf
and
https://www.waterboards.ca.gov/water_issues/programs/enforcement/docs/seps/20180503_sep_policy_amd.pdf

OPTION 3: Check here if the Discharger waives the 90-day hearing requirement in order to extend the hearing date and/or hearing deadlines. Attach a separate sheet with the amount of additional time requested and the rationale.

a. I hereby waive any right the Discharger may have to a hearing before the Regional Water Board within 90 days after service of the Complaint. By checking this box, the Discharger requests that the Regional Water Board delay the hearing and/or hearing deadlines so that the Discharger may have additional time to prepare for the hearing. It remains within the discretion of the Regional Water Board to approve the extension.

CRESCENT CITY
WASTEWATER TREATMENT FACILITY

_____
(Print Name and Title)

_____
(Signature)

_____
(Date)

Appendix D
Hydraulic Calculations

```
*****************************************
*                                       *
*                  HYDRO                *
*        TREATMENT PLANT HYDRAULICS     *
*                                       *
*             CH2M Hill, Inc.           *
*         2300 NW Walnut Boulevard      *
*               P.O. Box 428            *
*         Corvallis, Oregon  97330      *
*                                       *
*             VERSION  10.10            *
*               01-OCT-15               *
*                                       *
*           (C) COPYRIGHT 2015          *
*             CH2M HILL, INC.           *
*           ALL RIGHTS RESERVED         *
*                                       *
*                                       *
*                                       *
*                  NOTE                 *
* This page contains valuable information *
* that should be saved.  If it becomes    *
* necessary to rerun this analysis in the *
* future, this page will allow retrieval  *
* of the proper program and data files.   *
*****************************************



UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN

                                                                  PAGE   1
Q1=    0.00     Q2=    0.00     Q3=    0.00
=========================================================================




UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN

                                                                  PAGE   2
Q1=    0.48     Q2=    0.00     Q3=    0.00
=========================================================================
```

```
CONDITIONS SET -                                                NODE =   5
* Effluent_CL_Contact_Basin
ENERGY LINE =  18.98  Q1 =   0.48  Q2 =   0.00  Q3 =   0.00  VEL = 0.00

 There are mutliple different elevations shown from different drawings

ELEMENT NO.  4                                          NODES     5   10
* Weir into Effluent
RECTANGULAR WEIR        FLOWRATE =     0.48          NON SUBMERGED WEIR
WEIR ------------ SIDE CONTRACTION COEFFICIENT =0.00    ELEV =    19.11
LENGTH =   4.0       SUBMERGENCE =  0.00               HEAD =     0.15
HYDRAULIC GRADE LINE ELEV. HLOSS =  0.28    DN =   18.98  UP =    19.26
ENERGY LINE ELEVATION                       DN =   18.98  UP =    19.26



ELEMENT NO.  6                                          NODES    10   15
* CL_Contact_Channel
RECT/TRAP CHANNEL       FLOWRATE =     0.48     MINOR LOSS K =    0.000
BASE =  65.0     SLP = 0.0   LEN =  29.4     N =0.015  SLOPE =  0.00200
VELOCITY ---------------- NORMAL =  1.08    DN =    0.02  UP =     0.02
CHANNEL BOTTOM ELEVATION                    DN =   10.25  UP =    10.31
DEPTH ---- CRIT =  0.08   NORMAL =   0.13   DN =    9.01  UP =     8.95
HEAD LOSS -----            MINOR =  0.000  HLOSS = 0.001  TOTAL = 0.001
HYDRAULIC GRADE LINE ELEV                   DN =   19.26  UP =    19.26
ENERGY LINE ELEVATION                       DN =   19.26  UP =    19.26



ELEMENT NO. 30                                          NODES     3
 * Bend 1
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00  TURNING ANGLE = 90.00
CALCULATED K =  1.03   VHEAD =  0.00   DEPTHS: UP =  8.86  CRIT =  0.08
HYDRAULIC GRADE LINE                        DN =   19.26  UP =    19.26
ENERGY LINE EL.    HEAD LOSS =  0.00        DN =   19.26  UP =    19.26




UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN

                                                                  PAGE   3
Q1=    0.48     Q2=    0.00     Q3=    0.00
=====================================================================
```

```
ELEMENT NO. 30                                          NODES     4
 * Bend 2
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00  TURNING ANGLE = 90.00
CALCULATED K =  1.03   VHEAD =  0.00   DEPTHS: UP =  8.86  CRIT =  0.08
HYDRAULIC GRADE LINE                         DN =   19.26  UP =    19.26
ENERGY LINE EL.    HEAD LOSS =  0.00         DN =   19.26  UP =    19.26



ELEMENT NO.  6                                          NODES    25   30
* CL_Contact_Channel
RECT/TRAP CHANNEL       FLOWRATE =     0.48     MINOR LOSS K =    0.000
BASE =  65.0     SLP = 0.0   LEN =  30.4     N =0.015  SLOPE =  0.00200
VELOCITY ---------------- NORMAL =  1.08    DN =    0.02  UP =     0.02
CHANNEL BOTTOM ELEVATION                     DN =   10.57  UP =    10.63
DEPTH ---- CRIT =  0.08   NORMAL =   0.13   DN =    8.69  UP =     8.63
HEAD LOSS -----            MINOR =  0.000  HLOSS = 0.002  TOTAL = 0.002
HYDRAULIC GRADE LINE ELEV                    DN =   19.26  UP =    19.26
ENERGY LINE ELEVATION                        DN =   19.26  UP =    19.26



ELEMENT NO. 30                                          NODES     6
 * Bend 3
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00  TURNING ANGLE = 90.00
CALCULATED K =  1.01   VHEAD =  0.00   DEPTHS: UP =  8.80  CRIT =  0.08
HYDRAULIC GRADE LINE                         DN =   19.26  UP =    19.26
ENERGY LINE EL.    HEAD LOSS =  0.00         DN =   19.26  UP =    19.26



ELEMENT NO. 30                                          NODES     7
 * Bend 4
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00  TURNING ANGLE = 90.00
CALCULATED K =  1.01   VHEAD =  0.00   DEPTHS: UP =  8.80  CRIT =  0.08
HYDRAULIC GRADE LINE                         DN =   19.26  UP =    19.26
ENERGY LINE EL.    HEAD LOSS =  0.00         DN =   19.26  UP =    19.26




UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN
```

Q1= 0.48 Q2= 0.00 Q3= 0.00

==========

ELEMENT NO. 6 NODES 40 45
* CL_Contact_Channel
RECT/TRAP CHANNEL FLOWRATE = 0.48 MINOR LOSS K = 0.000
BASE = 65.0 SLP = 0.0 LEN = 27.5 N =0.015 SLOPE = 0.00200
VELOCITY ---------- NORMAL = 1.08 DN = 0.02 UP = 0.02
CHANNEL BOTTOM ELEVATION DN = 10.40 UP = 10.45
DEPTH ---- CRIT = 0.08 NORMAL = 0.13 DN = 8.86 UP = 8.81
HEAD LOSS ----- MINOR = 0.000 HLOSS = 0.001 TOTAL = 0.001
HYDRAULIC GRADE LINE ELEV DN = 19.26 UP = 19.26
ENERGY LINE ELEVATION DN = 19.26 UP = 19.26

ELEMENT NO. 30 NODES 9
* Bend 5
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00 TURNING ANGLE = 90.00
CALCULATED K = 1.00 VHEAD = 0.00 DEPTHS: UP = 8.75 CRIT = 0.08
HYDRAULIC GRADE LINE DN = 19.26 UP = 19.26
ENERGY LINE EL. HEAD LOSS = 0.00 DN = 19.26 UP = 19.26

ELEMENT NO. 30 NODES 10
* Bend 6
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00 TURNING ANGLE = 90.00
CALCULATED K = 1.00 VHEAD = 0.00 DEPTHS: UP = 8.75 CRIT = 0.08
HYDRAULIC GRADE LINE DN = 19.26 UP = 19.26
ENERGY LINE EL. HEAD LOSS = 0.00 DN = 19.26 UP = 19.26

ELEMENT NO. 6 NODES 55 60
* CL_Contact_Channel
RECT/TRAP CHANNEL FLOWRATE = 0.48 MINOR LOSS K = 0.000
BASE = 65.0 SLP = 0.0 LEN = 27.5 N =0.015 SLOPE = 0.00200
VELOCITY ---------- NORMAL = 1.08 DN = 0.02 UP = 0.02
CHANNEL BOTTOM ELEVATION DN = 10.46 UP = 10.52
DEPTH ---- CRIT = 0.08 NORMAL = 0.13 DN = 8.80 UP = 8.75
HEAD LOSS ----- MINOR = 0.000 HLOSS = 0.001 TOTAL = 0.001
HYDRAULIC GRADE LINE ELEV DN = 19.26 UP = 19.26
ENERGY LINE ELEVATION DN = 19.26 UP = 19.26

UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT FLOWS = MGD VELOCITY = FPS
WIDTH/HEIGHT = IN DIAM = IN

Q1= 0.48 Q2= 0.00 Q3= 0.00

==========

ELEMENT NO. 30 NODES 12
* Bend 7
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00 TURNING ANGLE = 90.00
CALCULATED K = 0.99 VHEAD = 0.00 DEPTHS: UP = 8.69 CRIT = 0.08
HYDRAULIC GRADE LINE DN = 19.26 UP = 19.26
ENERGY LINE EL. HEAD LOSS = 0.00 DN = 19.26 UP = 19.26

ELEMENT NO. 30 NODES 13
* Bend 8
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00 TURNING ANGLE = 90.00
CALCULATED K = 0.99 VHEAD = 0.00 DEPTHS: UP = 8.69 CRIT = 0.08
HYDRAULIC GRADE LINE DN = 19.26 UP = 19.26
ENERGY LINE EL. HEAD LOSS = 0.00 DN = 19.26 UP = 19.26

ELEMENT NO. 6 NODES 70 75
* CL_Contact_Channel
RECT/TRAP CHANNEL FLOWRATE = 0.48 MINOR LOSS K = 0.000
BASE = 65.0 SLP = 0.0 LEN = 27.5 N =0.015 SLOPE = 0.00200
VELOCITY ---------- NORMAL = 1.08 DN = 0.02 UP = 0.02
CHANNEL BOTTOM ELEVATION DN = 10.52 UP = 10.58
DEPTH ---- CRIT = 0.08 NORMAL = 0.13 DN = 8.74 UP = 8.69
HEAD LOSS ----- MINOR = 0.000 HLOSS = 0.001 TOTAL = 0.001
HYDRAULIC GRADE LINE ELEV DN = 19.26 UP = 19.26
ENERGY LINE ELEVATION DN = 19.26 UP = 19.26

ELEMENT NO. 30 NODES 15
* Bend 9
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00 TURNING ANGLE = 90.00
CALCULATED K = 0.98 VHEAD = 0.00 DEPTHS: UP = 8.64 CRIT = 0.08

```
HYDRAULIC GRADE LINE                          DN =   19.27  UP =    19.26
ENERGY LINE EL.    HEAD LOSS =  0.00          DN =   19.26  UP =    19.26



UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN

                                                                    PAGE   6
Q1=    0.48     Q2=    0.00     Q3=    0.00
======================================================================


ELEMENT NO. 30                                          NODES    16
 * Bend 10
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00  TURNING ANGLE = 90.00
CALCULATED K =  0.98   VHEAD =  0.00   DEPTHS: UP =  8.64  CRIT =  0.08
HYDRAULIC GRADE LINE                          DN =   19.27  UP =    19.26
ENERGY LINE EL.    HEAD LOSS =  0.00          DN =   19.26  UP =    19.26



ELEMENT NO.  6                                          NODES    85   90
* CL_Contact_Channel
RECT/TRAP CHANNEL       FLOWRATE =     0.48     MINOR LOSS K =    0.000
BASE =  65.0     SLP = 0.0   LEN =  30.4     N =0.015  SLOPE =  0.00200
VELOCITY ---------------- NORMAL =  1.08    DN =    0.02  UP =     0.02
CHANNEL BOTTOM ELEVATION                      DN =   10.27  UP =    10.33
DEPTH ---- CRIT =  0.08   NORMAL =   0.13   DN =    9.00  UP =     8.94
HEAD LOSS -----            MINOR =  0.000  HLOSS = 0.002  TOTAL = 0.002
HYDRAULIC GRADE LINE ELEV                     DN =   19.26  UP =    19.27
ENERGY LINE ELEVATION                         DN =   19.26  UP =    19.27



ELEMENT NO.  4                                          NODES    90   95
* Chlorination exit
RECTANGULAR WEIR        FLOWRATE =     0.48          *** SUBMERGED WEIR
WEIR ------------ SIDE CONTRACTION COEFFICIENT =0.00    ELEV =    17.90
LENGTH =   3.0       SUBMERGENCE =  1.00               HEAD =     1.37
HYDRAULIC GRADE LINE ELEV. HLOSS =  0.00    DN =   19.27  UP =    19.27
ENERGY LINE ELEVATION                         DN =   19.27  UP =    19.27



ELEMENT NO. 10                                          NODES    95  100
```

```
 * Chlorine Mixer Stand In
******ADDITIONAL HEAD LOSS SPECIFIED******
HL =  0.10     K =  0.00   VHEAD =  0.00
HYDRAULIC GRADE LINE EL.   HLOSS =  0.10    DN =   19.27  UP =    19.37
ENERGY LINE EL.                             DN =   19.27  UP =    19.37




UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN

                                                                    PAGE   7
Q1=    0.48     Q2=    0.00     Q3=    0.00
======================================================================


ELEMENT NO.  6                                          NODES   100  105
* Chlorine Mixer Tank
RECT/TRAP CHANNEL       FLOWRATE =     0.48     MINOR LOSS K =    0.000
BASE = 112.0     SLP = 0.0   LEN =   8.0     N =0.013  SLOPE =  0.00000
VELOCITY ---------------- NORMAL =999.99    DN =    0.01  UP =     0.01
CHANNEL BOTTOM ELEVATION                    DN =   11.73  UP =    11.73
DEPTH ---- CRIT =  0.06   NORMAL = 999.99   DN =    7.64  UP =     7.64
HEAD LOSS -----            MINOR =  0.000  HLOSS = 0.001  TOTAL = 0.001
HYDRAULIC GRADE LINE ELEV                   DN =   19.37  UP =    19.37
ENERGY LINE ELEVATION                       DN =   19.37  UP =    19.37



ELEMENT NO.  5                                          NODES   105  110
* Disks Effluent Pipe
CIRCULAR CHANNEL        FLOWRATE =     0.20     MINOR LOSS K =    1.500
PIPE ------ DIA = 24.0       LEN = 100.0     N =*****  SLOPE =  0.00000
Q EXCEEDS THE MAXIMUM CHANNEL CAPACITY -- TREAT AS CONDUIT

ELEMENT NO.  1                                          NODES   105  110
* Disks Effluent Pipe
PRESSURE LINE (CIR)     FLOWRATE =     0.20            VELOCITY =  0.10
PIPE ------ DIA = 24.0       LEN = 100.0                    C =  130.
MINOR LOSS COEFFICIENTS ----- MISCELLANEOUS K =  1.50    EXIT K =  0.00
HEAD LOSS: MISC =  0.00     EXIT =  0.00 PIPE =  0.00     TOTAL =  0.00
HYDRAULIC GRADE LINE ELEVATION              DN =   19.37  UP =    19.37
ENERGY LINE ELEVATION                       DN =   19.37  UP =    19.37



ELEMENT NO. 10                                          NODES   110  115
```

```
 * Assumed Loss thru cloth disks
******ADDITIONAL HEAD LOSS SPECIFIED******
HL =  0.50     K =  0.00   VHEAD =  0.00
HYDRAULIC GRADE LINE EL.   HLOSS =  0.50    DN =   19.37  UP =    19.87
ENERGY LINE EL.                             DN =   19.37  UP =    19.87




UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN

                                                                    PAGE   8
Q1=    0.48     Q2=    0.00     Q3=    0.00
======================================================================


ELEMENT NO.  6                                          NODES   115  120
* Disks Channel
RECT/TRAP CHANNEL       FLOWRATE =     0.20     MINOR LOSS K =    0.000
BASE =  93.0     SLP = 0.0   LEN =  13.2     N =0.013  SLOPE =  0.00000
VELOCITY ---------------- NORMAL =999.99    DN =    0.00  UP =     0.00
CHANNEL BOTTOM ELEVATION                    DN =   11.27  UP =    11.27
DEPTH ---- CRIT =  0.04   NORMAL = 999.99   DN =    8.60  UP =     8.60
HEAD LOSS -----            MINOR =  0.000  HLOSS = 0.001  TOTAL = 0.001
HYDRAULIC GRADE LINE ELEV                   DN =   19.87  UP =    19.87
ENERGY LINE ELEVATION                       DN =   19.87  UP =    19.87



ELEMENT NO.  6                                          NODES   120  125
* Clarifier
RECT/TRAP CHANNEL       FLOWRATE =     0.20     MINOR LOSS K =    0.000
BASE = 216.0     SLP = 0.0   LEN =  13.7     N =0.013  SLOPE =  0.00000
VELOCITY ---------------- NORMAL =999.99    DN =    0.00  UP =     0.00
CHANNEL BOTTOM ELEVATION                    DN =   11.27  UP =    11.27
DEPTH ---- CRIT =  0.02   NORMAL = 999.99   DN =    8.60  UP =     8.60
HEAD LOSS -----            MINOR =  0.000  HLOSS = 0.001  TOTAL = 0.001
HYDRAULIC GRADE LINE ELEV                   DN =   19.87  UP =    19.87
ENERGY LINE ELEVATION                       DN =   19.87  UP =    19.87
```

```
*****************************************
*                                       *
*                  HYDRO                *
*        TREATMENT PLANT HYDRAULICS     *
*                                       *
*             CH2M Hill, Inc.           *
*         2300 NW Walnut Boulevard      *
*               P.O. Box 428            *
*         Corvallis, Oregon  97330      *
*                                       *
*             VERSION  10.10            *
*               01-OCT-15               *
*                                       *
*           (C) COPYRIGHT 2015          *
*             CH2M HILL, INC.           *
*           ALL RIGHTS RESERVED         *
*                                       *
*                                       *
*                                       *
*                  NOTE                 *
* This page contains valuable information *
* that should be saved.  If it becomes    *
* necessary to rerun this analysis in the *
* future, this page will allow retrieval  *
* of the proper program and data files.   *
*****************************************


UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN

                                                                  PAGE   1
Q1=    0.00     Q2=    0.00     Q3=    0.00
======================================================================




UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN

                                                                  PAGE   2
Q1=    3.44     Q2=    0.00     Q3=    0.00
======================================================================
```

```
CONDITIONS SET -                                                NODE =   5
* Effluent_CL_Contact_Basin
ENERGY LINE =  18.98  Q1 =   3.44  Q2 =   0.00  Q3 =   0.00  VEL = 0.00

 There are mutliple different elevations shown from different drawings

ELEMENT NO.  4                                          NODES     5   10
* Weir into Effluent
RECTANGULAR WEIR        FLOWRATE =     3.44          NON SUBMERGED WEIR
WEIR ------------ SIDE CONTRACTION COEFFICIENT =0.00    ELEV =    19.11
LENGTH =   4.0       SUBMERGENCE =  0.00               HEAD =     0.55
HYDRAULIC GRADE LINE ELEV. HLOSS =  0.68    DN =   18.98  UP =    19.66
ENERGY LINE ELEVATION                       DN =   18.98  UP =    19.66



ELEMENT NO.  6                                          NODES    10   15
* CL_Contact_Channel
RECT/TRAP CHANNEL       FLOWRATE =     3.44     MINOR LOSS K =    0.000
BASE =  65.0     SLP = 0.0   LEN =  29.4     N =0.015  SLOPE =  0.00200
VELOCITY ---------------- NORMAL =  2.29    DN =    0.10  UP =     0.11
CHANNEL BOTTOM ELEVATION                    DN =   10.25  UP =    10.31
DEPTH ---- CRIT =  0.31   NORMAL =   0.43   DN =    9.41  UP =     9.35
HEAD LOSS -----            MINOR =  0.000  HLOSS = 0.001  TOTAL = 0.001
HYDRAULIC GRADE LINE ELEV                   DN =   19.66  UP =    19.66
ENERGY LINE ELEVATION                       DN =   19.66  UP =    19.66



ELEMENT NO. 30                                          NODES     3
 * Bend 1
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00  TURNING ANGLE = 90.00
CALCULATED K =  0.88   VHEAD =  0.00   DEPTHS: UP =  9.26  CRIT =  0.31
HYDRAULIC GRADE LINE                        DN =   19.66  UP =    19.66
ENERGY LINE EL.    HEAD LOSS =  0.00        DN =   19.66  UP =    19.66




UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN

                                                                  PAGE   3
Q1=    3.44     Q2=    0.00     Q3=    0.00
=====================================================================
```

```
ELEMENT NO. 30                                          NODES     4
 * Bend 2
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00  TURNING ANGLE = 90.00
CALCULATED K =  0.88   VHEAD =  0.00   DEPTHS: UP =  9.26  CRIT =  0.31
HYDRAULIC GRADE LINE                         DN =   19.66  UP =    19.66
ENERGY LINE EL.    HEAD LOSS =  0.00         DN =   19.66  UP =    19.66



ELEMENT NO.  6                                          NODES    25   30
* CL_Contact_Channel
RECT/TRAP CHANNEL       FLOWRATE =     3.44     MINOR LOSS K =    0.000
BASE =  65.0     SLP = 0.0   LEN =  30.4     N =0.015  SLOPE =  0.00200
VELOCITY ---------------- NORMAL =  2.29    DN =    0.11  UP =     0.11
CHANNEL BOTTOM ELEVATION                     DN =   10.57  UP =    10.63
DEPTH ---- CRIT =  0.31   NORMAL =   0.43   DN =    9.09  UP =     9.03
HEAD LOSS -----            MINOR =  0.000  HLOSS = 0.002  TOTAL = 0.002
HYDRAULIC GRADE LINE ELEV                    DN =   19.66  UP =    19.66
ENERGY LINE ELEVATION                        DN =   19.66  UP =    19.66



ELEMENT NO. 30                                          NODES     6
 * Bend 3
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00  TURNING ANGLE = 90.00
CALCULATED K =  0.88   VHEAD =  0.00   DEPTHS: UP =  9.20  CRIT =  0.31
HYDRAULIC GRADE LINE                         DN =   19.66  UP =    19.66
ENERGY LINE EL.    HEAD LOSS =  0.00         DN =   19.66  UP =    19.66



ELEMENT NO. 30                                          NODES     7
 * Bend 4
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00  TURNING ANGLE = 90.00
CALCULATED K =  0.88   VHEAD =  0.00   DEPTHS: UP =  9.20  CRIT =  0.31
HYDRAULIC GRADE LINE                         DN =   19.66  UP =    19.66
ENERGY LINE EL.    HEAD LOSS =  0.00         DN =   19.66  UP =    19.66




UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN
```

Q1= 3.44 Q2= 0.00 Q3= 0.00

==========

ELEMENT NO. 6 NODES 40 45
* CL_Contact_Channel
RECT/TRAP CHANNEL FLOWRATE = 3.44 MINOR LOSS K = 0.000
BASE = 65.0 SLP = 0.0 LEN = 27.5 N =0.015 SLOPE = 0.00200
VELOCITY ---------- NORMAL = 2.29 DN = 0.11 UP = 0.11
CHANNEL BOTTOM ELEVATION DN = 10.40 UP = 10.45
DEPTH ---- CRIT = 0.31 NORMAL = 0.43 DN = 9.26 UP = 9.21
HEAD LOSS ----- MINOR = 0.000 HLOSS = 0.001 TOTAL = 0.001
HYDRAULIC GRADE LINE ELEV DN = 19.66 UP = 19.66
ENERGY LINE ELEVATION DN = 19.66 UP = 19.66

ELEMENT NO. 30 NODES 9
* Bend 5
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00 TURNING ANGLE = 90.00
CALCULATED K = 0.89 VHEAD = 0.00 DEPTHS: UP = 9.15 CRIT = 0.31
HYDRAULIC GRADE LINE DN = 19.66 UP = 19.66
ENERGY LINE EL. HEAD LOSS = 0.00 DN = 19.66 UP = 19.66

ELEMENT NO. 30 NODES 10
* Bend 6
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00 TURNING ANGLE = 90.00
CALCULATED K = 0.89 VHEAD = 0.00 DEPTHS: UP = 9.15 CRIT = 0.31
HYDRAULIC GRADE LINE DN = 19.66 UP = 19.66
ENERGY LINE EL. HEAD LOSS = 0.00 DN = 19.66 UP = 19.66

ELEMENT NO. 6 NODES 55 60
* CL_Contact_Channel
RECT/TRAP CHANNEL FLOWRATE = 3.44 MINOR LOSS K = 0.000
BASE = 65.0 SLP = 0.0 LEN = 27.5 N =0.015 SLOPE = 0.00200
VELOCITY ---------- NORMAL = 2.29 DN = 0.11 UP = 0.11
CHANNEL BOTTOM ELEVATION DN = 10.46 UP = 10.52
DEPTH ---- CRIT = 0.31 NORMAL = 0.43 DN = 9.20 UP = 9.15
HEAD LOSS ----- MINOR = 0.000 HLOSS = 0.001 TOTAL = 0.001
HYDRAULIC GRADE LINE ELEV DN = 19.66 UP = 19.66
ENERGY LINE ELEVATION DN = 19.66 UP = 19.66

UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT FLOWS = MGD VELOCITY = FPS
WIDTH/HEIGHT = IN DIAM = IN

Q1= 3.44 Q2= 0.00 Q3= 0.00

==========

ELEMENT NO. 30 NODES 12
* Bend 7
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00 TURNING ANGLE = 90.00
CALCULATED K = 0.89 VHEAD = 0.00 DEPTHS: UP = 9.09 CRIT = 0.31
HYDRAULIC GRADE LINE DN = 19.66 UP = 19.66
ENERGY LINE EL. HEAD LOSS = 0.00 DN = 19.66 UP = 19.66

ELEMENT NO. 30 NODES 13
* Bend 8
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00 TURNING ANGLE = 90.00
CALCULATED K = 0.89 VHEAD = 0.00 DEPTHS: UP = 9.09 CRIT = 0.31
HYDRAULIC GRADE LINE DN = 19.66 UP = 19.66
ENERGY LINE EL. HEAD LOSS = 0.00 DN = 19.66 UP = 19.66

ELEMENT NO. 6 NODES 70 75
* CL_Contact_Channel
RECT/TRAP CHANNEL FLOWRATE = 3.44 MINOR LOSS K = 0.000
BASE = 65.0 SLP = 0.0 LEN = 27.5 N =0.015 SLOPE = 0.00200
VELOCITY ---------- NORMAL = 2.29 DN = 0.11 UP = 0.11
CHANNEL BOTTOM ELEVATION DN = 10.52 UP = 10.58
DEPTH ---- CRIT = 0.31 NORMAL = 0.43 DN = 9.14 UP = 9.09
HEAD LOSS ----- MINOR = 0.000 HLOSS = 0.001 TOTAL = 0.001
HYDRAULIC GRADE LINE ELEV DN = 19.66 UP = 19.67
ENERGY LINE ELEVATION DN = 19.66 UP = 19.67

ELEMENT NO. 30 NODES 15
* Bend 9
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00 TURNING ANGLE = 90.00
CALCULATED K = 0.89 VHEAD = 0.00 DEPTHS: UP = 9.04 CRIT = 0.31

```
HYDRAULIC GRADE LINE                          DN =   19.67  UP =    19.67
ENERGY LINE EL.    HEAD LOSS =  0.00          DN =   19.67  UP =    19.67



UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN

                                                                    PAGE   6
Q1=    3.44     Q2=    0.00     Q3=    0.00
======================================================================


ELEMENT NO. 30                                          NODES    16
 * Bend 10
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00  TURNING ANGLE = 90.00
CALCULATED K =  0.89   VHEAD =  0.00   DEPTHS: UP =  9.04  CRIT =  0.31
HYDRAULIC GRADE LINE                          DN =   19.67  UP =    19.67
ENERGY LINE EL.    HEAD LOSS =  0.00          DN =   19.67  UP =    19.67



ELEMENT NO.  6                                          NODES    85   90
* CL_Contact_Channel
RECT/TRAP CHANNEL       FLOWRATE =     3.44     MINOR LOSS K =    0.000
BASE =  65.0     SLP = 0.0   LEN =  30.4     N =0.015  SLOPE =  0.00200
VELOCITY ---------------- NORMAL =  2.29    DN =    0.10  UP =     0.11
CHANNEL BOTTOM ELEVATION                      DN =   10.27  UP =    10.33
DEPTH ---- CRIT =  0.31   NORMAL =   0.43   DN =    9.40  UP =     9.34
HEAD LOSS -----            MINOR =  0.000  HLOSS = 0.002  TOTAL = 0.002
HYDRAULIC GRADE LINE ELEV                     DN =   19.67  UP =    19.67
ENERGY LINE ELEVATION                         DN =   19.67  UP =    19.67



ELEMENT NO.  4                                          NODES    90   95
* Chlorination exit
RECTANGULAR WEIR        FLOWRATE =     3.44          *** SUBMERGED WEIR
WEIR ------------ SIDE CONTRACTION COEFFICIENT =0.00    ELEV =    17.90
LENGTH =   3.0       SUBMERGENCE =  0.96               HEAD =     1.84
HYDRAULIC GRADE LINE ELEV. HLOSS =  0.07    DN =   19.67  UP =    19.74
ENERGY LINE ELEVATION                         DN =   19.67  UP =    19.74



ELEMENT NO. 10                                          NODES    95  100
```

```
 * Chlorine Mixer Stand In
******ADDITIONAL HEAD LOSS SPECIFIED******
HL =  0.10     K =  0.00   VHEAD =  0.00
HYDRAULIC GRADE LINE EL.   HLOSS =  0.10    DN =   19.74  UP =    19.84
ENERGY LINE EL.                             DN =   19.74  UP =    19.84




UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN

                                                                    PAGE   7
Q1=    3.44     Q2=    0.00     Q3=    0.00
======================================================================


ELEMENT NO.  6                                          NODES   100  105
* Chlorine Mixer Tank
RECT/TRAP CHANNEL       FLOWRATE =     3.44     MINOR LOSS K =    0.000
BASE = 112.0     SLP = 0.0   LEN =   8.0     N =0.013  SLOPE =  0.00000
VELOCITY ---------------- NORMAL =999.99    DN =    0.07  UP =     0.07
CHANNEL BOTTOM ELEVATION                    DN =   11.73  UP =    11.73
DEPTH ---- CRIT =  0.22   NORMAL = 999.99   DN =    8.11  UP =     8.11
HEAD LOSS -----            MINOR =  0.000  HLOSS = 0.001  TOTAL = 0.001
HYDRAULIC GRADE LINE ELEV                   DN =   19.84  UP =    19.84
ENERGY LINE ELEVATION                       DN =   19.84  UP =    19.84



ELEMENT NO.  5                                          NODES   105  110
* Disks Effluent Pipe
CIRCULAR CHANNEL        FLOWRATE =     1.14     MINOR LOSS K =    1.500
PIPE ------ DIA = 24.0       LEN = 100.0     N =*****  SLOPE =  0.00000
Q EXCEEDS THE MAXIMUM CHANNEL CAPACITY -- TREAT AS CONDUIT

ELEMENT NO.  1                                          NODES   105  110
* Disks Effluent Pipe
PRESSURE LINE (CIR)     FLOWRATE =     1.14            VELOCITY =  0.56
PIPE ------ DIA = 24.0       LEN = 100.0                    C =  130.
MINOR LOSS COEFFICIENTS ----- MISCELLANEOUS K =  1.50    EXIT K =  0.00
HEAD LOSS: MISC =  0.01     EXIT =  0.00 PIPE =  0.01     TOTAL =  0.01
HYDRAULIC GRADE LINE ELEVATION              DN =   19.83  UP =    19.85
ENERGY LINE ELEVATION                       DN =   19.84  UP =    19.85



ELEMENT NO. 10                                          NODES   110  115
```

```
 * Assumed Loss thru cloth disks
******ADDITIONAL HEAD LOSS SPECIFIED******
HL =  0.50     K =  0.00   VHEAD =  0.00
HYDRAULIC GRADE LINE EL.   HLOSS =  0.50    DN =   19.85  UP =    20.35
ENERGY LINE EL.                             DN =   19.85  UP =    20.35




UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN

                                                                    PAGE   8
Q1=    3.44     Q2=    0.00     Q3=    0.00
=============================================================================


ELEMENT NO.  6                                          NODES   115  120
* Disks Channel
RECT/TRAP CHANNEL       FLOWRATE =     1.14     MINOR LOSS K =    0.000
BASE =  93.0     SLP = 0.0   LEN =  13.2     N =0.013  SLOPE =  0.00000
VELOCITY ---------------- NORMAL =999.99    DN =    0.03  UP =     0.03
CHANNEL BOTTOM ELEVATION                    DN =   11.27  UP =    11.27
DEPTH ---- CRIT =  0.12   NORMAL = 999.99   DN =    9.08  UP =     9.08
HEAD LOSS -----            MINOR =  0.000  HLOSS = 0.001  TOTAL = 0.001
HYDRAULIC GRADE LINE ELEV                   DN =   20.35  UP =    20.35
ENERGY LINE ELEVATION                       DN =   20.35  UP =    20.35



ELEMENT NO.  6                                          NODES   120  125
* Clarifier
RECT/TRAP CHANNEL       FLOWRATE =     1.14     MINOR LOSS K =    0.000
BASE = 216.0     SLP = 0.0   LEN =  13.7     N =0.013  SLOPE =  0.00000
VELOCITY ---------------- NORMAL =999.99    DN =    0.01  UP =     0.01
CHANNEL BOTTOM ELEVATION                    DN =   11.27  UP =    11.27
DEPTH ---- CRIT =  0.07   NORMAL = 999.99   DN =    9.08  UP =     9.08
HEAD LOSS -----            MINOR =  0.000  HLOSS = 0.001  TOTAL = 0.001
HYDRAULIC GRADE LINE ELEV                   DN =   20.35  UP =    20.35
ENERGY LINE ELEVATION                       DN =   20.35  UP =    20.35
```

```
*****************************************
*                                       *
*                  HYDRO                *
*        TREATMENT PLANT HYDRAULICS     *
*                                       *
*             CH2M Hill, Inc.           *
*         2300 NW Walnut Boulevard      *
*               P.O. Box 428            *
*         Corvallis, Oregon  97330      *
*                                       *
*             VERSION  10.10            *
*               01-OCT-15               *
*                                       *
*           (C) COPYRIGHT 2015          *
*             CH2M HILL, INC.           *
*           ALL RIGHTS RESERVED         *
*                                       *
*                                       *
*                                       *
*                  NOTE                 *
* This page contains valuable information *
* that should be saved.  If it becomes    *
* necessary to rerun this analysis in the *
* future, this page will allow retrieval  *
* of the proper program and data files.   *
*****************************************


UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN

                                                                  PAGE   1
Q1=    0.00     Q2=    0.00     Q3=    0.00
======================================================================




UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN

                                                                  PAGE   2
Q1=    6.45     Q2=    0.00     Q3=    0.00
======================================================================
```

```
CONDITIONS SET -                                                NODE =   5
* Effluent_CL_Contact_Basin
ENERGY LINE =  18.98  Q1 =   6.45  Q2 =   0.00  Q3 =   0.00  VEL = 0.00

 There are mutliple different elevations shown from different drawings

ELEMENT NO.  4                                          NODES     5   10
* Weir into Effluent
RECTANGULAR WEIR        FLOWRATE =     6.45          NON SUBMERGED WEIR
WEIR ------------ SIDE CONTRACTION COEFFICIENT =0.00    ELEV =    19.11
LENGTH =   4.0       SUBMERGENCE =  0.00               HEAD =     0.83
HYDRAULIC GRADE LINE ELEV. HLOSS =  0.96    DN =   18.98  UP =    19.94
ENERGY LINE ELEVATION                       DN =   18.98  UP =    19.94



ELEMENT NO.  6                                          NODES    10   15
* CL_Contact_Channel
RECT/TRAP CHANNEL       FLOWRATE =     6.45     MINOR LOSS K =    0.000
BASE =  65.0     SLP = 0.0   LEN =  29.4     N =0.015  SLOPE =  0.00200
VELOCITY ---------------- NORMAL =  2.86    DN =    0.19  UP =     0.19
CHANNEL BOTTOM ELEVATION                    DN =   10.25  UP =    10.31
DEPTH ---- CRIT =  0.47   NORMAL =   0.64   DN =    9.69  UP =     9.63
HEAD LOSS -----            MINOR =  0.000  HLOSS = 0.002  TOTAL = 0.002
HYDRAULIC GRADE LINE ELEV                   DN =   19.94  UP =    19.94
ENERGY LINE ELEVATION                       DN =   19.94  UP =    19.94



ELEMENT NO. 30                                          NODES     3
 * Bend 1
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00  TURNING ANGLE = 90.00
CALCULATED K =  0.89   VHEAD =  0.00   DEPTHS: UP =  9.55  CRIT =  0.47
HYDRAULIC GRADE LINE                        DN =   19.94  UP =    19.94
ENERGY LINE EL.    HEAD LOSS =  0.00        DN =   19.94  UP =    19.94




UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN

                                                                  PAGE   3
Q1=    6.45     Q2=    0.00     Q3=    0.00
======================================================================
```

```
ELEMENT NO. 30                                          NODES     4
 * Bend 2
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00  TURNING ANGLE = 90.00
CALCULATED K =  0.89   VHEAD =  0.00   DEPTHS: UP =  9.55  CRIT =  0.47
HYDRAULIC GRADE LINE                         DN =   19.94  UP =    19.94
ENERGY LINE EL.    HEAD LOSS =  0.00         DN =   19.94  UP =    19.94



ELEMENT NO.  6                                          NODES    25   30
* CL_Contact_Channel
RECT/TRAP CHANNEL       FLOWRATE =     6.45     MINOR LOSS K =    0.000
BASE =  65.0     SLP = 0.0   LEN =  30.4     N =0.015  SLOPE =  0.00200
VELOCITY ---------------- NORMAL =  2.86    DN =    0.20  UP =     0.20
CHANNEL BOTTOM ELEVATION                     DN =   10.57  UP =    10.63
DEPTH ---- CRIT =  0.47   NORMAL =   0.64   DN =    9.37  UP =     9.31
HEAD LOSS -----            MINOR =  0.000  HLOSS = 0.002  TOTAL = 0.002
HYDRAULIC GRADE LINE ELEV                    DN =   19.94  UP =    19.94
ENERGY LINE ELEVATION                        DN =   19.94  UP =    19.94



ELEMENT NO. 30                                          NODES     6
 * Bend 3
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00  TURNING ANGLE = 90.00
CALCULATED K =  0.89   VHEAD =  0.00   DEPTHS: UP =  9.49  CRIT =  0.47
HYDRAULIC GRADE LINE                         DN =   19.94  UP =    19.94
ENERGY LINE EL.    HEAD LOSS =  0.00         DN =   19.94  UP =    19.94



ELEMENT NO. 30                                          NODES     7
 * Bend 4
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00  TURNING ANGLE = 90.00
CALCULATED K =  0.89   VHEAD =  0.00   DEPTHS: UP =  9.49  CRIT =  0.47
HYDRAULIC GRADE LINE                         DN =   19.94  UP =    19.94
ENERGY LINE EL.    HEAD LOSS =  0.00         DN =   19.94  UP =    19.94




UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN
```

Q1= 6.45 Q2= 0.00 Q3= 0.00

==========

ELEMENT NO. 6 NODES 40 45
* CL_Contact_Channel
RECT/TRAP CHANNEL FLOWRATE = 6.45 MINOR LOSS K = 0.000
BASE = 65.0 SLP = 0.0 LEN = 27.5 N =0.015 SLOPE = 0.00200
VELOCITY ---------- NORMAL = 2.86 DN = 0.19 UP = 0.19
CHANNEL BOTTOM ELEVATION DN = 10.40 UP = 10.45
DEPTH ---- CRIT = 0.47 NORMAL = 0.64 DN = 9.54 UP = 9.49
HEAD LOSS ----- MINOR = 0.000 HLOSS = 0.001 TOTAL = 0.001
HYDRAULIC GRADE LINE ELEV DN = 19.94 UP = 19.95
ENERGY LINE ELEVATION DN = 19.94 UP = 19.95

ELEMENT NO. 30 NODES 9
* Bend 5
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00 TURNING ANGLE = 90.00
CALCULATED K = 0.89 VHEAD = 0.00 DEPTHS: UP = 9.43 CRIT = 0.47
HYDRAULIC GRADE LINE DN = 19.95 UP = 19.95
ENERGY LINE EL. HEAD LOSS = 0.00 DN = 19.95 UP = 19.95

ELEMENT NO. 30 NODES 10
* Bend 6
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00 TURNING ANGLE = 90.00
CALCULATED K = 0.89 VHEAD = 0.00 DEPTHS: UP = 9.43 CRIT = 0.47
HYDRAULIC GRADE LINE DN = 19.95 UP = 19.95
ENERGY LINE EL. HEAD LOSS = 0.00 DN = 19.95 UP = 19.95

ELEMENT NO. 6 NODES 55 60
* CL_Contact_Channel
RECT/TRAP CHANNEL FLOWRATE = 6.45 MINOR LOSS K = 0.000
BASE = 65.0 SLP = 0.0 LEN = 27.5 N =0.015 SLOPE = 0.00200
VELOCITY ---------- NORMAL = 2.86 DN = 0.19 UP = 0.20
CHANNEL BOTTOM ELEVATION DN = 10.46 UP = 10.52
DEPTH ---- CRIT = 0.47 NORMAL = 0.64 DN = 9.49 UP = 9.43
HEAD LOSS ----- MINOR = 0.000 HLOSS = 0.001 TOTAL = 0.001
HYDRAULIC GRADE LINE ELEV DN = 19.95 UP = 19.95
ENERGY LINE ELEVATION DN = 19.95 UP = 19.95

UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT FLOWS = MGD VELOCITY = FPS
WIDTH/HEIGHT = IN DIAM = IN

Q1= 6.45 Q2= 0.00 Q3= 0.00

==========

ELEMENT NO. 30 NODES 12
* Bend 7
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00 TURNING ANGLE = 90.00
CALCULATED K = 0.89 VHEAD = 0.00 DEPTHS: UP = 9.37 CRIT = 0.47
HYDRAULIC GRADE LINE DN = 19.95 UP = 19.95
ENERGY LINE EL. HEAD LOSS = 0.00 DN = 19.95 UP = 19.95

ELEMENT NO. 30 NODES 13
* Bend 8
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00 TURNING ANGLE = 90.00
CALCULATED K = 0.89 VHEAD = 0.00 DEPTHS: UP = 9.37 CRIT = 0.47
HYDRAULIC GRADE LINE DN = 19.95 UP = 19.95
ENERGY LINE EL. HEAD LOSS = 0.00 DN = 19.95 UP = 19.95

ELEMENT NO. 6 NODES 70 75
* CL_Contact_Channel
RECT/TRAP CHANNEL FLOWRATE = 6.45 MINOR LOSS K = 0.000
BASE = 65.0 SLP = 0.0 LEN = 27.5 N =0.015 SLOPE = 0.00200
VELOCITY ---------- NORMAL = 2.86 DN = 0.20 UP = 0.20
CHANNEL BOTTOM ELEVATION DN = 10.52 UP = 10.58
DEPTH ---- CRIT = 0.47 NORMAL = 0.64 DN = 9.43 UP = 9.38
HEAD LOSS ----- MINOR = 0.000 HLOSS = 0.001 TOTAL = 0.001
HYDRAULIC GRADE LINE ELEV DN = 19.95 UP = 19.95
ENERGY LINE ELEVATION DN = 19.95 UP = 19.95

ELEMENT NO. 30 NODES 15
* Bend 9
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00 TURNING ANGLE = 90.00
CALCULATED K = 0.89 VHEAD = 0.00 DEPTHS: UP = 9.33 CRIT = 0.47

```
HYDRAULIC GRADE LINE                          DN =   19.95  UP =    19.95
ENERGY LINE EL.    HEAD LOSS =  0.00          DN =   19.95  UP =    19.95



UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN

                                                                    PAGE   6
Q1=    6.45     Q2=    0.00     Q3=    0.00
======================================================================


ELEMENT NO. 30                                          NODES    16
 * Bend 10
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00  TURNING ANGLE = 90.00
CALCULATED K =  0.89   VHEAD =  0.00   DEPTHS: UP =  9.33  CRIT =  0.47
HYDRAULIC GRADE LINE                          DN =   19.95  UP =    19.95
ENERGY LINE EL.    HEAD LOSS =  0.00          DN =   19.95  UP =    19.95



ELEMENT NO.  6                                          NODES    85   90
* CL_Contact_Channel
RECT/TRAP CHANNEL       FLOWRATE =     6.45     MINOR LOSS K =    0.000
BASE =  65.0     SLP = 0.0   LEN =  30.4     N =0.015  SLOPE =  0.00200
VELOCITY ---------------- NORMAL =  2.86    DN =    0.19  UP =     0.19
CHANNEL BOTTOM ELEVATION                      DN =   10.27  UP =    10.33
DEPTH ---- CRIT =  0.47   NORMAL =   0.64   DN =    9.68  UP =     9.62
HEAD LOSS -----            MINOR =  0.000  HLOSS = 0.002  TOTAL = 0.002
HYDRAULIC GRADE LINE ELEV                     DN =   19.95  UP =    19.95
ENERGY LINE ELEVATION                         DN =   19.95  UP =    19.95



ELEMENT NO.  4                                          NODES    90   95
* Chlorination exit
RECTANGULAR WEIR        FLOWRATE =     6.45          *** SUBMERGED WEIR
WEIR ------------ SIDE CONTRACTION COEFFICIENT =0.00    ELEV =    17.90
LENGTH =   3.0       SUBMERGENCE =  0.93               HEAD =     2.20
HYDRAULIC GRADE LINE ELEV. HLOSS =  0.15    DN =   19.95  UP =    20.10
ENERGY LINE ELEVATION                         DN =   19.95  UP =    20.10



ELEMENT NO. 10                                          NODES    95  100
```

```
 * Chlorine Mixer Stand In
******ADDITIONAL HEAD LOSS SPECIFIED******
HL =  0.10     K =  0.00   VHEAD =  0.00
HYDRAULIC GRADE LINE EL.   HLOSS =  0.10    DN =   20.10  UP =    20.20
ENERGY LINE EL.                             DN =   20.10  UP =    20.20




UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN

                                                                    PAGE   7
Q1=    6.45     Q2=    0.00     Q3=    0.00
======================================================================


ELEMENT NO.  6                                          NODES   100  105
* Chlorine Mixer Tank
RECT/TRAP CHANNEL       FLOWRATE =     6.45     MINOR LOSS K =    0.000
BASE = 112.0     SLP = 0.0   LEN =   8.0     N =0.013  SLOPE =  0.00000
VELOCITY ---------------- NORMAL =999.99    DN =    0.13  UP =     0.13
CHANNEL BOTTOM ELEVATION                    DN =   11.73  UP =    11.73
DEPTH ---- CRIT =  0.33   NORMAL = 999.99   DN =    8.47  UP =     8.47
HEAD LOSS -----            MINOR =  0.000  HLOSS = 0.001  TOTAL = 0.001
HYDRAULIC GRADE LINE ELEV                   DN =   20.20  UP =    20.20
ENERGY LINE ELEVATION                       DN =   20.20  UP =    20.20



ELEMENT NO.  5                                          NODES   105  110
* Disks Effluent Pipe
CIRCULAR CHANNEL        FLOWRATE =     3.45     MINOR LOSS K =    1.500
PIPE ------ DIA = 24.0       LEN = 100.0     N =*****  SLOPE =  0.00000
Q EXCEEDS THE MAXIMUM CHANNEL CAPACITY -- TREAT AS CONDUIT

ELEMENT NO.  1                                          NODES   105  110
* Disks Effluent Pipe
PRESSURE LINE (CIR)     FLOWRATE =     3.45            VELOCITY =  1.70
PIPE ------ DIA = 24.0       LEN = 100.0                    C =  130.
MINOR LOSS COEFFICIENTS ----- MISCELLANEOUS K =  1.50    EXIT K =  0.00
HEAD LOSS: MISC =  0.07     EXIT =  0.00 PIPE =  0.04     TOTAL =  0.11
HYDRAULIC GRADE LINE ELEVATION              DN =   20.16  UP =    20.27
ENERGY LINE ELEVATION                       DN =   20.20  UP =    20.31



ELEMENT NO. 10                                          NODES   110  115
```

```
 * Assumed Loss thru cloth disks
******ADDITIONAL HEAD LOSS SPECIFIED******
HL =  0.50     K =  0.00   VHEAD =  0.00
HYDRAULIC GRADE LINE EL.   HLOSS =  0.50    DN =   20.27  UP =    20.81
ENERGY LINE EL.                             DN =   20.31  UP =    20.81




UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN

                                                                    PAGE   8
Q1=    6.45     Q2=    0.00     Q3=    0.00
=============================================================================


ELEMENT NO.  6                                          NODES   115  120
* Disks Channel
RECT/TRAP CHANNEL       FLOWRATE =     3.45     MINOR LOSS K =    0.000
BASE =  93.0     SLP = 0.0   LEN =  13.2     N =0.013  SLOPE =  0.00000
VELOCITY ---------------- NORMAL =999.99    DN =    0.07  UP =     0.07
CHANNEL BOTTOM ELEVATION                    DN =   11.27  UP =    11.27
DEPTH ---- CRIT =  0.25   NORMAL = 999.99   DN =    9.54  UP =     9.54
HEAD LOSS -----            MINOR =  0.000  HLOSS = 0.001  TOTAL = 0.001
HYDRAULIC GRADE LINE ELEV                   DN =   20.81  UP =    20.81
ENERGY LINE ELEVATION                       DN =   20.81  UP =    20.81



ELEMENT NO.  6                                          NODES   120  125
* Clarifier
RECT/TRAP CHANNEL       FLOWRATE =     3.45     MINOR LOSS K =    0.000
BASE = 216.0     SLP = 0.0   LEN =  13.7     N =0.013  SLOPE =  0.00000
VELOCITY ---------------- NORMAL =999.99    DN =    0.03  UP =     0.03
CHANNEL BOTTOM ELEVATION                    DN =   11.27  UP =    11.27
DEPTH ---- CRIT =  0.14   NORMAL = 999.99   DN =    9.54  UP =     9.54
HEAD LOSS -----            MINOR =  0.000  HLOSS = 0.001  TOTAL = 0.001
HYDRAULIC GRADE LINE ELEV                   DN =   20.81  UP =    20.81
ENERGY LINE ELEVATION                       DN =   20.81  UP =    20.81
```

```
*****************************************
*                                       *
*                  HYDRO                *
*        TREATMENT PLANT HYDRAULICS     *
*                                       *
*             CH2M Hill, Inc.           *
*         2300 NW Walnut Boulevard      *
*               P.O. Box 428            *
*         Corvallis, Oregon  97330      *
*                                       *
*             VERSION  10.10            *
*               01-OCT-15               *
*                                       *
*           (C) COPYRIGHT 2015          *
*             CH2M HILL, INC.           *
*           ALL RIGHTS RESERVED         *
*                                       *
*                                       *
*                                       *
*                  NOTE                 *
* This page contains valuable information *
* that should be saved.  If it becomes    *
* necessary to rerun this analysis in the *
* future, this page will allow retrieval  *
* of the proper program and data files.   *
*****************************************



UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN

                                                                  PAGE   1
Q1=    0.00     Q2=    0.00     Q3=    0.00
======================================================================




UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN

                                                                  PAGE   2
Q1=   12.50     Q2=    0.00     Q3=    0.00
======================================================================
```

```
CONDITIONS SET -                                                NODE =   5
* Effluent_CL_Contact_Basin
ENERGY LINE =  18.98  Q1 =  12.50  Q2 =   0.00  Q3 =   0.00  VEL = 0.00

 There are mutliple different elevations shown from different drawings

ELEMENT NO.  4                                          NODES     5   10
* Weir into Effluent
RECTANGULAR WEIR        FLOWRATE =    12.50          NON SUBMERGED WEIR
WEIR ------------ SIDE CONTRACTION COEFFICIENT =0.00    ELEV =    19.11
LENGTH =   4.0       SUBMERGENCE =  0.00               HEAD =     1.28
HYDRAULIC GRADE LINE ELEV. HLOSS =  1.42    DN =   18.98  UP =    20.39
ENERGY LINE ELEVATION                       DN =   18.98  UP =    20.40



ELEMENT NO.  6                                          NODES    10   15
* CL_Contact_Channel
RECT/TRAP CHANNEL       FLOWRATE =    12.50     MINOR LOSS K =    0.000
BASE =  65.0     SLP = 0.0   LEN =  29.4     N =0.015  SLOPE =  0.00200
VELOCITY ---------------- NORMAL =  3.59    DN =    0.35  UP =     0.35
CHANNEL BOTTOM ELEVATION                    DN =   10.25  UP =    10.31
DEPTH ---- CRIT =  0.73   NORMAL =   1.00   DN =   10.14  UP =    10.09
HEAD LOSS -----            MINOR =  0.000  HLOSS = 0.002  TOTAL = 0.002
HYDRAULIC GRADE LINE ELEV                   DN =   20.39  UP =    20.40
ENERGY LINE ELEVATION                       DN =   20.40  UP =    20.40



ELEMENT NO. 30                                          NODES     3
 * Bend 1
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00  TURNING ANGLE = 90.00
CALCULATED K =  0.01   VHEAD =  0.00   DEPTHS: UP = 10.00  CRIT =  0.73
HYDRAULIC GRADE LINE                        DN =   20.40  UP =    20.40
ENERGY LINE EL.    HEAD LOSS =  0.00        DN =   20.40  UP =    20.40




UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN

                                                                PAGE   3
Q1=   12.50     Q2=    0.00     Q3=    0.00
======================================================================
```

```
ELEMENT NO. 30                                          NODES     4
 * Bend 2
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00  TURNING ANGLE = 90.00
CALCULATED K =  0.01   VHEAD =  0.00   DEPTHS: UP = 10.00  CRIT =  0.73
HYDRAULIC GRADE LINE                         DN =   20.40  UP =    20.40
ENERGY LINE EL.    HEAD LOSS =  0.00         DN =   20.40  UP =    20.40



ELEMENT NO.  6                                          NODES    25   30
* CL_Contact_Channel
RECT/TRAP CHANNEL       FLOWRATE =    12.50     MINOR LOSS K =    0.000
BASE =  65.0     SLP = 0.0   LEN =  30.4     N =0.015  SLOPE =  0.00200
VELOCITY ---------------- NORMAL =  3.59    DN =    0.36  UP =     0.37
CHANNEL BOTTOM ELEVATION                     DN =   10.57  UP =    10.63
DEPTH ---- CRIT =  0.73   NORMAL =   1.00   DN =    9.83  UP =     9.77
HEAD LOSS -----            MINOR =  0.000  HLOSS = 0.002  TOTAL = 0.002
HYDRAULIC GRADE LINE ELEV                    DN =   20.40  UP =    20.40
ENERGY LINE ELEVATION                        DN =   20.40  UP =    20.40



ELEMENT NO. 30                                          NODES     6
 * Bend 3
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00  TURNING ANGLE = 90.00
CALCULATED K =  0.01   VHEAD =  0.00   DEPTHS: UP =  9.94  CRIT =  0.73
HYDRAULIC GRADE LINE                         DN =   20.40  UP =    20.40
ENERGY LINE EL.    HEAD LOSS =  0.00         DN =   20.40  UP =    20.40



ELEMENT NO. 30                                          NODES     7
 * Bend 4
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00  TURNING ANGLE = 90.00
CALCULATED K =  0.01   VHEAD =  0.00   DEPTHS: UP =  9.94  CRIT =  0.73
HYDRAULIC GRADE LINE                         DN =   20.40  UP =    20.40
ENERGY LINE EL.    HEAD LOSS =  0.00         DN =   20.40  UP =    20.40




UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN
```

Q1= 12.50 Q2= 0.00 Q3= 0.00

==========

ELEMENT NO. 6 NODES 40 45
* CL_Contact_Channel
RECT/TRAP CHANNEL FLOWRATE = 12.50 MINOR LOSS K = 0.000
BASE = 65.0 SLP = 0.0 LEN = 27.5 N =0.015 SLOPE = 0.00200
VELOCITY ---------- NORMAL = 3.59 DN = 0.36 UP = 0.36
CHANNEL BOTTOM ELEVATION DN = 10.40 UP = 10.45
DEPTH ---- CRIT = 0.73 NORMAL = 1.00 DN = 10.00 UP = 9.94
HEAD LOSS ----- MINOR = 0.000 HLOSS = 0.002 TOTAL = 0.002
HYDRAULIC GRADE LINE ELEV DN = 20.40 UP = 20.40
ENERGY LINE ELEVATION DN = 20.40 UP = 20.40

ELEMENT NO. 30 NODES 9
* Bend 5
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00 TURNING ANGLE = 90.00
CALCULATED K = 0.01 VHEAD = 0.00 DEPTHS: UP = 9.88 CRIT = 0.73
HYDRAULIC GRADE LINE DN = 20.40 UP = 20.40
ENERGY LINE EL. HEAD LOSS = 0.00 DN = 20.40 UP = 20.40

ELEMENT NO. 30 NODES 10
* Bend 6
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00 TURNING ANGLE = 90.00
CALCULATED K = 0.01 VHEAD = 0.00 DEPTHS: UP = 9.88 CRIT = 0.73
HYDRAULIC GRADE LINE DN = 20.40 UP = 20.40
ENERGY LINE EL. HEAD LOSS = 0.00 DN = 20.40 UP = 20.40

ELEMENT NO. 6 NODES 55 60
* CL_Contact_Channel
RECT/TRAP CHANNEL FLOWRATE = 12.50 MINOR LOSS K = 0.000
BASE = 65.0 SLP = 0.0 LEN = 27.5 N =0.015 SLOPE = 0.00200
VELOCITY ---------- NORMAL = 3.59 DN = 0.36 UP = 0.36
CHANNEL BOTTOM ELEVATION DN = 10.46 UP = 10.52
DEPTH ---- CRIT = 0.73 NORMAL = 1.00 DN = 9.94 UP = 9.88
HEAD LOSS ----- MINOR = 0.000 HLOSS = 0.002 TOTAL = 0.002
HYDRAULIC GRADE LINE ELEV DN = 20.40 UP = 20.40
ENERGY LINE ELEVATION DN = 20.40 UP = 20.40

UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT FLOWS = MGD VELOCITY = FPS
WIDTH/HEIGHT = IN DIAM = IN

Q1= 12.50 Q2= 0.00 Q3= 0.00

==========

ELEMENT NO. 30 NODES 12
* Bend 7
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00 TURNING ANGLE = 90.00
CALCULATED K = 0.01 VHEAD = 0.00 DEPTHS: UP = 9.82 CRIT = 0.73
HYDRAULIC GRADE LINE DN = 20.40 UP = 20.40
ENERGY LINE EL. HEAD LOSS = 0.00 DN = 20.40 UP = 20.40

ELEMENT NO. 30 NODES 13
* Bend 8
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00 TURNING ANGLE = 90.00
CALCULATED K = 0.01 VHEAD = 0.00 DEPTHS: UP = 9.82 CRIT = 0.73
HYDRAULIC GRADE LINE DN = 20.40 UP = 20.40
ENERGY LINE EL. HEAD LOSS = 0.00 DN = 20.40 UP = 20.40

ELEMENT NO. 6 NODES 70 75
* CL_Contact_Channel
RECT/TRAP CHANNEL FLOWRATE = 12.50 MINOR LOSS K = 0.000
BASE = 65.0 SLP = 0.0 LEN = 27.5 N =0.015 SLOPE = 0.00200
VELOCITY ---------- NORMAL = 3.59 DN = 0.36 UP = 0.36
CHANNEL BOTTOM ELEVATION DN = 10.52 UP = 10.58
DEPTH ---- CRIT = 0.73 NORMAL = 1.00 DN = 9.88 UP = 9.83
HEAD LOSS ----- MINOR = 0.000 HLOSS = 0.002 TOTAL = 0.002
HYDRAULIC GRADE LINE ELEV DN = 20.40 UP = 20.40
ENERGY LINE ELEVATION DN = 20.40 UP = 20.40

ELEMENT NO. 30 NODES 15
* Bend 9
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00 TURNING ANGLE = 90.00
CALCULATED K = 0.01 VHEAD = 0.00 DEPTHS: UP = 9.78 CRIT = 0.73

```
HYDRAULIC GRADE LINE                          DN =   20.40  UP =    20.40
ENERGY LINE EL.    HEAD LOSS =  0.00          DN =   20.40  UP =    20.40



UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN

                                                                    PAGE   6
Q1=   12.50     Q2=    0.00     Q3=    0.00
======================================================================


ELEMENT NO. 30                                          NODES    16
 * Bend 10
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00  TURNING ANGLE = 90.00
CALCULATED K =  0.01   VHEAD =  0.00   DEPTHS: UP =  9.78  CRIT =  0.73
HYDRAULIC GRADE LINE                          DN =   20.40  UP =    20.40
ENERGY LINE EL.    HEAD LOSS =  0.00          DN =   20.40  UP =    20.40



ELEMENT NO.  6                                          NODES    85   90
* CL_Contact_Channel
RECT/TRAP CHANNEL       FLOWRATE =    12.50     MINOR LOSS K =    0.000
BASE =  65.0     SLP = 0.0   LEN =  30.4     N =0.015  SLOPE =  0.00200
VELOCITY ---------------- NORMAL =  3.59    DN =    0.35  UP =     0.35
CHANNEL BOTTOM ELEVATION                      DN =   10.27  UP =    10.33
DEPTH ---- CRIT =  0.73   NORMAL =   1.00   DN =   10.13  UP =    10.07
HEAD LOSS -----            MINOR =  0.000  HLOSS = 0.002  TOTAL = 0.002
HYDRAULIC GRADE LINE ELEV                     DN =   20.40  UP =    20.40
ENERGY LINE ELEVATION                         DN =   20.40  UP =    20.41



ELEMENT NO.  4                                          NODES    90   95
* Chlorination exit
RECTANGULAR WEIR        FLOWRATE =    12.50          *** SUBMERGED WEIR
WEIR ------------ SIDE CONTRACTION COEFFICIENT =0.00    ELEV =    17.90
LENGTH =   3.0       SUBMERGENCE =  0.89               HEAD =     2.81
HYDRAULIC GRADE LINE ELEV. HLOSS =  0.31    DN =   20.40  UP =    20.71
ENERGY LINE ELEVATION                         DN =   20.41  UP =    20.72



ELEMENT NO. 10                                          NODES    95  100
```

```
 * Chlorine Mixer Stand In
******ADDITIONAL HEAD LOSS SPECIFIED******
HL =  0.10     K =  0.00   VHEAD =  0.00
HYDRAULIC GRADE LINE EL.   HLOSS =  0.10    DN =   20.71  UP =    20.82
ENERGY LINE EL.                             DN =   20.72  UP =    20.82




UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN

                                                                    PAGE   7
Q1=   12.50     Q2=    0.00     Q3=    0.00
======================================================================


ELEMENT NO.  6                                          NODES   100  105
* Chlorine Mixer Tank
RECT/TRAP CHANNEL       FLOWRATE =    12.50     MINOR LOSS K =    0.000
BASE = 112.0     SLP = 0.0   LEN =   8.0     N =0.013  SLOPE =  0.00000
VELOCITY ---------------- NORMAL =999.99    DN =    0.23  UP =     0.23
CHANNEL BOTTOM ELEVATION                    DN =   11.73  UP =    11.73
DEPTH ---- CRIT =  0.51   NORMAL = 999.99   DN =    9.09  UP =     9.09
HEAD LOSS -----            MINOR =  0.000  HLOSS = 0.001  TOTAL = 0.001
HYDRAULIC GRADE LINE ELEV                   DN =   20.81  UP =    20.82
ENERGY LINE ELEVATION                       DN =   20.82  UP =    20.82



ELEMENT NO.  5                                          NODES   105  110
* Disks Effluent Pipe
CIRCULAR CHANNEL        FLOWRATE =     8.70     MINOR LOSS K =    1.500
PIPE ------ DIA = 24.0       LEN = 100.0     N =*****  SLOPE =  0.00000
Q EXCEEDS THE MAXIMUM CHANNEL CAPACITY -- TREAT AS CONDUIT

ELEMENT NO.  1                                          NODES   105  110
* Disks Effluent Pipe
PRESSURE LINE (CIR)     FLOWRATE =     8.70            VELOCITY =  4.28
PIPE ------ DIA = 24.0       LEN = 100.0                    C =  130.
MINOR LOSS COEFFICIENTS ----- MISCELLANEOUS K =  1.50    EXIT K =  0.00
HEAD LOSS: MISC =  0.43     EXIT =  0.00 PIPE =  0.24     TOTAL =  0.67
HYDRAULIC GRADE LINE ELEVATION              DN =   20.53  UP =    21.20
ENERGY LINE ELEVATION                       DN =   20.82  UP =    21.49



ELEMENT NO. 10                                          NODES   110  115
```

```
 * Assumed Loss thru cloth disks
******ADDITIONAL HEAD LOSS SPECIFIED******
HL =  0.50     K =  0.00   VHEAD =  0.00
HYDRAULIC GRADE LINE EL.   HLOSS =  0.50    DN =   21.20  UP =    21.99
ENERGY LINE EL.                             DN =   21.49  UP =    21.99




UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN

                                                                    PAGE   8
Q1=   12.50     Q2=    0.00     Q3=    0.00
=========================================================================


ELEMENT NO.  6                                          NODES   115  120
* Disks Channel
RECT/TRAP CHANNEL       FLOWRATE =     8.70     MINOR LOSS K =    0.000
BASE =  93.0     SLP = 0.0   LEN =  13.2     N =0.013  SLOPE =  0.00000
VELOCITY ---------------- NORMAL =999.99    DN =    0.16  UP =     0.16
CHANNEL BOTTOM ELEVATION                    DN =   11.27  UP =    11.27
DEPTH ---- CRIT =  0.45   NORMAL = 999.99   DN =   10.72  UP =    10.72
HEAD LOSS -----            MINOR =  0.000  HLOSS = 0.001  TOTAL = 0.001
HYDRAULIC GRADE LINE ELEV                   DN =   21.99  UP =    21.99
ENERGY LINE ELEVATION                       DN =   21.99  UP =    21.99



ELEMENT NO.  6                                          NODES   120  125
* Clarifier
RECT/TRAP CHANNEL       FLOWRATE =     8.70     MINOR LOSS K =    0.000
BASE = 216.0     SLP = 0.0   LEN =  13.7     N =0.013  SLOPE =  0.00000
VELOCITY ---------------- NORMAL =999.99    DN =    0.07  UP =     0.07
CHANNEL BOTTOM ELEVATION                    DN =   11.27  UP =    11.27
DEPTH ---- CRIT =  0.26   NORMAL = 999.99   DN =   10.72  UP =    10.72
HEAD LOSS -----            MINOR =  0.000  HLOSS = 0.001  TOTAL = 0.001
HYDRAULIC GRADE LINE ELEV                   DN =   21.99  UP =    21.99
ENERGY LINE ELEVATION                       DN =   21.99  UP =    21.99
```

```
*****************************************
*                                       *
*                  HYDRO                *
*        TREATMENT PLANT HYDRAULICS     *
*                                       *
*             CH2M Hill, Inc.           *
*         2300 NW Walnut Boulevard      *
*               P.O. Box 428            *
*         Corvallis, Oregon  97330      *
*                                       *
*             VERSION  10.10            *
*               01-OCT-15               *
*                                       *
*           (C) COPYRIGHT 2015          *
*             CH2M HILL, INC.           *
*           ALL RIGHTS RESERVED         *
*                                       *
*                                       *
*                                       *
*                  NOTE                 *
* This page contains valuable information *
* that should be saved.  If it becomes    *
* necessary to rerun this analysis in the *
* future, this page will allow retrieval  *
* of the proper program and data files.   *
*****************************************



UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN

                                                                  PAGE   1
Q1=    0.00     Q2=    0.00     Q3=    0.00
======================================================================




UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN

                                                                  PAGE   2
Q1=   14.00     Q2=    0.00     Q3=    0.00
======================================================================
```

```
CONDITIONS SET -                                                NODE =   5
* Effluent_CL_Contact_Basin
ENERGY LINE =  18.98  Q1 =  14.00  Q2 =   0.00  Q3 =   0.00  VEL = 0.00

 There are mutliple different elevations shown from different drawings

ELEMENT NO.  4                                          NODES     5   10
* Weir into Effluent
RECTANGULAR WEIR        FLOWRATE =    14.00          NON SUBMERGED WEIR
WEIR ------------ SIDE CONTRACTION COEFFICIENT =0.00    ELEV =    19.11
LENGTH =   4.0       SUBMERGENCE =  0.00               HEAD =     1.38
HYDRAULIC GRADE LINE ELEV. HLOSS =  1.52    DN =   18.98  UP =    20.49
ENERGY LINE ELEVATION                       DN =   18.98  UP =    20.50



ELEMENT NO.  6                                          NODES    10   15
* CL_Contact_Channel
RECT/TRAP CHANNEL       FLOWRATE =    14.00     MINOR LOSS K =    0.000
BASE =  65.0     SLP = 0.0   LEN =  29.4     N =0.015  SLOPE =  0.00200
VELOCITY ---------------- NORMAL =  3.72    DN =    0.39  UP =     0.39
CHANNEL BOTTOM ELEVATION                    DN =   10.25  UP =    10.31
DEPTH ---- CRIT =  0.79   NORMAL =   1.07   DN =   10.24  UP =    10.19
HEAD LOSS -----            MINOR =  0.000  HLOSS = 0.002  TOTAL = 0.002
HYDRAULIC GRADE LINE ELEV                   DN =   20.49  UP =    20.49
ENERGY LINE ELEVATION                       DN =   20.50  UP =    20.50



ELEMENT NO. 30                                          NODES     3
 * Bend 1
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00  TURNING ANGLE = 90.00
CALCULATED K =  0.01   VHEAD =  0.00   DEPTHS: UP = 10.10  CRIT =  0.79
HYDRAULIC GRADE LINE                        DN =   20.50  UP =    20.49
ENERGY LINE EL.    HEAD LOSS =  0.00        DN =   20.50  UP =    20.50




UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN

                                                                PAGE   3
Q1=   14.00     Q2=    0.00     Q3=    0.00
======================================================================
```

```
ELEMENT NO. 30                                          NODES     4
 * Bend 2
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00  TURNING ANGLE = 90.00
CALCULATED K =  0.01   VHEAD =  0.00   DEPTHS: UP = 10.10  CRIT =  0.79
HYDRAULIC GRADE LINE                         DN =   20.50  UP =    20.49
ENERGY LINE EL.    HEAD LOSS =  0.00         DN =   20.50  UP =    20.50



ELEMENT NO.  6                                          NODES    25   30
* CL_Contact_Channel
RECT/TRAP CHANNEL       FLOWRATE =    14.00     MINOR LOSS K =    0.000
BASE =  65.0     SLP = 0.0   LEN =  30.4     N =0.015  SLOPE =  0.00200
VELOCITY ---------------- NORMAL =  3.72    DN =    0.40  UP =     0.41
CHANNEL BOTTOM ELEVATION                     DN =   10.57  UP =    10.63
DEPTH ---- CRIT =  0.79   NORMAL =   1.07   DN =    9.93  UP =     9.87
HEAD LOSS -----            MINOR =  0.000  HLOSS = 0.002  TOTAL = 0.002
HYDRAULIC GRADE LINE ELEV                    DN =   20.49  UP =    20.50
ENERGY LINE ELEVATION                        DN =   20.50  UP =    20.50



ELEMENT NO. 30                                          NODES     6
 * Bend 3
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00  TURNING ANGLE = 90.00
CALCULATED K =  0.01   VHEAD =  0.00   DEPTHS: UP = 10.04  CRIT =  0.79
HYDRAULIC GRADE LINE                         DN =   20.50  UP =    20.50
ENERGY LINE EL.    HEAD LOSS =  0.00         DN =   20.50  UP =    20.50



ELEMENT NO. 30                                          NODES     7
 * Bend 4
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00  TURNING ANGLE = 90.00
CALCULATED K =  0.01   VHEAD =  0.00   DEPTHS: UP = 10.04  CRIT =  0.79
HYDRAULIC GRADE LINE                         DN =   20.50  UP =    20.50
ENERGY LINE EL.    HEAD LOSS =  0.00         DN =   20.50  UP =    20.50




UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN
```

Q1= 14.00 Q2= 0.00 Q3= 0.00

==========

ELEMENT NO. 6 NODES 40 45
* CL_Contact_Channel
RECT/TRAP CHANNEL FLOWRATE = 14.00 MINOR LOSS K = 0.000
BASE = 65.0 SLP = 0.0 LEN = 27.5 N =0.015 SLOPE = 0.00200
VELOCITY ---------- NORMAL = 3.72 DN = 0.40 UP = 0.40
CHANNEL BOTTOM ELEVATION DN = 10.40 UP = 10.45
DEPTH ---- CRIT = 0.79 NORMAL = 1.07 DN = 10.10 UP = 10.04
HEAD LOSS ----- MINOR = 0.000 HLOSS = 0.002 TOTAL = 0.002
HYDRAULIC GRADE LINE ELEV DN = 20.50 UP = 20.50
ENERGY LINE ELEVATION DN = 20.50 UP = 20.50

ELEMENT NO. 30 NODES 9
* Bend 5
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00 TURNING ANGLE = 90.00
CALCULATED K = 0.01 VHEAD = 0.00 DEPTHS: UP = 9.98 CRIT = 0.79
HYDRAULIC GRADE LINE DN = 20.50 UP = 20.50
ENERGY LINE EL. HEAD LOSS = 0.00 DN = 20.50 UP = 20.50

ELEMENT NO. 30 NODES 10
* Bend 6
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00 TURNING ANGLE = 90.00
CALCULATED K = 0.01 VHEAD = 0.00 DEPTHS: UP = 9.98 CRIT = 0.79
HYDRAULIC GRADE LINE DN = 20.50 UP = 20.50
ENERGY LINE EL. HEAD LOSS = 0.00 DN = 20.50 UP = 20.50

ELEMENT NO. 6 NODES 55 60
* CL_Contact_Channel
RECT/TRAP CHANNEL FLOWRATE = 14.00 MINOR LOSS K = 0.000
BASE = 65.0 SLP = 0.0 LEN = 27.5 N =0.015 SLOPE = 0.00200
VELOCITY ---------- NORMAL = 3.72 DN = 0.40 UP = 0.40
CHANNEL BOTTOM ELEVATION DN = 10.46 UP = 10.52
DEPTH ---- CRIT = 0.79 NORMAL = 1.07 DN = 10.04 UP = 9.98
HEAD LOSS ----- MINOR = 0.000 HLOSS = 0.002 TOTAL = 0.002
HYDRAULIC GRADE LINE ELEV DN = 20.50 UP = 20.50
ENERGY LINE ELEVATION DN = 20.50 UP = 20.50

UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT FLOWS = MGD VELOCITY = FPS
WIDTH/HEIGHT = IN DIAM = IN

Q1= 14.00 Q2= 0.00 Q3= 0.00

==========

ELEMENT NO. 30 NODES 12
* Bend 7
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00 TURNING ANGLE = 90.00
CALCULATED K = 0.01 VHEAD = 0.00 DEPTHS: UP = 9.92 CRIT = 0.79
HYDRAULIC GRADE LINE DN = 20.50 UP = 20.50
ENERGY LINE EL. HEAD LOSS = 0.00 DN = 20.50 UP = 20.50

ELEMENT NO. 30 NODES 13
* Bend 8
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00 TURNING ANGLE = 90.00
CALCULATED K = 0.01 VHEAD = 0.00 DEPTHS: UP = 9.92 CRIT = 0.79
HYDRAULIC GRADE LINE DN = 20.50 UP = 20.50
ENERGY LINE EL. HEAD LOSS = 0.00 DN = 20.50 UP = 20.50

ELEMENT NO. 6 NODES 70 75
* CL_Contact_Channel
RECT/TRAP CHANNEL FLOWRATE = 14.00 MINOR LOSS K = 0.000
BASE = 65.0 SLP = 0.0 LEN = 27.5 N =0.015 SLOPE = 0.00200
VELOCITY ---------- NORMAL = 3.72 DN = 0.40 UP = 0.40
CHANNEL BOTTOM ELEVATION DN = 10.52 UP = 10.58
DEPTH ---- CRIT = 0.79 NORMAL = 1.07 DN = 9.98 UP = 9.93
HEAD LOSS ----- MINOR = 0.000 HLOSS = 0.002 TOTAL = 0.002
HYDRAULIC GRADE LINE ELEV DN = 20.50 UP = 20.50
ENERGY LINE ELEVATION DN = 20.50 UP = 20.50

ELEMENT NO. 30 NODES 15
* Bend 9
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00 TURNING ANGLE = 90.00
CALCULATED K = 0.01 VHEAD = 0.00 DEPTHS: UP = 9.88 CRIT = 0.79

```
HYDRAULIC GRADE LINE                          DN =   20.50  UP =    20.50
ENERGY LINE EL.    HEAD LOSS =  0.00          DN =   20.50  UP =    20.50



UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN

                                                                    PAGE   6
Q1=   14.00     Q2=    0.00     Q3=    0.00
======================================================================


ELEMENT NO. 30                                          NODES    16
 * Bend 10
******CALCULATED BEND HEAD LOSS******
CHANNEL WIDTH = 65.00 CENTERLINE RADIUS = 18.00  TURNING ANGLE = 90.00
CALCULATED K =  0.01   VHEAD =  0.00   DEPTHS: UP =  9.88  CRIT =  0.79
HYDRAULIC GRADE LINE                          DN =   20.50  UP =    20.50
ENERGY LINE EL.    HEAD LOSS =  0.00          DN =   20.50  UP =    20.50



ELEMENT NO.  6                                          NODES    85   90
* CL_Contact_Channel
RECT/TRAP CHANNEL       FLOWRATE =    14.00     MINOR LOSS K =    0.000
BASE =  65.0     SLP = 0.0   LEN =  30.4     N =0.015  SLOPE =  0.00200
VELOCITY ---------------- NORMAL =  3.72    DN =    0.39  UP =     0.39
CHANNEL BOTTOM ELEVATION                      DN =   10.27  UP =    10.33
DEPTH ---- CRIT =  0.79   NORMAL =   1.07   DN =   10.23  UP =    10.17
HEAD LOSS -----            MINOR =  0.000  HLOSS = 0.002  TOTAL = 0.002
HYDRAULIC GRADE LINE ELEV                     DN =   20.50  UP =    20.50
ENERGY LINE ELEVATION                         DN =   20.50  UP =    20.51



ELEMENT NO.  4                                          NODES    90   95
* Chlorination exit
RECTANGULAR WEIR        FLOWRATE =    14.00          *** SUBMERGED WEIR
WEIR ------------ SIDE CONTRACTION COEFFICIENT =0.00    ELEV =    17.90
LENGTH =   3.0       SUBMERGENCE =  0.88               HEAD =     2.95
HYDRAULIC GRADE LINE ELEV. HLOSS =  0.35    DN =   20.50  UP =    20.85
ENERGY LINE ELEVATION                         DN =   20.51  UP =    20.86



ELEMENT NO. 10                                          NODES    95  100
```

```
 * Chlorine Mixer Stand In
******ADDITIONAL HEAD LOSS SPECIFIED******
HL =  0.10     K =  0.00   VHEAD =  0.00
HYDRAULIC GRADE LINE EL.   HLOSS =  0.10    DN =   20.85  UP =    20.96
ENERGY LINE EL.                             DN =   20.86  UP =    20.96




UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN

                                                                    PAGE   7
Q1=   14.00     Q2=    0.00     Q3=    0.00
======================================================================


ELEMENT NO.  6                                          NODES   100  105
* Chlorine Mixer Tank
RECT/TRAP CHANNEL       FLOWRATE =    14.00     MINOR LOSS K =    0.000
BASE = 112.0     SLP = 0.0   LEN =   8.0     N =0.013  SLOPE =  0.00000
VELOCITY ---------------- NORMAL =999.99    DN =    0.25  UP =     0.25
CHANNEL BOTTOM ELEVATION                    DN =   11.73  UP =    11.73
DEPTH ---- CRIT =  0.55   NORMAL = 999.99   DN =    9.23  UP =     9.23
HEAD LOSS -----            MINOR =  0.000  HLOSS = 0.001  TOTAL = 0.001
HYDRAULIC GRADE LINE ELEV                   DN =   20.96  UP =    20.96
ENERGY LINE ELEVATION                       DN =   20.96  UP =    20.96



ELEMENT NO.  5                                          NODES   105  110
* Disks Effluent Pipe
CIRCULAR CHANNEL        FLOWRATE =    10.20     MINOR LOSS K =    1.500
PIPE ------ DIA = 24.0       LEN = 100.0     N =*****  SLOPE =  0.00000
Q EXCEEDS THE MAXIMUM CHANNEL CAPACITY -- TREAT AS CONDUIT

ELEMENT NO.  1                                          NODES   105  110
* Disks Effluent Pipe
PRESSURE LINE (CIR)     FLOWRATE =    10.20           VELOCITY =  5.02
PIPE ------ DIA = 24.0       LEN = 100.0                   C =  130.
MINOR LOSS COEFFICIENTS ----- MISCELLANEOUS K =  1.50    EXIT K =  0.00
HEAD LOSS: MISC =  0.59     EXIT =  0.00 PIPE =  0.33     TOTAL =  0.91
HYDRAULIC GRADE LINE ELEVATION              DN =   20.57  UP =    21.48
ENERGY LINE ELEVATION                       DN =   20.96  UP =    21.87



ELEMENT NO. 10                                          NODES   110  115
```

```
 * Assumed Loss thru cloth disks
******ADDITIONAL HEAD LOSS SPECIFIED******
HL =  0.50     K =  0.00   VHEAD =  0.00
HYDRAULIC GRADE LINE EL.   HLOSS =  0.50    DN =   21.48  UP =    22.37
ENERGY LINE EL.                             DN =   21.87  UP =    22.37




UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN

                                                                    PAGE   8
Q1=   14.00     Q2=    0.00     Q3=    0.00
======================================================================


ELEMENT NO.  6                                          NODES   115  120
* Disks Channel
RECT/TRAP CHANNEL       FLOWRATE =    10.20     MINOR LOSS K =    0.000
BASE =  93.0     SLP = 0.0   LEN =  13.2     N =0.013  SLOPE =  0.00000
VELOCITY ---------------- NORMAL =999.99    DN =    0.18  UP =     0.18
CHANNEL BOTTOM ELEVATION                    DN =   11.27  UP =    11.27
DEPTH ---- CRIT =  0.51   NORMAL = 999.99   DN =   11.10  UP =    11.10
HEAD LOSS -----            MINOR =  0.000  HLOSS = 0.001  TOTAL = 0.001
HYDRAULIC GRADE LINE ELEV                   DN =   22.37  UP =    22.37
ENERGY LINE ELEVATION                       DN =   22.37  UP =    22.37



ELEMENT NO.  6                                          NODES   120  125
* Clarifier
RECT/TRAP CHANNEL       FLOWRATE =    10.20     MINOR LOSS K =    0.000
BASE = 216.0     SLP = 0.0   LEN =  13.7     N =0.013  SLOPE =  0.00000
VELOCITY ---------------- NORMAL =999.99    DN =    0.08  UP =     0.08
CHANNEL BOTTOM ELEVATION                    DN =   11.27  UP =    11.27
DEPTH ---- CRIT =  0.29   NORMAL = 999.99   DN =   11.10  UP =    11.10
HEAD LOSS -----            MINOR =  0.000  HLOSS = 0.001  TOTAL = 0.001
HYDRAULIC GRADE LINE ELEV                   DN =   22.37  UP =    22.37
ENERGY LINE ELEVATION                       DN =   22.37  UP =    22.37
```

```
*****************************************
*                                       *
*                  HYDRO                *
*        TREATMENT PLANT HYDRAULICS     *
*                                       *
*             CH2M Hill, Inc.           *
*         2300 NW Walnut Boulevard      *
*               P.O. Box 428            *
*         Corvallis, Oregon  97330      *
*                                       *
*             VERSION  10.10            *
*               01-OCT-15               *
*                                       *
*           (C) COPYRIGHT 2015          *
*             CH2M HILL, INC.           *
*           ALL RIGHTS RESERVED         *
*                                       *
*                                       *
*                                       *
*                  NOTE                 *
* This page contains valuable information *
* that should be saved.  If it becomes    *
* necessary to rerun this analysis in the *
* future, this page will allow retrieval  *
* of the proper program and data files.   *
*****************************************



UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN

                                                                  PAGE   1
Q1=    0.00     Q2=    0.00     Q3=    0.00
======================================================================




UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN

                                                                  PAGE   2
Q1=    3.80     Q2=    0.00     Q3=    0.00
======================================================================
```

```
CONDITIONS SET -                                                NODE =   5
* ML Tank
ENERGY LINE =  20.11  Q1 =   3.80  Q2 =   0.00  Q3 =   0.00  VEL = 0.00



ELEMENT NO.  6                                          NODES     5   10
* ML Tank
RECT/TRAP CHANNEL       FLOWRATE =     1.90     MINOR LOSS K =    0.000
BASE = 202.2     SLP = 0.0   LEN =   5.6     N =0.013  SLOPE =  0.00000
VELOCITY ---------------- NORMAL =999.99    DN =    0.02  UP =     0.02
CHANNEL BOTTOM ELEVATION                    DN =    9.45  UP =     9.45
DEPTH ---- CRIT =  0.10   NORMAL = 999.99   DN =   10.67  UP =    10.67
HEAD LOSS -----            MINOR =  0.000  HLOSS = 0.001  TOTAL = 0.001
HYDRAULIC GRADE LINE ELEV                   DN =   20.11  UP =    20.12
ENERGY LINE ELEVATION                       DN =   20.12  UP =    20.12



ELEMENT NO.  2                                          NODES    10   15
* Wall Punchout
PRESSURE LINE (RECT)    FLOWRATE =     0.63           VELOCITY =   0.19
PIPE- H =  17.5 W =  42.0    LEN =   1.9                     N =  0.013
MINOR LOSS COEFFICIENTS ----- MISCELLANEOUS K =  0.00    EXIT K =  0.00
HEAD LOSS: MISC =  0.00     EXIT =  0.00 PIPE =  0.00     TOTAL =  0.00
HYDRAULIC GRADE LINE ELEVATION              DN =   20.12  UP =    20.12
ENERGY LINE ELEVATION                       DN =   20.12  UP =    20.12



ELEMENT NO.  6                                          NODES    15   20
* Aeration Tank
RECT/TRAP CHANNEL       FLOWRATE =     1.90     MINOR LOSS K =    0.000
BASE = 264.0     SLP = 0.0   LEN =  33.4     N =0.013  SLOPE =  0.00000
VELOCITY ---------------- NORMAL =999.99    DN =    0.03  UP =     0.03
CHANNEL BOTTOM ELEVATION                    DN =   15.46  UP =    15.46
DEPTH ---- CRIT =  0.08   NORMAL = 999.99   DN =    4.66  UP =     4.66
HEAD LOSS -----            MINOR =  0.000  HLOSS = 0.001  TOTAL = 0.001
HYDRAULIC GRADE LINE ELEV                   DN =   20.12  UP =    20.12
ENERGY LINE ELEVATION                       DN =   20.12  UP =    20.12




UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN
```

Q1= 3.80 Q2= 0.00 Q3= 0.00

==========

ELEMENT NO. 4 NODES 20 25
* Punchout
RECTANGULAR WEIR FLOWRATE = 1.90 *** SUBMERGED WEIR
WEIR ---------- SIDE CONTRACTION COEFFICIENT =0.00 ELEV = 17.50
LENGTH = 1.9 SUBMERGENCE = 0.99 HEAD = 2.65
HYDRAULIC GRADE LINE ELEV. HLOSS = 0.03 DN = 20.12 UP = 20.15
ENERGY LINE ELEVATION DN = 20.12 UP = 20.15

ELEMENT NO. 6 NODES 25 30
* Anoxic Tank
RECT/TRAP CHANNEL FLOWRATE = 1.90 MINOR LOSS K = 0.000
BASE = 264.0 SLP = 0.0 LEN = 10.0 N =0.013 SLOPE = 0.00000
VELOCITY ---------- NORMAL =999.99 DN = 0.03 UP = 0.03
CHANNEL BOTTOM ELEVATION DN = 15.49 UP = 15.49
DEPTH ---- CRIT = 0.08 NORMAL = 999.99 DN = 4.66 UP = 4.66
HEAD LOSS ----- MINOR = 0.000 HLOSS = 0.001 TOTAL = 0.001
HYDRAULIC GRADE LINE ELEV DN = 20.15 UP = 20.15
ENERGY LINE ELEVATION DN = 20.15 UP = 20.15

ELEMENT NO. 10 NODES 30 35
* Fine screen
******ADDITIONAL HEAD LOSS SPECIFIED******
HL = 0.17 K = 0.00 VHEAD = 0.00
HYDRAULIC GRADE LINE EL. HLOSS = 0.17 DN = 20.15 UP = 20.32
ENERGY LINE EL. DN = 20.15 UP = 20.32

ELEMENT NO. 1 NODES 35 40
* PE
PRESSURE LINE (CIR) FLOWRATE = 1.90 VELOCITY = 1.35
PIPE ------ DIA = 20.0 LEN = 27.0 N = 0.013
MINOR LOSS COEFFICIENTS ----- MISCELLANEOUS K = 0.50 EXIT K = 0.50
HEAD LOSS: MISC = 0.01 EXIT = 0.01 PIPE = 0.01 TOTAL = 0.04
HYDRAULIC GRADE LINE ELEVATION DN = 20.29 UP = 20.33
ENERGY LINE ELEVATION DN = 20.32 UP = 20.36

UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT FLOWS = MGD VELOCITY = FPS
WIDTH/HEIGHT = IN DIAM = IN

Q1= 3.80 Q2= 0.00 Q3= 0.00

==========

ELEMENT NO. 1 NODES 40 45
* PE
PRESSURE LINE (CIR) FLOWRATE = 3.80 VELOCITY = 2.69
PIPE ------ DIA = 20.0 LEN = 347.0 N = 0.013
MINOR LOSS COEFFICIENTS ----- MISCELLANEOUS K = 1.80 EXIT K = 0.00
HEAD LOSS: MISC = 0.20 EXIT = 0.00 PIPE = 0.62 TOTAL = 0.82
HYDRAULIC GRADE LINE ELEVATION DN = 20.25 UP = 21.07
ENERGY LINE ELEVATION DN = 20.36 UP = 21.19

```
*****************************************
*                                       *
*                  HYDRO                *
*        TREATMENT PLANT HYDRAULICS     *
*                                       *
*             CH2M Hill, Inc.           *
*         2300 NW Walnut Boulevard      *
*               P.O. Box 428            *
*         Corvallis, Oregon  97330      *
*                                       *
*             VERSION  10.10            *
*               01-OCT-15               *
*                                       *
*           (C) COPYRIGHT 2015          *
*             CH2M HILL, INC.           *
*           ALL RIGHTS RESERVED         *
*                                       *
*                                       *
*                                       *
*                  NOTE                 *
* This page contains valuable information *
* that should be saved.  If it becomes    *
* necessary to rerun this analysis in the *
* future, this page will allow retrieval  *
* of the proper program and data files.   *
*****************************************


UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN

                                                                  PAGE   1
Q1=    0.00     Q2=    0.00     Q3=    0.00
======================================================================




UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN

                                                                  PAGE   2
Q1=    2.40     Q2=    0.00     Q3=    0.00
======================================================================
```

```
CONDITIONS SET -                                                NODE =   5
* ML Tank
ENERGY LINE =  20.11  Q1 =   2.40  Q2 =   0.00  Q3 =   0.00  VEL = 0.00



ELEMENT NO.  6                                          NODES     5   10
* ML Tank
RECT/TRAP CHANNEL       FLOWRATE =     1.20     MINOR LOSS K =    0.000
BASE = 202.2     SLP = 0.0   LEN =   5.6     N =0.013  SLOPE =  0.00000
VELOCITY ---------------- NORMAL =999.99    DN =    0.01  UP =     0.01
CHANNEL BOTTOM ELEVATION                    DN =    9.45  UP =     9.45
DEPTH ---- CRIT =  0.07   NORMAL = 999.99   DN =   10.67  UP =    10.67
HEAD LOSS -----            MINOR =  0.000  HLOSS = 0.001  TOTAL = 0.001
HYDRAULIC GRADE LINE ELEV                   DN =   20.11  UP =    20.12
ENERGY LINE ELEVATION                       DN =   20.11  UP =    20.12



ELEMENT NO.  2                                          NODES    10   15
* Wall Punchout
PRESSURE LINE (RECT)    FLOWRATE =     0.40           VELOCITY =   0.12
PIPE- H =  17.5 W =  42.0    LEN =   1.9                     N =  0.013
MINOR LOSS COEFFICIENTS ----- MISCELLANEOUS K =  0.00    EXIT K =  0.00
HEAD LOSS: MISC =  0.00     EXIT =  0.00 PIPE =  0.00     TOTAL =  0.00
HYDRAULIC GRADE LINE ELEVATION              DN =   20.12  UP =    20.12
ENERGY LINE ELEVATION                       DN =   20.12  UP =    20.12



ELEMENT NO.  6                                          NODES    15   20
* Aeration Tank
RECT/TRAP CHANNEL       FLOWRATE =     1.20     MINOR LOSS K =    0.000
BASE = 264.0     SLP = 0.0   LEN =  33.4     N =0.013  SLOPE =  0.00000
VELOCITY ---------------- NORMAL =999.99    DN =    0.02  UP =     0.02
CHANNEL BOTTOM ELEVATION                    DN =   15.46  UP =    15.46
DEPTH ---- CRIT =  0.06   NORMAL = 999.99   DN =    4.66  UP =     4.66
HEAD LOSS -----            MINOR =  0.000  HLOSS = 0.001  TOTAL = 0.001
HYDRAULIC GRADE LINE ELEV                   DN =   20.12  UP =    20.12
ENERGY LINE ELEVATION                       DN =   20.12  UP =    20.12




UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN
```

Q1= 2.40 Q2= 0.00 Q3= 0.00

==========

ELEMENT NO. 4 NODES 20 25
* Punchout
RECTANGULAR WEIR FLOWRATE = 1.20 *** SUBMERGED WEIR
WEIR ---------- SIDE CONTRACTION COEFFICIENT =0.00 ELEV = 17.50
LENGTH = 1.9 SUBMERGENCE = 1.00 HEAD = 2.63
HYDRAULIC GRADE LINE ELEV. HLOSS = 0.01 DN = 20.12 UP = 20.13
ENERGY LINE ELEVATION DN = 20.12 UP = 20.13

ELEMENT NO. 6 NODES 25 30
* Anoxic Tank
RECT/TRAP CHANNEL FLOWRATE = 1.20 MINOR LOSS K = 0.000
BASE = 264.0 SLP = 0.0 LEN = 10.0 N =0.013 SLOPE = 0.00000
VELOCITY ---------- NORMAL =999.99 DN = 0.02 UP = 0.02
CHANNEL BOTTOM ELEVATION DN = 15.47 UP = 15.47
DEPTH ---- CRIT = 0.06 NORMAL = 999.99 DN = 4.66 UP = 4.66
HEAD LOSS ----- MINOR = 0.000 HLOSS = 0.001 TOTAL = 0.001
HYDRAULIC GRADE LINE ELEV DN = 20.13 UP = 20.13
ENERGY LINE ELEVATION DN = 20.13 UP = 20.13

ELEMENT NO. 10 NODES 30 35
* Fine screen
******ADDITIONAL HEAD LOSS SPECIFIED******
HL = 0.17 K = 0.00 VHEAD = 0.00
HYDRAULIC GRADE LINE EL. HLOSS = 0.17 DN = 20.13 UP = 20.30
ENERGY LINE EL. DN = 20.13 UP = 20.30

ELEMENT NO. 1 NODES 35 40
* PE
PRESSURE LINE (CIR) FLOWRATE = 1.20 VELOCITY = 0.85
PIPE ------ DIA = 20.0 LEN = 27.0 N = 0.013
MINOR LOSS COEFFICIENTS ----- MISCELLANEOUS K = 0.50 EXIT K = 0.50
HEAD LOSS: MISC = 0.01 EXIT = 0.01 PIPE = 0.00 TOTAL = 0.02
HYDRAULIC GRADE LINE ELEVATION DN = 20.29 UP = 20.31
ENERGY LINE ELEVATION DN = 20.30 UP = 20.32

UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT FLOWS = MGD VELOCITY = FPS
WIDTH/HEIGHT = IN DIAM = IN

Q1= 2.40 Q2= 0.00 Q3= 0.00

==========

ELEMENT NO. 1 NODES 40 45
* PE
PRESSURE LINE (CIR) FLOWRATE = 2.40 VELOCITY = 1.70
PIPE ------ DIA = 20.0 LEN = 347.0 N = 0.013
MINOR LOSS COEFFICIENTS ----- MISCELLANEOUS K = 1.80 EXIT K = 0.00
HEAD LOSS: MISC = 0.08 EXIT = 0.00 PIPE = 0.25 TOTAL = 0.33
HYDRAULIC GRADE LINE ELEVATION DN = 20.27 UP = 20.60
ENERGY LINE ELEVATION DN = 20.32 UP = 20.65

```
*****************************************
*                                       *
*                  HYDRO                *
*        TREATMENT PLANT HYDRAULICS     *
*                                       *
*             CH2M Hill, Inc.           *
*         2300 NW Walnut Boulevard      *
*               P.O. Box 428            *
*         Corvallis, Oregon  97330      *
*                                       *
*             VERSION  10.10            *
*               01-OCT-15               *
*                                       *
*           (C) COPYRIGHT 2015          *
*             CH2M HILL, INC.           *
*           ALL RIGHTS RESERVED         *
*                                       *
*                                       *
*                                       *
*                  NOTE                 *
* This page contains valuable information *
* that should be saved.  If it becomes    *
* necessary to rerun this analysis in the *
* future, this page will allow retrieval  *
* of the proper program and data files.   *
*****************************************


UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN

                                                                  PAGE   1
Q1=    0.00     Q2=    0.00     Q3=    0.00
======================================================================




UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN

                                                                  PAGE   2
Q1=    2.40     Q2=    0.00     Q3=    0.00
======================================================================
```

```
CONDITIONS SET -                                                NODE =   5
* ML Tank
ENERGY LINE =  20.11  Q1 =   2.40  Q2 =   0.00  Q3 =   0.00  VEL = 0.00



ELEMENT NO.  6                                          NODES     5   10
* ML Tank
RECT/TRAP CHANNEL       FLOWRATE =     1.20     MINOR LOSS K =    0.000
BASE = 162.0     SLP = 0.0   LEN =   6.8     N =0.013  SLOPE =  0.00000
VELOCITY ---------------- NORMAL =999.99    DN =    0.02  UP =     0.02
CHANNEL BOTTOM ELEVATION                    DN =   11.21  UP =    11.21
DEPTH ---- CRIT =  0.08   NORMAL = 999.99   DN =    8.91  UP =     8.91
HEAD LOSS -----            MINOR =  0.000  HLOSS = 0.001  TOTAL = 0.001
HYDRAULIC GRADE LINE ELEV                   DN =   20.11  UP =    20.12
ENERGY LINE ELEVATION                       DN =   20.12  UP =    20.12



ELEMENT NO.  2                                          NODES    10   15
* Wall Punchout
PRESSURE LINE (RECT)    FLOWRATE =     0.40           VELOCITY =   0.12
PIPE- H =  17.5 W =  42.0    LEN =   1.9                     N =  0.013
MINOR LOSS COEFFICIENTS ----- MISCELLANEOUS K =  0.00    EXIT K =  0.00
HEAD LOSS: MISC =  0.00     EXIT =  0.00 PIPE =  0.00     TOTAL =  0.00
HYDRAULIC GRADE LINE ELEVATION              DN =   20.12  UP =    20.12
ENERGY LINE ELEVATION                       DN =   20.12  UP =    20.12



ELEMENT NO.  6                                          NODES    15   20
* Aeration Tank
RECT/TRAP CHANNEL       FLOWRATE =     1.20     MINOR LOSS K =    0.000
BASE = 162.0     SLP = 0.0   LEN =  55.0     N =0.013  SLOPE =  0.00000
VELOCITY ---------------- NORMAL =999.99    DN =    0.02  UP =     0.02
CHANNEL BOTTOM ELEVATION                    DN =   11.21  UP =    11.21
DEPTH ---- CRIT =  0.08   NORMAL = 999.99   DN =    8.91  UP =     8.91
HEAD LOSS -----            MINOR =  0.000  HLOSS = 0.002  TOTAL = 0.002
HYDRAULIC GRADE LINE ELEV                   DN =   20.12  UP =    20.12
ENERGY LINE ELEVATION                       DN =   20.12  UP =    20.12




UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN
```

Q1= 2.40 Q2= 0.00 Q3= 0.00

==========

ELEMENT NO. 4 NODES 20 25
* Punchout
RECTANGULAR WEIR FLOWRATE = 1.20 *** SUBMERGED WEIR
WEIR ---------- SIDE CONTRACTION COEFFICIENT =0.00 ELEV = 17.50
LENGTH = 1.9 SUBMERGENCE = 1.00 HEAD = 2.63
HYDRAULIC GRADE LINE ELEV. HLOSS = 0.01 DN = 20.12 UP = 20.13
ENERGY LINE ELEVATION DN = 20.12 UP = 20.13

ELEMENT NO. 6 NODES 25 30
* Anoxic Tank
RECT/TRAP CHANNEL FLOWRATE = 1.20 MINOR LOSS K = 0.000
BASE = 216.0 SLP = 0.0 LEN = 7.0 N =0.013 SLOPE = 0.00000
VELOCITY ---------- NORMAL =999.99 DN = 0.01 UP = 0.01
CHANNEL BOTTOM ELEVATION DN = 11.21 UP = 11.21
DEPTH ---- CRIT = 0.07 NORMAL = 999.99 DN = 8.92 UP = 8.92
HEAD LOSS ----- MINOR = 0.000 HLOSS = 0.001 TOTAL = 0.001
HYDRAULIC GRADE LINE ELEV DN = 20.13 UP = 20.13
ENERGY LINE ELEVATION DN = 20.13 UP = 20.13

ELEMENT NO. 10 NODES 30 35
* Fine screen
******ADDITIONAL HEAD LOSS SPECIFIED******
HL = 0.17 K = 0.00 VHEAD = 0.00
HYDRAULIC GRADE LINE EL. HLOSS = 0.17 DN = 20.13 UP = 20.30
ENERGY LINE EL. DN = 20.13 UP = 20.30

ELEMENT NO. 1 NODES 35 40
* PE
PRESSURE LINE (CIR) FLOWRATE = 1.20 VELOCITY = 0.85
PIPE ------ DIA = 20.0 LEN = 20.0 N = 0.013
MINOR LOSS COEFFICIENTS ----- MISCELLANEOUS K = 0.50 EXIT K = 0.50
HEAD LOSS: MISC = 0.01 EXIT = 0.01 PIPE = 0.00 TOTAL = 0.01
HYDRAULIC GRADE LINE ELEVATION DN = 20.29 UP = 20.31
ENERGY LINE ELEVATION DN = 20.30 UP = 20.32

UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT FLOWS = MGD VELOCITY = FPS
WIDTH/HEIGHT = IN DIAM = IN

Q1= 2.40 Q2= 0.00 Q3= 0.00

==========

ELEMENT NO. 1 NODES 40 45
* PE
PRESSURE LINE (CIR) FLOWRATE = 2.40 VELOCITY = 1.70
PIPE ------ DIA = 20.0 LEN = 347.0 N = 0.013
MINOR LOSS COEFFICIENTS ----- MISCELLANEOUS K = 1.80 EXIT K = 0.00
HEAD LOSS: MISC = 0.08 EXIT = 0.00 PIPE = 0.25 TOTAL = 0.33
HYDRAULIC GRADE LINE ELEVATION DN = 20.27 UP = 20.60
ENERGY LINE ELEVATION DN = 20.32 UP = 20.64

```
*****************************************
*                                       *
*                  HYDRO                *
*        TREATMENT PLANT HYDRAULICS     *
*                                       *
*             CH2M Hill, Inc.           *
*         2300 NW Walnut Boulevard      *
*               P.O. Box 428            *
*         Corvallis, Oregon  97330      *
*                                       *
*             VERSION  10.10            *
*               01-OCT-15               *
*                                       *
*           (C) COPYRIGHT 2015          *
*             CH2M HILL, INC.           *
*           ALL RIGHTS RESERVED         *
*                                       *
*                                       *
*                                       *
*                  NOTE                 *
* This page contains valuable information *
* that should be saved.  If it becomes    *
* necessary to rerun this analysis in the *
* future, this page will allow retrieval  *
* of the proper program and data files.   *
*****************************************



UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN

                                                                  PAGE   1
Q1=    0.00     Q2=    0.00     Q3=    0.00
======================================================================




UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN

                                                                  PAGE   2
Q1=    3.80     Q2=    0.00     Q3=    0.00
======================================================================
```

```
CONDITIONS SET -                                                NODE =   5
* ML Tank
ENERGY LINE =  20.11  Q1 =   3.80  Q2 =   0.00  Q3 =   0.00  VEL = 0.00



ELEMENT NO.  6                                          NODES     5   10
* ML Tank
RECT/TRAP CHANNEL       FLOWRATE =     1.90     MINOR LOSS K =    0.000
BASE = 162.0     SLP = 0.0   LEN =   6.8     N =0.013  SLOPE =  0.00000
VELOCITY ---------------- NORMAL =999.99    DN =    0.02  UP =     0.02
CHANNEL BOTTOM ELEVATION                    DN =   11.21  UP =    11.21
DEPTH ---- CRIT =  0.11   NORMAL = 999.99   DN =    8.91  UP =     8.91
HEAD LOSS -----            MINOR =  0.000  HLOSS = 0.001  TOTAL = 0.001
HYDRAULIC GRADE LINE ELEV                   DN =   20.11  UP =    20.12
ENERGY LINE ELEVATION                       DN =   20.12  UP =    20.12



ELEMENT NO.  2                                          NODES    10   15
* Wall Punchout
PRESSURE LINE (RECT)    FLOWRATE =     0.63           VELOCITY =   0.19
PIPE- H =  17.5 W =  42.0    LEN =   1.9                     N =  0.013
MINOR LOSS COEFFICIENTS ----- MISCELLANEOUS K =  0.00    EXIT K =  0.00
HEAD LOSS: MISC =  0.00     EXIT =  0.00 PIPE =  0.00     TOTAL =  0.00
HYDRAULIC GRADE LINE ELEVATION              DN =   20.12  UP =    20.12
ENERGY LINE ELEVATION                       DN =   20.12  UP =    20.12



ELEMENT NO.  6                                          NODES    15   20
* Aeration Tank
RECT/TRAP CHANNEL       FLOWRATE =     1.90     MINOR LOSS K =    0.000
BASE = 162.0     SLP = 0.0   LEN =  55.0     N =0.013  SLOPE =  0.00000
VELOCITY ---------------- NORMAL =999.99    DN =    0.02  UP =     0.02
CHANNEL BOTTOM ELEVATION                    DN =   11.21  UP =    11.21
DEPTH ---- CRIT =  0.11   NORMAL = 999.99   DN =    8.91  UP =     8.91
HEAD LOSS -----            MINOR =  0.000  HLOSS = 0.002  TOTAL = 0.002
HYDRAULIC GRADE LINE ELEV                   DN =   20.12  UP =    20.12
ENERGY LINE ELEVATION                       DN =   20.12  UP =    20.12




UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
          WIDTH/HEIGHT = IN     DIAM = IN
```

Q1= 3.80 Q2= 0.00 Q3= 0.00

==========

ELEMENT NO. 4 NODES 20 25
* Punchout
RECTANGULAR WEIR FLOWRATE = 1.90 *** SUBMERGED WEIR
WEIR ---------- SIDE CONTRACTION COEFFICIENT =0.00 ELEV = 17.50
LENGTH = 1.9 SUBMERGENCE = 0.99 HEAD = 2.65
HYDRAULIC GRADE LINE ELEV. HLOSS = 0.03 DN = 20.12 UP = 20.15
ENERGY LINE ELEVATION DN = 20.12 UP = 20.15

ELEMENT NO. 6 NODES 25 30
* Anoxic Tank
RECT/TRAP CHANNEL FLOWRATE = 1.90 MINOR LOSS K = 0.000
BASE = 216.0 SLP = 0.0 LEN = 7.0 N =0.013 SLOPE = 0.00000
VELOCITY ---------- NORMAL =999.99 DN = 0.02 UP = 0.02
CHANNEL BOTTOM ELEVATION DN = 11.21 UP = 11.21
DEPTH ---- CRIT = 0.09 NORMAL = 999.99 DN = 8.94 UP = 8.94
HEAD LOSS ----- MINOR = 0.000 HLOSS = 0.001 TOTAL = 0.001
HYDRAULIC GRADE LINE ELEV DN = 20.15 UP = 20.15
ENERGY LINE ELEVATION DN = 20.15 UP = 20.15

ELEMENT NO. 10 NODES 30 35
* Fine screen
******ADDITIONAL HEAD LOSS SPECIFIED******
HL = 0.17 K = 0.00 VHEAD = 0.00
HYDRAULIC GRADE LINE EL. HLOSS = 0.17 DN = 20.15 UP = 20.32
ENERGY LINE EL. DN = 20.15 UP = 20.32

ELEMENT NO. 1 NODES 35 40
* PE
PRESSURE LINE (CIR) FLOWRATE = 1.90 VELOCITY = 1.35
PIPE ------ DIA = 20.0 LEN = 20.0 N = 0.013
MINOR LOSS COEFFICIENTS ----- MISCELLANEOUS K = 0.50 EXIT K = 0.50
HEAD LOSS: MISC = 0.01 EXIT = 0.01 PIPE = 0.01 TOTAL = 0.04
HYDRAULIC GRADE LINE ELEVATION DN = 20.29 UP = 20.33
ENERGY LINE ELEVATION DN = 20.32 UP = 20.36

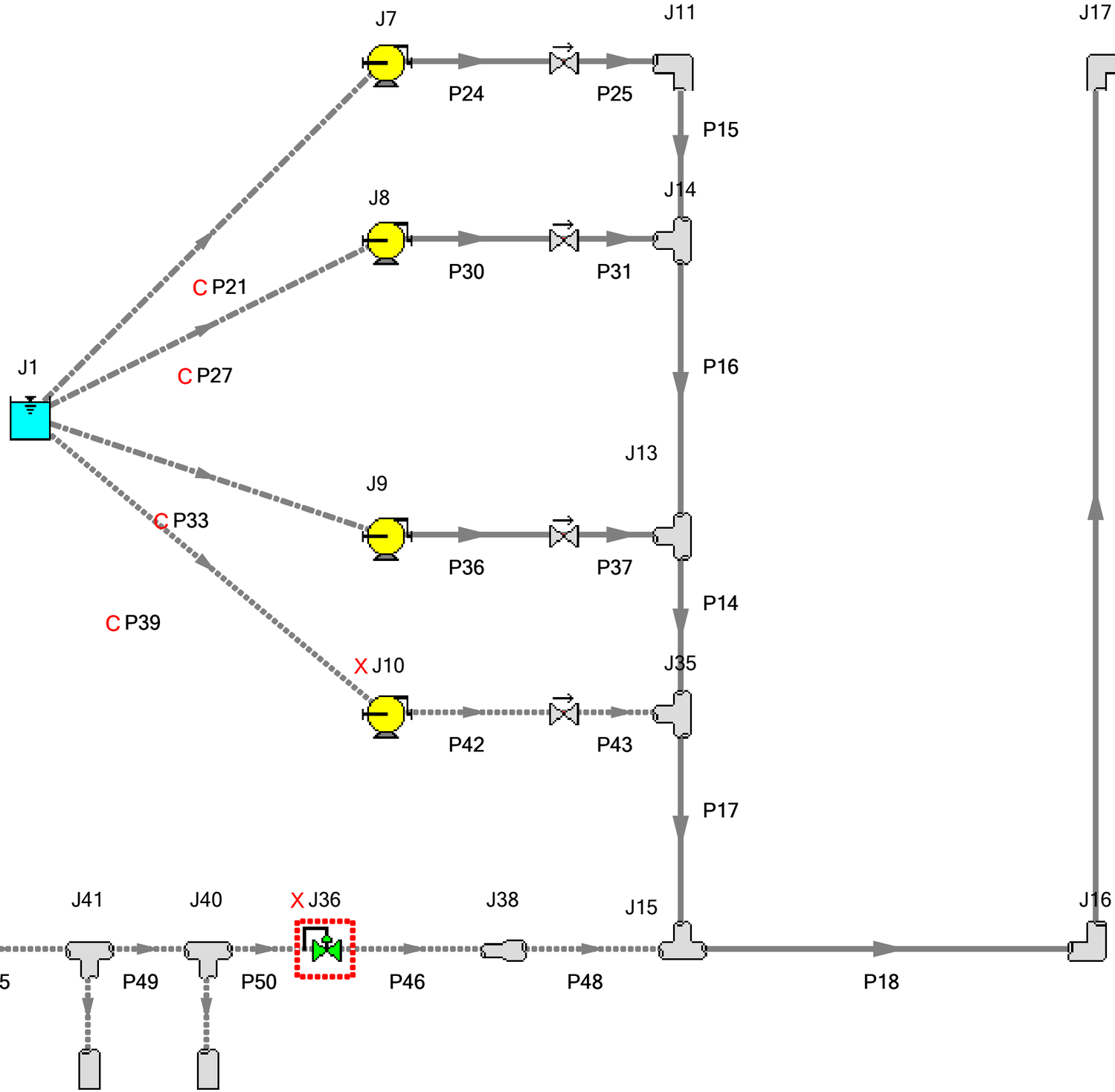
UNITS OPTION SPECIFIED = 0
LENGTH/ELEVATION/DEPTH = FT FLOWS = MGD VELOCITY = FPS
WIDTH/HEIGHT = IN DIAM = IN

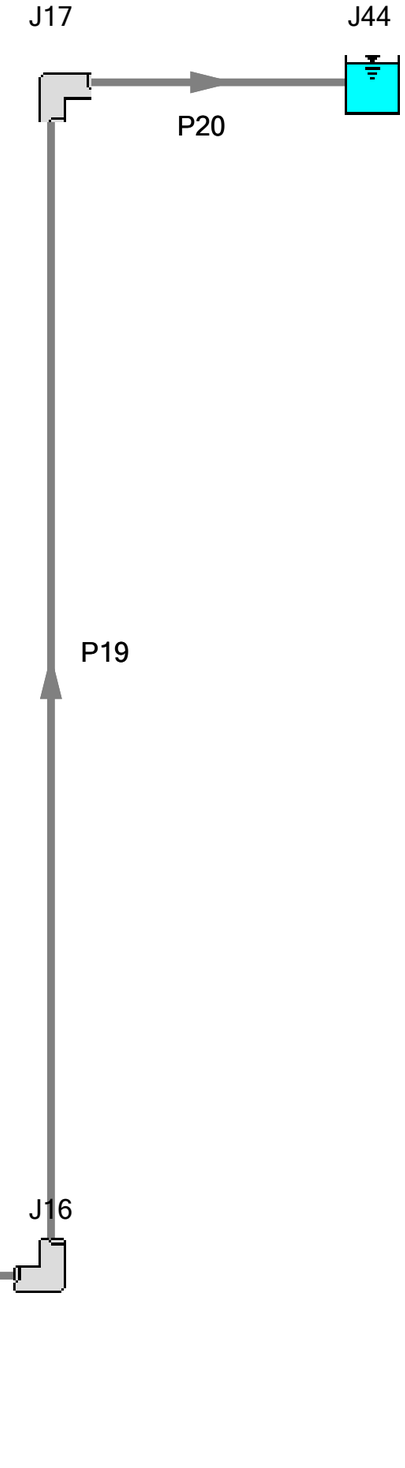
Q1= 3.80 Q2= 0.00 Q3= 0.00

==========

ELEMENT NO. 1 NODES 40 45
* PE
PRESSURE LINE (CIR) FLOWRATE = 3.80 VELOCITY = 2.69
PIPE ------ DIA = 20.0 LEN = 347.0 N = 0.013
MINOR LOSS COEFFICIENTS ----- MISCELLANEOUS K = 1.80 EXIT K = 0.00
HEAD LOSS: MISC = 0.20 EXIT = 0.00 PIPE = 0.62 TOTAL = 0.82
HYDRAULIC GRADE LINE ELEVATION DN = 20.25 UP = 21.07
ENERGY LINE ELEVATION DN = 20.36 UP = 21.18

Cloth Disks Pumps Fathom Model


J7
J11
P24
P25
P15
J8
J14
C P21
P30
P31
J1
C P27
P16
J13
J9
C P33
P36
P37
P14
C P39
X J10
J35
P42
P43
P17
J37
J41
J40
X J36
J38
J15
J16
P45
P49
P50
P46
P48
P18


J17
J44
P20
P19

Model Reference Information

General

Title: AFT Fathom Model
Analysis run on: 12/4/2025 8:38:36 AM
Application version: AFT Fathom Version 13 (2024.02.05)
Input File: C:\Users\Lunsfoc\Jacobs Engineering Group Inc\Crescent City CA - Preliminary Design\04 Calcs\02 Hydraulics\AFT Fathom\2025_08_28_Cloth_Disk_Pumps.bakF-001
Scenario: Base Scenario
Output File:

Execution Time= 0.09 seconds
Total Number Of Head/Pressure Iterations= 0
Total Number Of Flow Iterations= 2
Total Number Of Temperature Iterations= 0
Number Of Pipes= 26
Number Of Junctions= 24
Matrix Method= Gaussian Elimination

Pressure/Head Tolerance= 0.0001 relative change
Flow Rate Tolerance= 0.0001 relative change
Temperature Tolerance= 0.0001 relative change
Flow Relaxation= (Automatic)
Pressure Relaxation= (Automatic)
Maximum Temperature Limit= 10000 deg. R
Minimum Temperature Limit= 1E-05 deg. R

Constant Fluid Property Model
Fluid Library: AFT Standard
Fluid: Water (liquid)
Max Fluid Temperature Data= 485 deg. K
Min Fluid Temperature Data= 273.15 deg. K
Temperature= 70 deg. F
Density= 62.34661 lbm/ft3
Viscosity= 2.3664 lbm/hr-ft
Vapor Pressure= 0.36337 psia
Viscosity Model= Newtonian

Ambient Pressure (constant)= 1 atm
Gravitational Acceleration= 1 g
Turbulent Flow Above Reynolds Number= 4000
Laminar Flow Below Reynolds Number= 2300
Total Inflow= 0.00 gal/min
Total Outflow= 0.00 gal/min

Warnings

========== MULTIPLE SCENARIO SUMMARY ==========

CAUTION

The CURRENT scenario has not been selected in the Multi-Scenario Output display.

INFORMATION

===== Multiple Scenario Output Order =====

#1 -- Base Scenario/Pumps On High Flow

#2 -- Base Scenario/Pumps On Low Flow

#3 -- Base Scenario/Gravity Flow HWC = 150

#4 -- Base Scenario/Gravity Flow HWC = 130

========== SCENARIO: Base Scenario/Pumps On High Flow ==========

No Warnings

========== SCENARIO: Base Scenario/Pumps On Low Flow ==========

No Warnings

========== SCENARIO: Base Scenario/Gravity Flow HWC = 150 ==========

No Warnings

========== SCENARIO: Base Scenario/Gravity Flow HWC = 130 ==========

No Warnings

Design Alerts

========== SCENARIO: Base Scenario/Pumps On High Flow ==========

No Design Alerts Defined

========== SCENARIO: Base Scenario/Pumps On Low Flow ==========

No Design Alerts Defined

========== SCENARIO: Base Scenario/Gravity Flow HWC = 150 ==========

No Design Alerts Defined

========== SCENARIO: Base Scenario/Gravity Flow HWC = 130 ==========

No Design Alerts Defined

Pump Summary

Jct	Results Diagram	Name	Vol. Flow (gal/min)	dH (feet)	Ideal Isentropic Power (hp)	NPSHA (feet)
7 - Pumps On High Flow	Show	N/A	2,361	10.96	6.53	34.1
X7 - Pumps On Low Flow	Show	N/A	0	N/A	N/A	N/A
X7 - Gravity Flow HWC = 150	Show	N/A	0	N/A	N/A	N/A
X7 - Gravity Flow HWC = 130	Show	N/A	0	N/A	N/A	N/A
8 - Pumps On High Flow	Show	N/A	2,361	11.04	6.58	34.1
X8 - Pumps On Low Flow	Show	N/A	0	N/A	N/A	N/A
X8 - Gravity Flow HWC = 150	Show	N/A	0	N/A	N/A	N/A
X8 - Gravity Flow HWC = 130	Show	N/A	0	N/A	N/A	N/A
9 - Pumps On High Flow	Show	N/A	2,361	10.06	6.00	34.1
X9 - Pumps On Low Flow	Show	N/A	0	N/A	N/A	N/A
X9 - Gravity Flow HWC = 150	Show	N/A	0	N/A	N/A	N/A
X9 - Gravity Flow HWC = 130	Show	N/A	0	N/A	N/A	N/A

Jct	Results Diagram	Name	Vol. Flow (gal/min)	dH (feet)	Ideal Isentropic Power (hp)	NPSHA (feet)
X10 - Pumps On High Flow	Show	N/A	0	N/A	N/A	N/A
10 - Pumps On Low Flow	Show	N/A	2,396	5.98	3.62	34.1
X10 - Gravity Flow HWC = 150	Show	N/A	0	N/A	N/A	N/A
X10 - Gravity Flow HWC = 130	Show	N/A	0	N/A	N/A	N/A

Valve Summary

Jct	Name	Valve Type	Vol. Flow (gal/min)	dP Stag. (psid)	dH (feet)	P Static In (psig)	P Static Out (psia)	Cv	K
X36 - Pumps On High Flow	N/A	FCV	0	N/A	N/A	2.481	17.9	0	N/A
X36 - Pumps On Low Flow	N/A	FCV	0	N/A	N/A	2.442	16.9	0	N/A
36 - Gravity Flow HWC = 150	N/A	FCV	1,389	0.560	1.293	2.385	16.4	1,856	15.407
36 - Gravity Flow HWC = 130	N/A	FCV	1,389	0.352	0.813	2.385	16.6	2,340	9.689
31 - Pumps On High Flow	N/A	CHECK	2,361	0.366	0.846	3.312	17.6	3,900	0.690
31 - Pumps On Low Flow	N/A	CHECK	0	N/A	N/A	0.925	15.6	0	N/A
31 - Gravity Flow HWC = 150	N/A	CHECK	0	N/A	N/A	0.395	15.1	0	N/A
31 - Gravity Flow HWC = 130	N/A	CHECK	0	N/A	N/A	0.603	15.3	0	N/A
32 - Pumps On High Flow	N/A	CHECK	2,361	0.366	0.846	3.348	17.7	3,900	0.690
32 - Pumps On Low Flow	N/A	CHECK	0	N/A	N/A	0.925	15.6	0	N/A
32 - Gravity Flow HWC = 150	N/A	CHECK	0	N/A	N/A	0.395	15.1	0	N/A
32 - Gravity Flow HWC = 130	N/A	CHECK	0	N/A	N/A	0.603	15.3	0	N/A
33 - Pumps On High Flow	N/A	CHECK	2,361	0.366	0.846	2.922	17.3	3,900	0.690
33 - Pumps On Low Flow	N/A	CHECK	0	N/A	N/A	0.925	15.6	0	N/A
33 - Gravity Flow HWC = 150	N/A	CHECK	0	N/A	N/A	0.395	15.1	0	N/A
33 - Gravity Flow HWC = 130	N/A	CHECK	0	N/A	N/A	0.603	15.3	0	N/A
34 - Pumps On High Flow	N/A	CHECK	0	N/A	N/A	2.648	17.3	0	N/A
34 - Pumps On Low Flow	N/A	CHECK	2,396	0.377	0.871	1.138	15.5	3,900	0.690
34 - Gravity Flow HWC = 150	N/A	CHECK	0	N/A	N/A	0.395	15.1	0	N/A
34 - Gravity Flow HWC = 130	N/A	CHECK	0	N/A	N/A	0.603	15.3	0	N/A

Jct	Valve State
X36 - Pumps On High Flow	Closed By User
X36 - Pumps On Low Flow	Closed By User
36 - Gravity Flow HWC = 150	Open
36 - Gravity Flow HWC = 130	Open
31 - Pumps On High Flow	Open
31 - Pumps On Low Flow	Open
31 - Gravity Flow HWC = 150	Open
31 - Gravity Flow HWC = 130	Open
32 - Pumps On High Flow	Open
32 - Pumps On Low Flow	Open
32 - Gravity Flow HWC = 150	Open
32 - Gravity Flow HWC = 130	Open
33 - Pumps On High Flow	Open
33 - Pumps On Low Flow	Open
33 - Gravity Flow HWC = 150	Open
33 - Gravity Flow HWC = 130	Open
34 - Pumps On High Flow	Open
34 - Pumps On Low Flow	Open
34 - Gravity Flow HWC = 150	Open
34 - Gravity Flow HWC = 130	Open

Reservoir Summary

Jct	Name	Type	Liq. Elevation (feet)	Surface Pressure (psia)	Net Vol. Flow (gal/min)
1 - Pumps On High Flow	N/A	N/A	17.0	14.7	-7,083
1 - Pumps On Low Flow	N/A	N/A	17.0	14.7	-2,396
1 - Gravity Flow HWC = 150	N/A	N/A	21.5	14.7	0
1 - Gravity Flow HWC = 130	N/A	N/A	21.5	14.7	0
37 - Pumps On High Flow	N/A	N/A	21.7	14.7	0
37 - Pumps On Low Flow	N/A	N/A	21.5	14.7	0
37 - Gravity Flow HWC = 150	N/A	N/A	21.5	14.7	-1,389
37 - Gravity Flow HWC = 130	N/A	N/A	21.5	14.7	-1,389
44 - Pumps On High Flow	N/A	N/A	22.4	14.7	7,083
44 - Pumps On Low Flow	N/A	N/A	20.8	14.7	2,396
44 - Gravity Flow HWC = 150	N/A	N/A	19.9	14.7	1,389
44 - Gravity Flow HWC = 130	N/A	N/A	20.4	14.7	1,389

Pipe Output Table

Pipe	Name	Hyd. Diameter (inches)	Length (feet)	Vol. Flow Rate (gal/min)	Velocity (feet/sec)	dP Static Friction Total (psid)	dH (feet)	HGL Inlet (feet)	HGL Outlet (feet)
14 - Pumps On High Flow	N/A	15.6	3.00	7,083	11.85	0.034242	0.07909	23.0	22.9
14 - Pumps On Low Flow	N/A	15.6	3.00	0	0.00	0.000000	0.00000	21.1	21.1
14 - Gravity Flow HWC = 150	N/A	15.6	3.00	0	0.00	0.000000	0.00000	19.9	19.9
14 - Gravity Flow HWC = 130	N/A	15.6	3.00	0	0.00	0.000000	0.00000	20.4	20.4
15 - Pumps On High Flow	N/A	15.6	3.00	2,361	3.95	0.004477	0.01034	26.4	26.4
15 - Pumps On Low Flow	N/A	15.6	3.00	0	0.00	0.000000	0.00000	21.1	21.1
15 - Gravity Flow HWC = 150	N/A	15.6	3.00	0	0.00	0.000000	0.00000	19.9	19.9
15 - Gravity Flow HWC = 130	N/A	15.6	3.00	0	0.00	0.000000	0.00000	20.4	20.4
16 - Pumps On High Flow	N/A	15.6	3.00	4,722	7.90	0.016161	0.03733	25.2	25.1
16 - Pumps On Low Flow	N/A	15.6	3.00	0	0.00	0.000000	0.00000	21.1	21.1
16 - Gravity Flow HWC = 150	N/A	15.6	3.00	0	0.00	0.000000	0.00000	19.9	19.9
16 - Gravity Flow HWC = 130	N/A	15.6	3.00	0	0.00	0.000000	0.00000	20.4	20.4
17 - Pumps On High Flow	N/A	15.6	3.00	7,083	11.85	0.034242	0.07909	22.9	22.9
17 - Pumps On Low Flow	N/A	15.6	3.00	2,396	4.01	0.004600	0.01062	20.9	20.9
17 - Gravity Flow HWC = 150	N/A	15.6	3.00	0	0.00	0.000000	0.00000	19.9	19.9
17 - Gravity Flow HWC = 130	N/A	15.6	3.00	0	0.00	0.000000	0.00000	20.4	20.4
18 - Pumps On High Flow	N/A	19.6	4.50	7,083	7.56	0.017178	0.03968	22.5	22.4
18 - Pumps On Low Flow	N/A	19.6	4.50	2,396	2.56	0.002308	0.00533	20.8	20.8
18 - Gravity Flow HWC = 150	N/A	19.6	4.50	1,389	1.48	0.000841	0.00194	19.9	19.9
18 - Gravity Flow HWC = 130	N/A	19.6	4.50	1,389	1.48	0.000841	0.00194	20.4	20.4
19 - Pumps On High Flow	N/A	19.6	35.25	7,083	7.56	0.134564	0.31080	22.2	21.9
19 - Pumps On Low Flow	N/A	19.6	35.25	2,396	2.56	0.018076	0.04175	20.8	20.8
19 - Gravity Flow HWC = 150	N/A	19.6	35.25	1,389	1.48	0.006586	0.01521	19.9	19.9
19 - Gravity Flow HWC = 130	N/A	19.6	35.25	1,389	1.48	0.006586	0.01521	20.3	20.3
20 - Pumps On High Flow	N/A	19.6	22.83	7,083	7.56	0.087163	0.20132	21.7	21.5
20 - Pumps On Low Flow	N/A	19.6	22.83	2,396	2.56	0.011709	0.02704	20.7	20.7
20 - Gravity Flow HWC = 150	N/A	19.6	22.83	1,389	1.48	0.004266	0.00985	19.8	19.8
20 - Gravity Flow HWC = 130	N/A	19.6	22.83	1,389	1.48	0.004266	0.00985	20.3	20.3
24 - Pumps On High Flow	N/A	10.4	3.00	2,361	8.88	0.032197	0.07436	26.7	26.6
24 - Pumps On Low Flow	N/A	10.4	3.00	0	0.00	0.000000	0.00000	21.1	21.1
24 - Gravity Flow HWC = 150	N/A	10.4	3.00	0	0.00	0.000000	0.00000	19.9	19.9
24 - Gravity Flow HWC = 130	N/A	10.4	3.00	0	0.00	0.000000	0.00000	20.4	20.4
25 - Pumps On High Flow	N/A	10.4	2.00	2,361	8.88	0.021465	0.04958	25.8	25.8
25 - Pumps On Low Flow	N/A	10.4	2.00	0	0.00	0.000000	0.00000	21.1	21.1
25 - Gravity Flow HWC = 150	N/A	10.4	2.00	0	0.00	0.000000	0.00000	19.9	19.9
25 - Gravity Flow HWC = 130	N/A	10.4	2.00	0	0.00	0.000000	0.00000	20.4	20.4
30 - Pumps On High Flow	N/A	10.4	3.00	2,361	8.88	0.032197	0.07436	26.8	26.7
30 - Pumps On Low Flow	N/A	10.4	3.00	0	0.00	0.000000	0.00000	21.1	21.1
30 - Gravity Flow HWC = 150	N/A	10.4	3.00	0	0.00	0.000000	0.00000	19.9	19.9
30 - Gravity Flow HWC = 130	N/A	10.4	3.00	0	0.00	0.000000	0.00000	20.4	20.4

Pipe	Name	Hyd. Diameter (inches)	Length (feet)	Vol. Flow Rate (gal/min)	Velocity (feet/sec)	dP Static Friction Total (psid)	dH (feet)	HGL Inlet (feet)	HGL Outlet (feet)
31 - Pumps On High Flow	N/A	10.4	2.00	2,361	8.88	0.021465	0.04958	25.9	25.8
31 - Pumps On Low Flow	N/A	10.4	2.00	0	0.00	0.000000	0.00000	21.1	21.1
31 - Gravity Flow HWC = 150	N/A	10.4	2.00	0	0.00	0.000000	0.00000	19.9	19.9
31 - Gravity Flow HWC = 130	N/A	10.4	2.00	0	0.00	0.000000	0.00000	20.4	20.4
36 - Pumps On High Flow	N/A	10.4	3.00	2,361	8.88	0.032197	0.07436	25.8	25.7
36 - Pumps On Low Flow	N/A	10.4	3.00	0	0.00	0.000000	0.00000	21.1	21.1
36 - Gravity Flow HWC = 150	N/A	10.4	3.00	0	0.00	0.000000	0.00000	19.9	19.9
36 - Gravity Flow HWC = 130	N/A	10.4	3.00	0	0.00	0.000000	0.00000	20.4	20.4
37 - Pumps On High Flow	N/A	10.4	2.00	2,361	8.88	0.021465	0.04958	24.9	24.9
37 - Pumps On Low Flow	N/A	10.4	2.00	0	0.00	0.000000	0.00000	21.1	21.1
37 - Gravity Flow HWC = 150	N/A	10.4	2.00	0	0.00	0.000000	0.00000	19.9	19.9
37 - Gravity Flow HWC = 130	N/A	10.4	2.00	0	0.00	0.000000	0.00000	20.4	20.4
42 - Pumps On High Flow	N/A	10.4	3.00	0	0.00	0.000000	0.00000	25.1	25.1
42 - Pumps On Low Flow	N/A	10.4	3.00	2,396	9.01	0.033079	0.07640	21.7	21.6
42 - Gravity Flow HWC = 150	N/A	10.4	3.00	0	0.00	0.000000	0.00000	19.9	19.9
42 - Gravity Flow HWC = 130	N/A	10.4	3.00	0	0.00	0.000000	0.00000	20.4	20.4
43 - Pumps On High Flow	N/A	10.4	2.00	0	0.00	0.000000	0.00000	25.1	25.1
43 - Pumps On Low Flow	N/A	10.4	2.00	2,396	9.01	0.022053	0.05093	20.8	20.7
43 - Gravity Flow HWC = 150	N/A	10.4	2.00	0	0.00	0.000000	0.00000	19.9	19.9
43 - Gravity Flow HWC = 130	N/A	10.4	2.00	0	0.00	0.000000	0.00000	20.4	20.4
45 - Pumps On High Flow	N/A	19.6	80.00	0	0.00	0.000000	0.00000	21.7	21.7
45 - Pumps On Low Flow	N/A	19.6	80.00	0	0.00	0.000000	0.00000	21.5	21.5
45 - Gravity Flow HWC = 150	N/A	19.6	80.00	1,389	1.48	0.014947	0.03452	21.5	21.4
45 - Gravity Flow HWC = 130	N/A	19.6	80.00	1,389	1.48	0.014947	0.03452	21.5	21.4
46 - Pumps On High Flow	N/A	10.4	3.00	0	0.00	0.000000	0.00000	23.3	23.3
46 - Pumps On Low Flow	N/A	10.4	3.00	0	0.00	0.000000	0.00000	20.9	20.9
46 - Gravity Flow HWC = 150	N/A	10.4	3.00	1,389	5.23	0.012052	0.02784	19.7	19.7
46 - Gravity Flow HWC = 130	N/A	10.4	3.00	1,389	5.23	0.012052	0.02784	20.2	20.2
48 - Pumps On High Flow	N/A	19.6	3.00	0	0.00	0.000000	0.00000	23.3	23.3
48 - Pumps On Low Flow	N/A	19.6	3.00	0	0.00	0.000000	0.00000	20.9	20.9
48 - Gravity Flow HWC = 150	N/A	19.6	3.00	1,389	1.48	0.000560	0.00129	19.9	19.9
48 - Gravity Flow HWC = 130	N/A	19.6	3.00	1,389	1.48	0.000560	0.00129	20.4	20.4
49 - Pumps On High Flow	N/A	15.6	5.00	0	0.00	0.000000	0.00000	21.7	21.7
49 - Pumps On Low Flow	N/A	15.6	5.00	0	0.00	0.000000	0.00000	21.5	21.5
49 - Gravity Flow HWC = 150	N/A	15.6	5.00	1,389	2.32	0.002793	0.00645	21.4	21.4
49 - Gravity Flow HWC = 130	N/A	15.6	5.00	1,389	2.32	0.002793	0.00645	21.4	21.4
50 - Pumps On High Flow	N/A	15.6	5.00	0	0.00	0.000000	0.00000	21.7	21.7
50 - Pumps On Low Flow	N/A	15.6	5.00	0	0.00	0.000000	0.00000	21.5	21.5
50 - Gravity Flow HWC = 150	N/A	15.6	5.00	1,389	2.32	0.002793	0.00645	21.4	21.4
50 - Gravity Flow HWC = 130	N/A	15.6	5.00	1,389	2.32	0.002793	0.00645	21.4	21.4

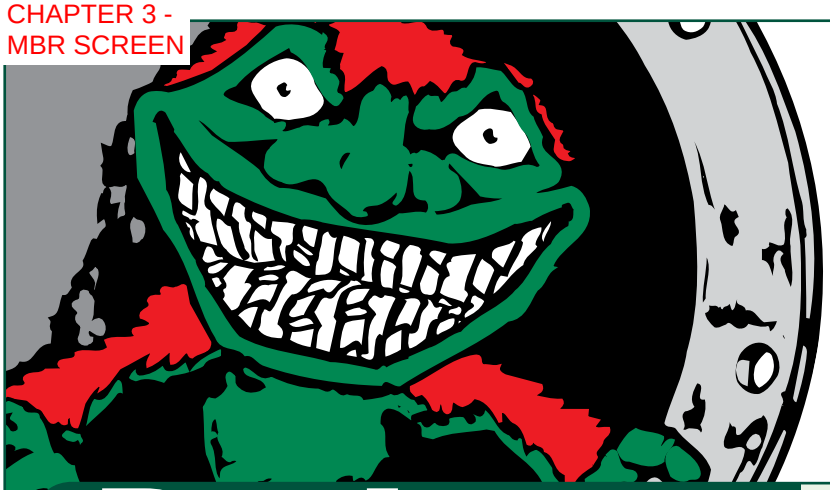
All Junction Table

Jct	Name	Vol. Flow Rate Thru Jct (gal/min)	dH (feet)	HGL Inlet (feet)	HGL Outlet (feet)	Loss Factor (K)	Elevation Outlet (feet)
1 - Pumps On High Flow	N/A	N/A	0.00000	17.0	17.0	0.000	17.0
1 - Pumps On Low Flow	N/A	N/A	0.00000	17.0	17.0	0.000	17.0
1 - Gravity Flow HWC = 150	N/A	N/A	0.00000	21.5	21.5	0.000	21.5
1 - Gravity Flow HWC = 130	N/A	N/A	0.00000	21.5	21.5	0.000	21.5
7 - Pumps On High Flow	N/A	2,361	-10.96006	16.4	26.7	0.000	16.0
X7 - Pumps On Low Flow	N/A	0	N/A	17.0	21.1	0.000	16.0
X7 - Gravity Flow HWC = 150	N/A	0	N/A	21.5	19.9	0.000	16.0
X7 - Gravity Flow HWC = 130	N/A	0	N/A	21.5	20.4	0.000	16.0
8 - Pumps On High Flow	N/A	2,361	-11.04337	16.4	26.8	0.000	16.0
X8 - Pumps On Low Flow	N/A	0	N/A	17.0	21.1	0.000	16.0
X8 - Gravity Flow HWC = 150	N/A	0	N/A	21.5	19.9	0.000	16.0
X8 - Gravity Flow HWC = 130	N/A	0	N/A	21.5	20.4	0.000	16.0
9 - Pumps On High Flow	N/A	2,361	-10.06053	16.4	25.8	0.000	16.0
X9 - Pumps On Low Flow	N/A	0	N/A	17.0	21.1	0.000	16.0
X9 - Gravity Flow HWC = 150	N/A	0	N/A	21.5	19.9	0.000	16.0
X9 - Gravity Flow HWC = 130	N/A	0	N/A	21.5	20.4	0.000	16.0
X10 - Pumps On High Flow	N/A	0	N/A	17.0	25.1	0.000	16.0
10 - Pumps On Low Flow	N/A	2,396	-5.97722	16.4	21.7	0.000	16.0
X10 - Gravity Flow HWC = 150	N/A	0	N/A	21.5	19.9	0.000	16.0
X10 - Gravity Flow HWC = 130	N/A	0	N/A	21.5	20.4	0.000	16.0
11 - Pumps On High Flow	N/A	2,361	0.33822	25.8	26.4	0.276	19.0
11 - Pumps On Low Flow	N/A	0	0.00000	21.1	21.1	0.000	19.0
11 - Gravity Flow HWC = 150	N/A	0	0.00000	19.9	19.9	0.000	19.0
11 - Gravity Flow HWC = 130	N/A	0	0.00000	20.4	20.4	0.000	19.0
13 - Pumps On High Flow	N/A	N/A	See Mult. Losses	23.8	23.8	See Mult. Losses	19.0
13 - Pumps On Low Flow	N/A	N/A	0.00000	21.1	21.1	See Mult. Losses	19.0
13 - Gravity Flow HWC = 150	N/A	N/A	0.00000	19.9	19.9	See Mult. Losses	19.0
13 - Gravity Flow HWC = 130	N/A	N/A	0.00000	20.4	20.4	See Mult. Losses	19.0
14 - Pumps On High Flow	N/A	N/A	See Mult. Losses	25.4	25.4	See Mult. Losses	19.0
14 - Pumps On Low Flow	N/A	N/A	0.00000	21.1	21.1	See Mult. Losses	19.0
14 - Gravity Flow HWC = 150	N/A	N/A	0.00000	19.9	19.9	See Mult. Losses	19.0
14 - Gravity Flow HWC = 130	N/A	N/A	0.00000	20.4	20.4	See Mult. Losses	19.0
15 - Pumps On High Flow	N/A	N/A	See Mult. Losses	22.7	22.7	See Mult. Losses	16.0
15 - Pumps On Low Flow	N/A	N/A	See Mult. Losses	20.9	20.9	See Mult. Losses	16.0
15 - Gravity Flow HWC = 150	N/A	N/A	See Mult. Losses	19.9	19.9	See Mult. Losses	16.0
15 - Gravity Flow HWC = 130	N/A	N/A	See Mult. Losses	20.4	20.4	See Mult. Losses	16.0
16 - Pumps On High Flow	N/A	7,083	0.21316	22.4	22.2	0.240	19.5
16 - Pumps On Low Flow	N/A	2,396	0.02439	20.8	20.8	0.240	16.0
16 - Gravity Flow HWC = 150	N/A	1,389	0.00820	19.9	19.9	0.240	16.0

Jct	Name	Vol. Flow Rate Thru Jct (gal/min)	dH (feet)	HGL Inlet (feet)	HGL Outlet (feet)	Loss Factor (K)	Elevation Outlet (feet)
16 - Gravity Flow HWC = 130	N/A	1,389	0.00820	20.4	20.3	0.240	16.0
17 - Pumps On High Flow	N/A	7,083	0.21316	21.9	21.7	0.240	20.0
17 - Pumps On Low Flow	N/A	2,396	0.02439	20.8	20.7	0.240	16.0
17 - Gravity Flow HWC = 150	N/A	1,389	0.00820	19.9	19.8	0.240	16.0
17 - Gravity Flow HWC = 130	N/A	1,389	0.00820	20.3	20.3	0.240	16.0
31 - Pumps On High Flow	N/A	2,361	0.84616	26.6	25.8	0.690	19.0
31 - Pumps On Low Flow	N/A	0	0.00000	21.1	21.1	0.000	19.0
31 - Gravity Flow HWC = 150	N/A	0	0.00000	19.9	19.9	0.000	19.0
31 - Gravity Flow HWC = 130	N/A	0	0.00000	20.4	20.4	0.000	19.0
32 - Pumps On High Flow	N/A	2,361	0.84616	26.7	25.9	0.690	19.0
32 - Pumps On Low Flow	N/A	0	0.00000	21.1	21.1	0.000	19.0
32 - Gravity Flow HWC = 150	N/A	0	0.00000	19.9	19.9	0.000	19.0
32 - Gravity Flow HWC = 130	N/A	0	0.00000	20.4	20.4	0.000	19.0
33 - Pumps On High Flow	N/A	2,361	0.84616	25.7	24.9	0.690	19.0
33 - Pumps On Low Flow	N/A	0	0.00000	21.1	21.1	0.000	19.0
33 - Gravity Flow HWC = 150	N/A	0	0.00000	19.9	19.9	0.000	19.0
33 - Gravity Flow HWC = 130	N/A	0	0.00000	20.4	20.4	0.000	19.0
34 - Pumps On High Flow	N/A	0	0.00000	25.1	25.1	0.000	19.0
34 - Pumps On Low Flow	N/A	2,396	0.87124	21.6	20.8	0.690	19.0
34 - Gravity Flow HWC = 150	N/A	0	0.00000	19.9	19.9	0.000	19.0
34 - Gravity Flow HWC = 130	N/A	0	0.00000	20.4	20.4	0.000	19.0
35 - Pumps On High Flow	N/A	N/A	See Mult. Losses	24.1	24.1	See Mult. Losses	19.0
35 - Pumps On Low Flow	N/A	N/A	See Mult. Losses	20.8	20.8	See Mult. Losses	19.0
35 - Gravity Flow HWC = 150	N/A	N/A	0.00000	19.9	19.9	See Mult. Losses	19.0
35 - Gravity Flow HWC = 130	N/A	N/A	0.00000	20.4	20.4	See Mult. Losses	19.0
X36 - Pumps On High Flow	N/A	0	-1.61811	21.7	23.3	0.000	16.0
X36 - Pumps On Low Flow	N/A	0	0.56710	21.5	20.9	0.000	15.9
36 - Gravity Flow HWC = 150	N/A	1,389	1.29335	21.4	19.7	15.407	15.9
36 - Gravity Flow HWC = 130	N/A	1,389	0.81335	21.4	20.2	9.689	15.9
37 - Pumps On High Flow	N/A	0	0.00000	21.7	21.7	0.000	21.7
37 - Pumps On Low Flow	N/A	0	0.00000	21.5	21.5	0.000	21.5
37 - Gravity Flow HWC = 150	N/A	1,389	0.00000	21.5	21.5	0.000	21.5
37 - Gravity Flow HWC = 130	N/A	1,389	0.00000	21.5	21.5	0.000	21.5
38 - Pumps On High Flow	N/A	0	0.00000	23.3	23.3	0.000	15.9
38 - Pumps On Low Flow	N/A	0	0.00000	20.9	20.9	0.000	15.9
38 - Gravity Flow HWC = 150	N/A	1,389	0.21664	19.7	19.9	0.511	15.9
38 - Gravity Flow HWC = 130	N/A	1,389	0.21664	20.2	20.4	0.511	15.9
40 - Pumps On High Flow	N/A	N/A	0.00000	21.7	21.7	See Mult. Losses	15.9
40 - Pumps On Low Flow	N/A	N/A	0.00000	21.5	21.5	See Mult. Losses	15.9
40 - Gravity Flow HWC = 150	N/A	N/A	0.00000	21.4	21.4	See Mult. Losses	15.9
40 - Gravity Flow HWC = 130	N/A	N/A	0.00000	21.4	21.4	See Mult. Losses	15.9

Jct	Name	Vol. Flow Rate Thru Jct (gal/min)	dH (feet)	HGL Inlet (feet)	HGL Outlet (feet)	Loss Factor (K)	Elevation Outlet (feet)
41 - Pumps On High Flow	N/A	N/A	0.00000	21.7	21.7	See Mult. Losses	15.9
41 - Pumps On Low Flow	N/A	N/A	0.00000	21.5	21.5	See Mult. Losses	15.9
41 - Gravity Flow HWC = 150	N/A	N/A	0.00000	21.4	21.4	See Mult. Losses	15.9
41 - Gravity Flow HWC = 130	N/A	N/A	0.00000	21.4	21.4	See Mult. Losses	15.9
42 - Pumps On High Flow	N/A	0	0.00000	21.7	21.7	0.000	15.9
42 - Pumps On Low Flow	N/A	0	0.00000	21.5	21.5	0.000	15.9
42 - Gravity Flow HWC = 150	N/A	0	0.00000	21.5	21.5	0.000	15.9
42 - Gravity Flow HWC = 130	N/A	0	0.00000	21.5	21.5	0.000	15.9
43 - Pumps On High Flow	N/A	0	0.00000	21.7	21.7	0.000	15.9
43 - Pumps On Low Flow	N/A	0	0.00000	21.5	21.5	0.000	15.9
43 - Gravity Flow HWC = 150	N/A	0	0.00000	21.5	21.5	0.000	15.9
43 - Gravity Flow HWC = 130	N/A	0	0.00000	21.5	21.5	0.000	15.9
44 - Pumps On High Flow	N/A	7,083	0.00000	22.4	22.4	0.000	22.4
44 - Pumps On Low Flow	N/A	2,396	0.00000	20.8	20.8	0.000	20.8
44 - Gravity Flow HWC = 150	N/A	1,389	0.00000	19.9	19.9	0.000	19.9
44 - Gravity Flow HWC = 130	N/A	1,389	0.00000	20.4	20.4	0.000	20.4

Appendix E
Equipment Cut Sheets



Bandscreen Monster®

Monster Separation Systems®

Excellent Protection for MBRs

Overview

In today's modern wastewater treatment plants, meeting high standards in effluent quality, cost efficiency and odor control is a must. To meet these higher standards, JWC introduces the Bandscreen Monster, a member of the Monster Separation System line of high performance screens.

This system offers incredibly high capture rates and is able to remove a wider variety of solids, particularly small solids and trash, better than traditional screens. It is frequently specified to protect high-tech Membrane Bioreactors (MBR) so they can run more efficiently and with less maintenance.

The rotating panels are positioned parallel to the flow and as wastewater enters the screen it flows left or right through the perforated screening panels. Panels available with 5/64", 1/8" or ¼" (2, 3 or 6mm) openings. The heavy-duty stainless steel roller chain passes around a UHMW guide track to eliminate the need for sprockets or bearings in the flow.

Unwanted solids are captured and lifted to the discharge level where a spray system washes solids into the Screenings Washer Monster® for washing, dewatering and compacting.

Flow passes through the left, right and bottom panels.

Detect screen "blinding" with the optional Monster Blind Diagnostic System.

Features & Benefits

Unique Flow Pattern
- Screen configuration eliminates screenings carryover

Advanced Design
- Perforated openings capture twice the trash as bar screens
- Perforated UHMW inserts *(replaceable)* with stainless steel frame
- Neoprene seals between the perforated plates and side seals ensure material does not bypass the screen

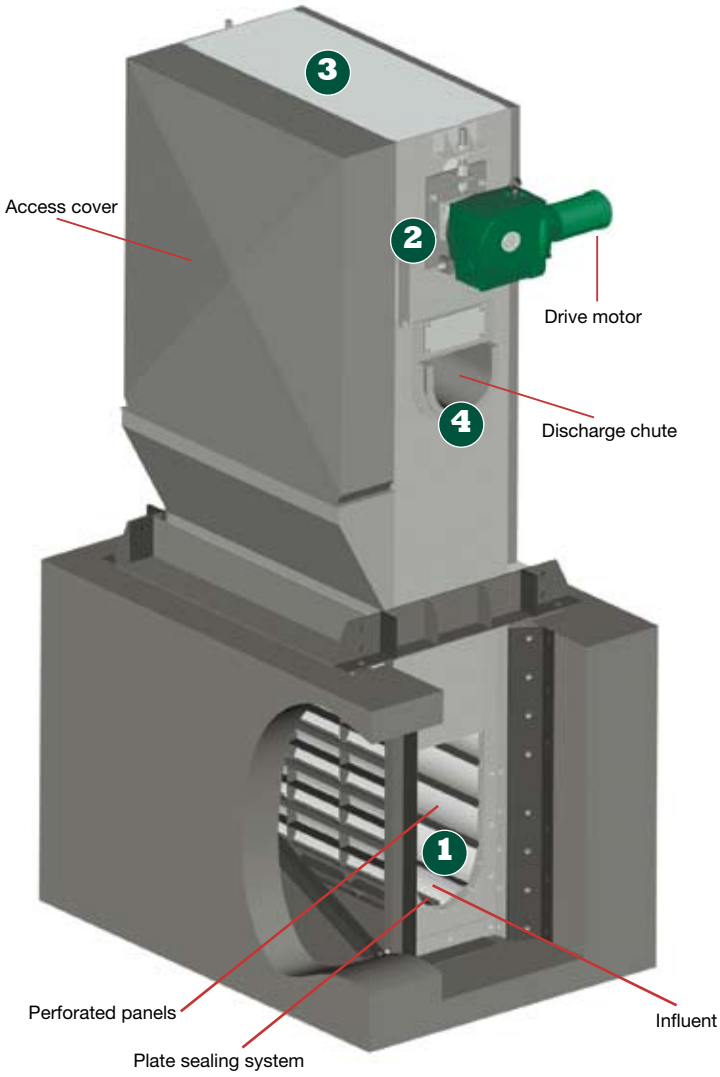
Optional Monster Blind Diagnostic System *(patent pending)*
- Detects and alerts operators of potential screen "blinding" situations

Enhanced Cleaning System
- High power spray bar keeps the screen's panels clear

Heavy-Duty Stainless Steel Roller Chains
- Stainless steel construction ensures long life
- Roller chains track smoothly in UHMW guides

Cleaner Screenings with Screenings Washer Monster
- Grinds, washes, dewaters and compacts screenings
- Dewaters screenings up to 50% or more
- Reduces volume of screenings up to 80% or more
- Lower disposal costs and improved landfill acceptability

JWC Environmental®
Trust Monster Quality™



Bandscreen Monster®

Monster Separation Systems®

Equipment Sizing

Screen panel hole size: ø 2, 3 or 6mm perforations

Minimum wash water head at spray jets: 30 PSI (2 bar)

Wash water: Spray nozzles at 6" (150mm) centers

Wash water requirement: 1.3 GPM (0.08 l/s) per nozzle

Discharge height above channel wall: 20' (.5m)

Operation

1) Wastewater in the channel flows into the center of the screen and then passes through the screening panels on the left and the right and through the bottom.

2) The drive moves panels from the screening zone, to the cleaning mechanism (during operating cycle).

3) Debris is removed from the perforated panels by the spray wash system.

4) Screenings are flushed or conveyed to the integrated Screenings Washer Monster® for washing and compacting.

Materials of Construction

Screen structure: 304 or 316 stainless steel

Sprockets: 304 or 316 stainless steel

Drive shafts: 17-4 stainless steel

Screen panels: UHMW plates, 6mm or 9mm thick

Heavy-duty roller chain: stainless steel

This empty channel makes it easier to view the unique screen configuration.

A pair of Bandscreen Monsters operating at a wastewater treatment plant in Hawaii.

The integrated Screenings Washer Monster produces ultra clean discharge.

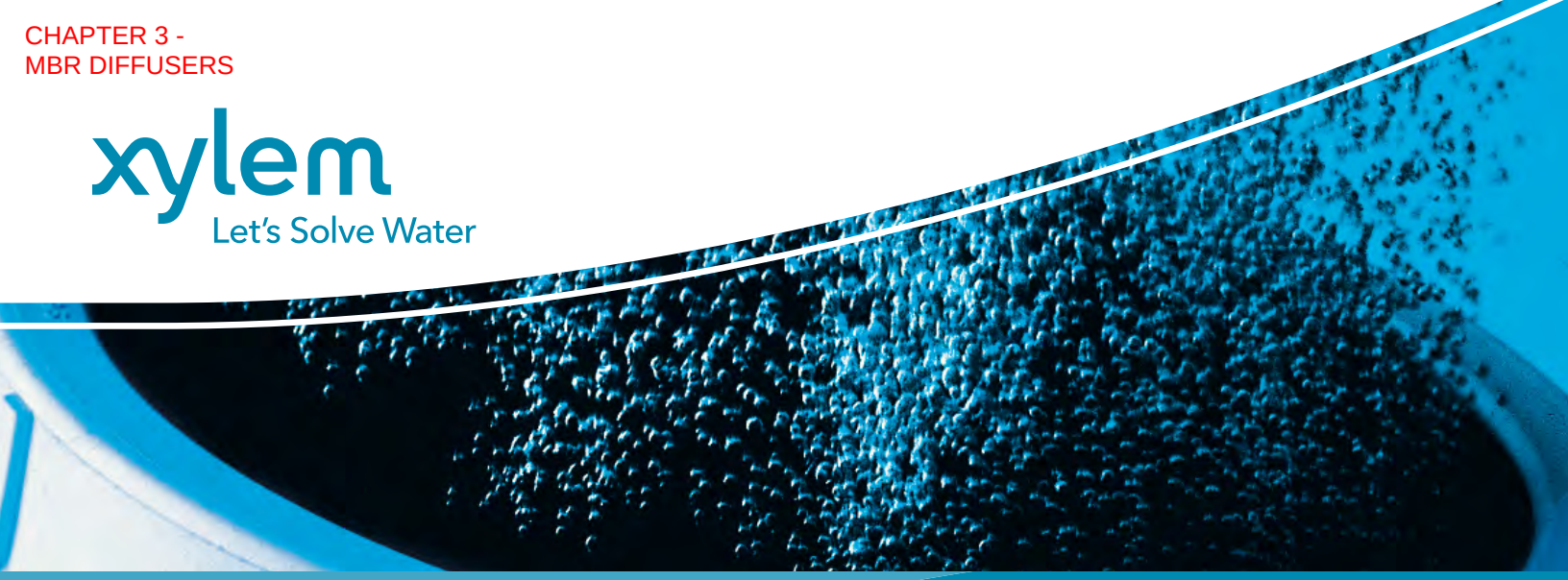
Headquarters
290 Paularino Ave.
Costa Mesa, CA 92626 USA
Toll Free: (800) 331-2277
Phone: (949) 833-3888
Fax: (949) 833-8858
jwce@jwce.com

Western Product Support
2600 S. Garnsey St.
Santa Ana, CA 92707, USA
Toll Free: (800) 331-2277
Phone: (949) 833-3888
Fax: (714) 751-1913
jwce@jwce.com

Eastern Product Support
4485 Commerce Dr, Ste 109
Buford, GA 30518, USA
Toll Free: (800) 331-8783
Phone: (770) 271-2106
Fax: (770) 925-9406
jwce@jwce.com

© JWC Environmental. JWC's Santa Ana Facility is registered by UL to ISO 9001:2000 File #A16182. United States patents may apply: 4,919,346; 5,060,872; 5,320,286; 5,333,801; 5,354,004; 5,478,020; 5,505,388; 5,593,100; 6,176,443; 6,332,984; 7,073,433; 7,080,650; 7,081,171; 7,086,405; RE37,550E; RE37,349; RE40,422. Additional and foreign patents are pending. (MBS-08-EN)

xylem
Let's Solve Water



Sanitaire® Silver Series II Diffusers

THE FINEST FINE BUBBLE DIFFUSER FOR BIOLOGICAL TREATMENT

For a combination of high aeration efficiency and low operating costs, choose the Sanitaire Silver Series II membrane diffuser – the most widely used fine bubble diffused aeration system available today.

High oxygen transfer efficiency

The Sanitaire Silver Series II membrane design uses a unique slit pattern and slit shapes to provide fine, uniform air distribution across the whole membrane surface. This allows the diffusers to deliver optimal oxygen transfer efficiency across the diffuser operating range.

Long service life, low maintenance

The high elasticity and degradation-resistance of specially blended high-grade EPDM elastomer compounds contribute to a service life of 10 or more years.

Operating efficiency

The unique membrane shape with integrated O-ring creates a top seal with the threaded retainer ring to eliminate leakage. This reduces energy consumption and raises operating efficiencies.

Great application flexibility

A highly effective, integrated check valve enables the aeration zones to easily be shut down for air-on/air-off applications.

Sanitaire Silver Series II LP

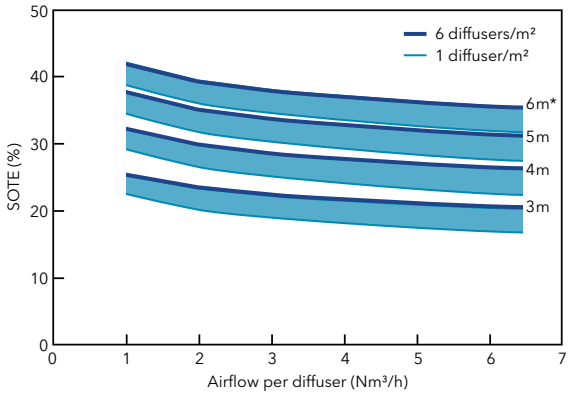
This 9" low-pressure version of the Sanitaire Silver Series II membrane features a modified slit pattern to handle airflow up to 20.4 Nm^3/h (12 scfm) with minimal pressure loss. It is an excellent choice for sludge and other heavy-duty applications.

SANITAIRE
a xylem brand

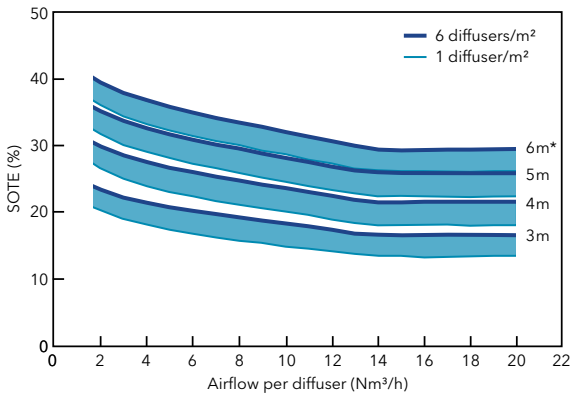
Sanitaire® Silver Series II Diffusers

Performance curves

Silver Series II



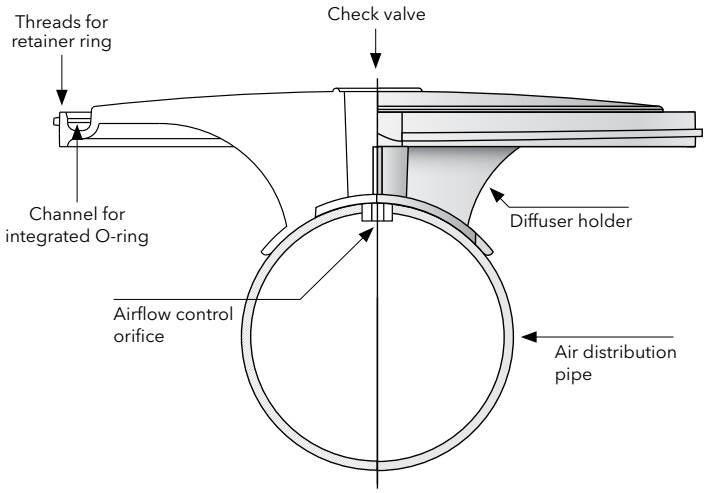
Silver Series II LP



*Submergence

Diffuser holder

Sanitaire 1633 diffuser holders provide superior mechanical strength to support Sanitaire Silver Series II disc diffusers.



Technical data

	Silver Series II	Silver Series II LP
Disc material	Specially blended high-grade EPDM	Specially blended high-grade EPDM
Diffuser holder material	uPVC or cPVC	uPVC or cPVC
Disc diameter	178 or 229 mm (7 or 9 in)	229 mm (9 in)
Mounting options	Saddle or screw-on	Saddle or screw-on
Effective surface area		
178 mm (7 in)	0.024 m^2 (0.26 ft^2)	n/a
229 mm (9 in)	0.038 m^2 (0.41 ft^2)	0.038 m^2 (0.41 ft^2)
Orifice size	5 mm ($^{13}/_{64}$ in)	5 or 6 mm ($^{13}/_{64}$ or 0.25 in)
Airflow range per disc	0.8-6.8 Nm^3/h (0.5-4.0 scfm)**	1.7-20.4 Nm^3/h (1-12 scfm)
Standard oxygen transfer efficiency (SOTE)	6-8% per m submergence (2-2.5% per ft)**	4-6.5% per m submergence (1.3-2% per ft)
Standard aeration efficiency (SAE)	2.5-6 kg O_2 / kWh (4-10 lb O_2 / hph)	1.5-4 kg O_2 / kWh (3-8 lb O_2 / hph)
Operating mode	Continuous / intermittent	Continuous / intermittent

** For 229 mm (9 in) diameter

xylem
Let's Solve Water

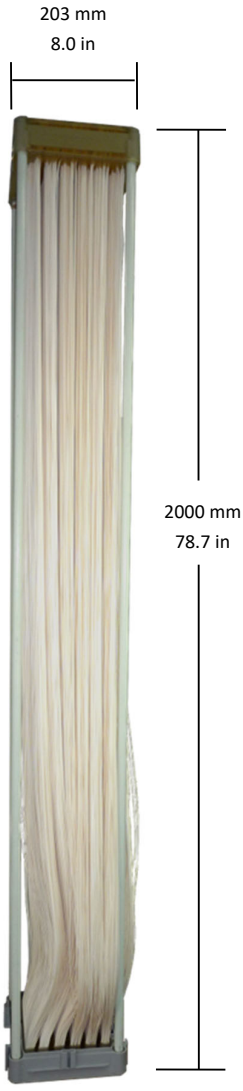
www.xylem.com

© 2022 Xylem. All rights reserved. Sanitaire is a trademark of Xylem or one of its subsidiaries.

SPECIFICATION SHEET
MEMCOR® B50N MemPulse MBR Membrane Filtration Module

MEMEMPULSE MBR MODULE SPECIFICATIONS

Parameter	Details
Module Operating Process	Submerged Ultrafiltration
Application	Membrane Bioreactor (MBR) Systems
Membrane Type	Hollow Fiber
Filtration Flow Direction	Outside to Inside
Backwash Type	Relaxation
Membrane Material	PVDF (Polyvinylidene Fluoride)
Other Wetted Module Components	Polyurethane, Fibreglass, Polyamide, Silicone Rubber, EPDM, SS316
Nominal Membrane Pore Size	0.04 µm
Nominal Membrane Area	50.0 m^2 / 538 ft^2
Nominal Module Length (Overall)	2000 mm / 78.7 in
Nominal Module Pot Dimensions (Overall)	203 mm x 203 mm / 8.0 in x 8.0 in Square
Approximate Module Mass	22 kg / 49 lb



B40N-L MODULE OPERATING SPECIFICATIONS

Parameter	Details
Operating Temperature Range	> 0 to 40 °C / > 32 to 104 °F (Must not be exposed to freezing conditions)
Temperature Range for Transportation and Storage	Preferred range 5 to 25 °C / 41 to 77 °F Allowable range > 0 to 40 °C / > 32 to 104 °F (shipment/storage in a temperature controlled container (or reefer) at 20 °C / 68 °F recommended). Modules must not be exposed to freezing conditions and must remain moist at all times.
Typical Feed pH Range	6.0 – 9.0 pH Note i
Allowable pH Range for Cleaning	2.0 – 10.5 pH typical
Typical Maximum Available Trans-Membrane Pressure (TMP) in Filtration	50 kPa / 7.3 psi Note ii
Maximum Allowable TMP at any time	+75 kPa / +11 psi to –110 kPa / -16 psi
Typical target chlorine concentration during cleaning:	
- Maintenance Wash	200 – 600 mg/L @ 20 °C / 200 – 600 ppm @ 68 °F
- CIP	500 - 1000 mg/L @ 20 °C / 500 – 1000 ppm @ 68 °F
Maximum chlorine concentration during cleaning	1500 mg/L @ 20 °C / 1500 ppm @ 68 °F Note iii
Maximum total chlorine exposure	1,000,000 mg.h/L @ 25 °C / 1,000,000 ppm.h @ 77 °F Note iv

Notes:

i. Exposure to chloramines is not recommended in feeds below 6.5 pH.

ii. Maximum available filtration TMP is based on a number of variables including atmospheric pressure, module submergence depth and filtrate pump NPSH requirement. The actual value may vary slightly from that shown.

iii. The recommendation for maximum chlorine cleaning solution concentration is to account for an initial rapid consumption of chlorine at the start of a MW or CIP cleaning cycle. The targeted chlorine cleaning solution concentration is then typically 200 to 1000 ppm for the remainder of the cycle.

iv. Please consult DuPont Water Solutions for additional guidance on exposure limits and for operation at different temperatures.

v. Parameters are subject to change without notice.

MEMCOR®
a DuPont™ brand

DuPont Water Solutions

www.dupont.com/water

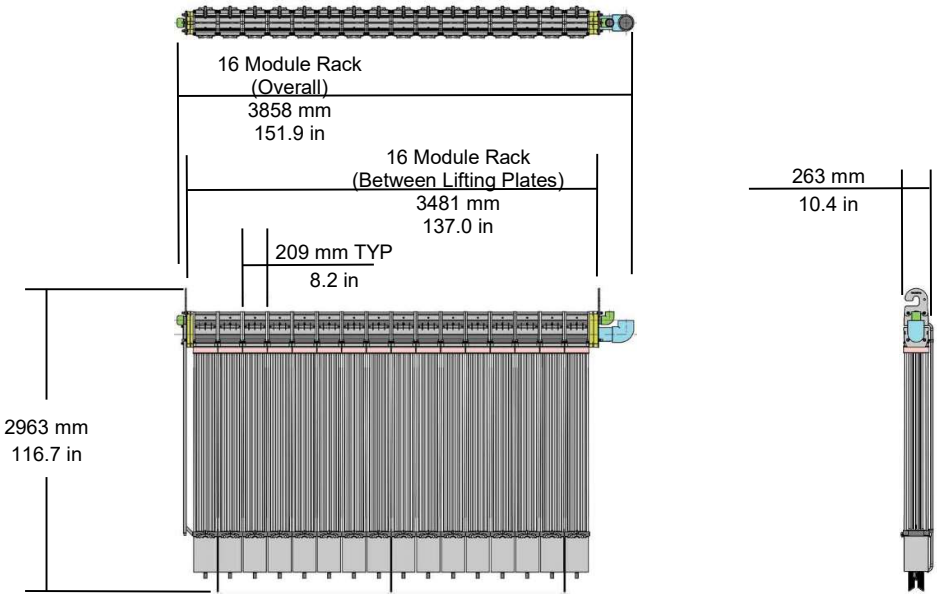
All rights reserved. DuPont™, the DuPont Oval Logo, and all trademarks and service marks denoted with ™, ℠ or ® are owned by affiliates of DuPont de Nemours, Inc. unless otherwise noted. Nothing contained herein shall be construed as a representation that any recommendations, use or resale of the product or process described herein is permitted and complies with the rules or regulations of any countries, regions, localities, etc., or does not infringe upon patents or other intellectual property rights of third parties.

MEMCOR® is a registered trademark of DuPont Water Solutions. All other logos, trademarks, registered trademarks or service marks used herein are the property of their respective holders.

© 2022 DuPont. **Subject to change without notice**.

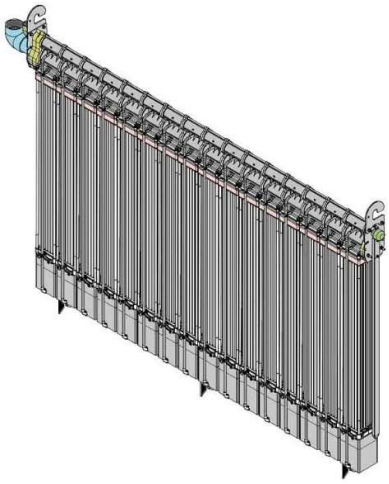
MEMCOR®
a DuPont brand

SPECIFICATION SHEET
MBR MemRACK® Assemblies – SR MemPulse® 5B50N to 16B50N Single Racks



SPECIFICATIONS

Parameter	Details
Module Operating Process	Submerged Ultrafiltration with MemPulse®
Application	Membrane Bioreactor (MBR) Systems
Membrane Module Type	Memcor® B50N Hollow Fibre Membrane Filtration Modules Note i
Filtration Flow Direction	Outside to Inside
Backwash Type	Relaxation
Number of Membrane Module Mounting Positions (Module Blanking Kits available)	Typically from 5 to 16 x B50 Module positions (Typical 16 Module MemRACK® Assembly illustrated)
Membrane Material	PVDF (Polyvinylidene Fluoride)
Nominal Membrane Pore Size	0.04 µm
Nominal Total Membrane Area	800 m^2 / 8611 ft^2 for 16B50N Modules



MEMCOR®
a DuPont brand

ASSEMBLY DETAILS

Parameter	Details
Process Connection Options (Refer to End Connection Detail drawing for option details) *(Both process connections are vertical upwards. Standard arrangement has both at one end. Option for Air and Filtrate connections at opposite ends)*	**Filtrate Outlet** (all Grey PVC): Standard 4" (DN 100) Plain Inch Socket Pipe Stub 4" (DN 100) Plain Pipe Stub BSP Male Thread 4" (DN 100) BSP Threaded Nipple Metric Pipe Socket 110 mm Plain Metric Socket **Aeration Air Inlet** (all Grey PVC) Standard 2" (DN 50) Plain Inch Socket Pipe Stub 2" (DN 50) Plain Pipe Stub BSP Male Thread 2" (DN 50) BSP Threaded Nipple NPT Male Thread 2" (DN 50) NPT Threaded Nipple Metric Pipe Socket 63 mm Plain Metric Socket
Aeration and Filtrate Termination Point Connection hardware	Air Inlet hoses and quick couplings are **not** included but can be supplied as options to suit site requirements (length and connection types to be specified)
Nominal Rack Assembly Width and Height	263 mm / 10.4 in W 2963 mm / 116.7 in H
Nominal Standard Rack Assembly Lengths [For Racks with both connections at one end. Add 48 mm to overall lengths for connections at opposite ends of rack.] Refer to General Arrangement Drawings for additional details. (Heavily soiled membranes can add up to ~15 kg per Module)	Rack Size / Overall Length (mm/in) / Approximate Mass (kg/lb) Note ii 6 Modules: 1768 / 69.6: 230 kg / 510 lb 8 Modules: 2186 / 86.1: 290 kg / 640 lb 10 Modules: 2604 / 102.5: 360 kg / 795 lb 12 Modules: 3022 / 119.0: 430 kg / 950 lb 14 Modules: 3440 / 135.4: 490 kg / 1080 lb 16 Modules: 3858 / 151.9: 560 kg / 1235 lb
Recommended Minimum Hoist Capacity	1500 kg / 3300 lb
Typical Wetted Rack Assembly Components	SS316L end/lifting plates, SS316 tie rods, nuts and washers, Nylon mouldings and ABS End Plates, EPDM seals, ABS/PVC Air Droppers, POM Locator Plates, PP MemPulse® Devices, ABS and UPVC pipe/tube and fittings. Note iii
Temperature Range for Transportation and Storage (without Modules)	> 0 to 50 °C / > 32 to 122 °F Note i (Must not be exposed to freezing conditions)
Protection from ultraviolet (UV) radiation	The assembly should not be exposed to ultraviolet radiation (direct sunlight) during storage or operation.

Notes:

i. When Membrane Filtration Modules are fitted to the MemRACK® Assemblies, the transport, storage and operating limits of the membranes determine allowable limits of exposure. Please refer to the relevant Module specification sheet for further details.

ii. Mass estimates are for MemRACK® Assemblies loaded with Modules and filtrate side substantially filled with water. The mass will be greater if the Modules are heavily soiled.

iii. Some alternative materials of construction may be recommended for seawater or other high TDS applications.

DuPont Water Solutions

www.dupont.com/brands/memcor

All rights reserved. DuPont™, the DuPont Oval Logo, and all trademarks and service marks denoted with ™, ℠ or ® are owned by affiliates of DuPont de Nemours, Inc. unless otherwise noted. Nothing contained herein shall be construed as a representation that any recommendations, use or resale of the product or process described herein is permitted and complies with the rules or regulations of any countries, regions, localities, etc., or does not infringe upon patents or other intellectual property rights of third parties.

Memcor®, MemPulse® and MemRACK® are registered trademarks of DuPont Water Solutions. All other logos, trademarks, registered trademarks or service marks used herein are the property of their respective holders.

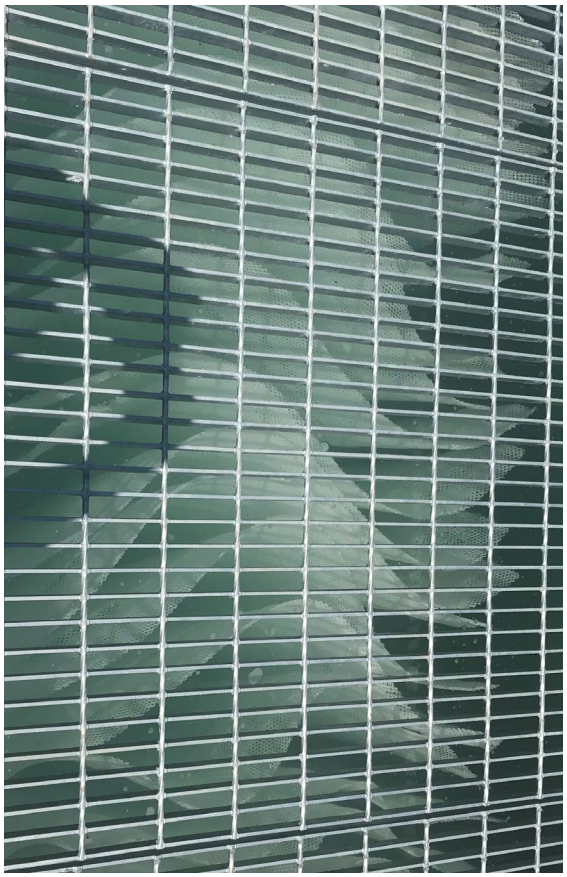
© 2023 DuPont. Subject to change without notice.

2. About WavTex™

WavTex is a second generation moving media system using Entex's patent pending EnTextile™ media for use in Integrated Fixed-film Activated Sludge (IFAS) and Submerged Fixed-Film (SFF) systems. Independently moving EnTextile media sheets continually wave in the aeration basin in a random motion, ensuring excellent oxygen and substrate transfer.

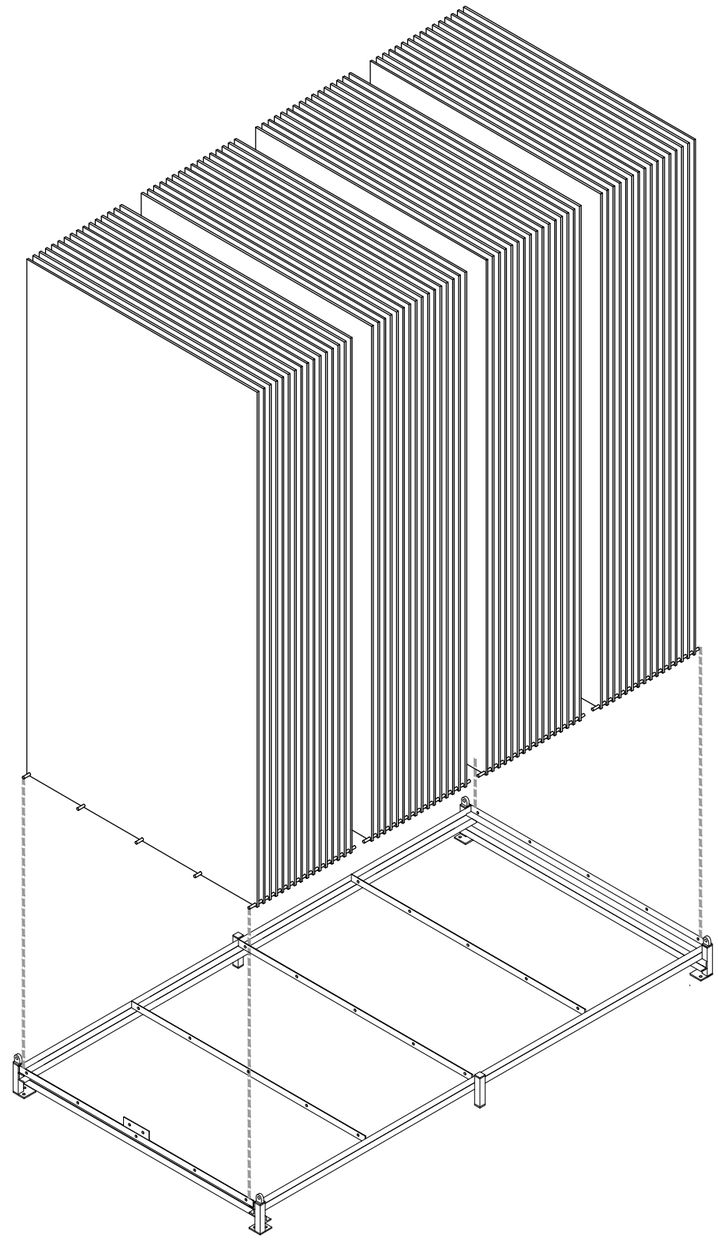
WavTex is a cost-effective solution for existing activated sludge plants that need more advanced treatment. Because little or no additional tankage is required, WavTex is ideal for plants with limited room for expansion. It is also an excellent choice for space efficient, high performance new plant designs.

WavTex moving flex media provides extensive surface area for biomass growth. The attached biomass population can more than double the effective MLSS concentration. The vigorous motion of the EnTextile media in the aeration basin provides a high shear on the surface of the EnTextile media, maintaining a thin biological film. The thin film provides for high rate biological kinetics.



WavTex Modules in Aeration Tank

EnTextile Media close up



ISOMETRIC VIEW

Notes
TYPICAL WAVTEX DRAWING SET.
DIMENSIONS MAY NOT TO BE SCALE.

This drawing contains confidential data and information that is the property of Entex Technologies Inc. It is not to be copied or disclosed to third parties without prior written permission from Entex Technologies Inc.

Rev	Date	Description	By	App'd

TOLERANCE UNLESS NOTED:
ALL DIMENSIONS IN INCHES
DIMENSIONS IN [ ] = METRIC
BREAK ALL SHARP EDGES
CONNECTION POINTS = ± 1/4"
ANGLES = ± 1°
NON-FUNCTIONAL DIM'S = ± 1"

DRAWN	ACS	DATE	07-20-22
CHECKED	LT	DATE	07-20-22
APPROVED	LT	DATE	07-20-22
NEXT ASS'Y		WEIGHT	

ENTEX Technologies
Engineering a Clean Water Environment

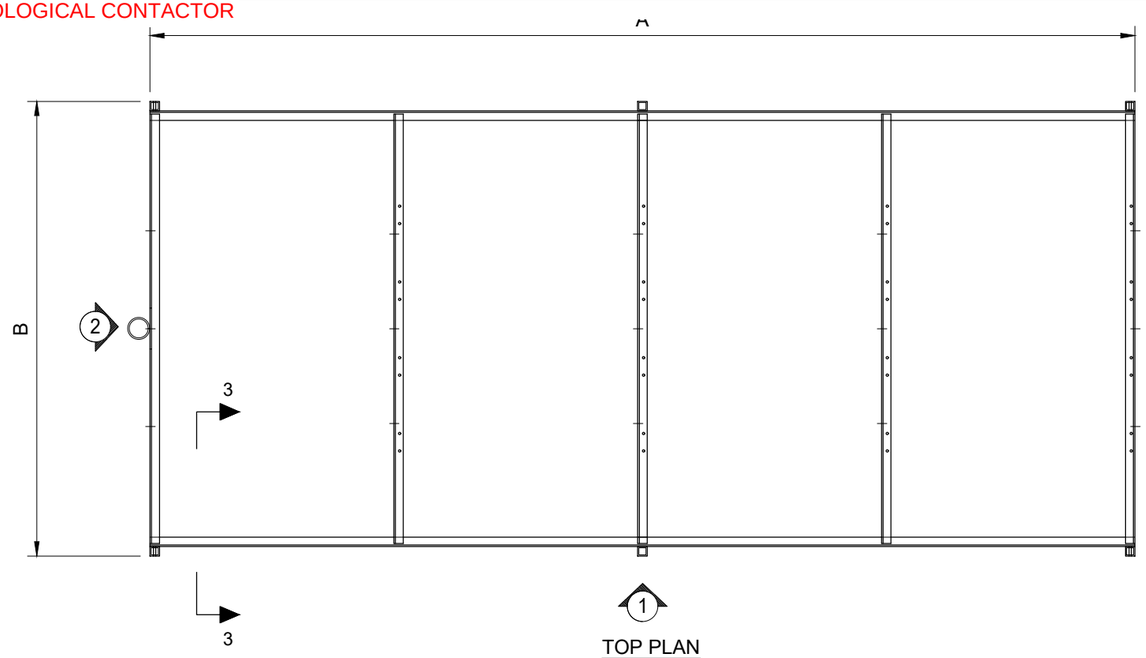
ENTEX TECHNOLOGIES INC
400 Silver Cedar Court
Suite 200
Chapel Hill, North Carolina 27514
(919) 933-2770
www.EntexInc.com

Title
WAVTEX FRAME

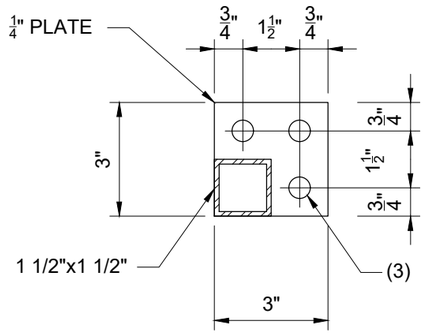
Scale	Dwg. No.	Rev.
NONE	001	0

08/09/2022 11:10am – Admin – H:\654 – Entex\654-149 Typical Wavtex\Typical Wavtex 7-18-22 Submittal.dwg

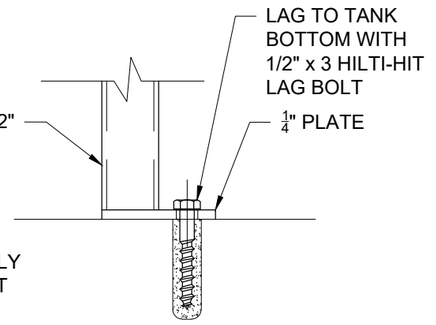
DIMENSION	ft	m
A	10.0	3.05
B	6.00	1.83
C	7.00	2.13
D	5.67	1.73



TOP PLAN

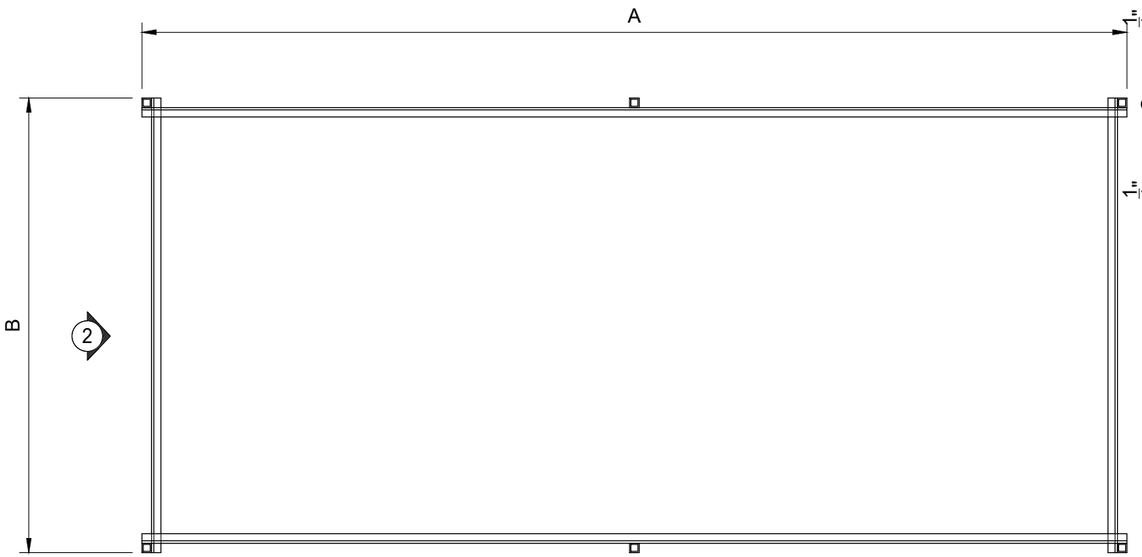


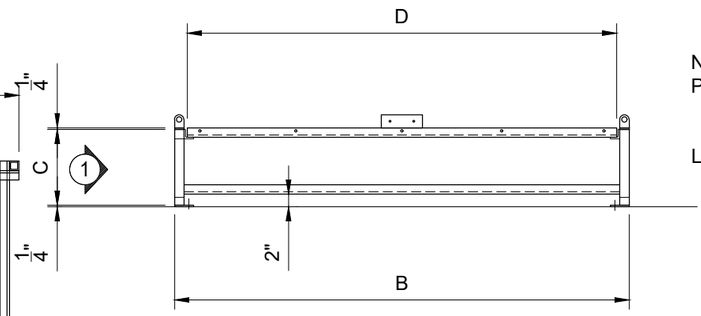
PLAN



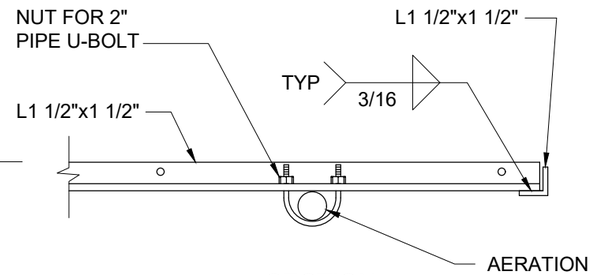
ELEVATION

4 DETAIL

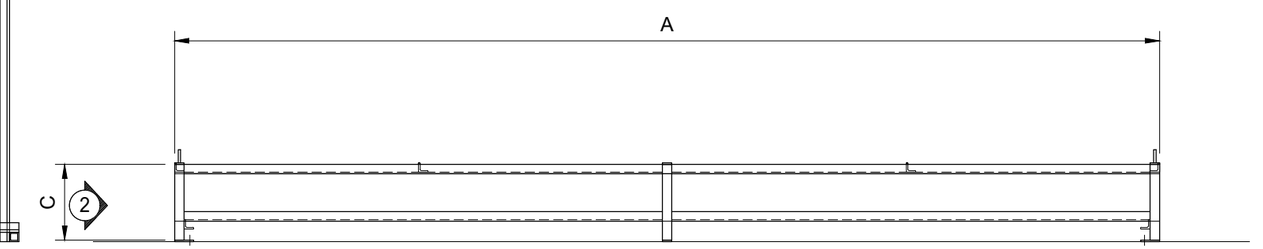




2 ELEVATION



3 SECTION



1 ELEVATION

Notes
TYPICAL WAVTEX DRAWING SET.
DIMENSIONS MAY NOT TO BE SCALE.

This drawing contains confidential data and information that is the property of Entex Technologies Inc. It is not to be copied or disclosed to third parties without prior written permission from Entex Technologies Inc.

Rev	Date	Description	By	App'd

TOLERANCE UNLESS NOTED:
ALL DIMENSIONS IN INCHES
DIMENSIONS IN [ ] = METRIC
BREAK ALL SHARP EDGES
CONNECTION POINTS = ± 1/4"
ANGLES = ± 1°
NON-FUNCTIONAL DIM'S = ± 1"

DRAWN	ACS	DATE	07-20-22
CHECKED	LT	DATE	07-20-22
APPROVED	LT	DATE	07-20-22
NEXT ASS'Y		WEIGHT	

ENTEX Technologies
Engineering a Clean Water Environment

ENTEX TECHNOLOGIES INC
400 Silver Cedar Court
Suite 200
Chapel Hill, North Carolina 27514
(919) 933-2770
www.EntexInc.com

Title: WAVTEX FRAME

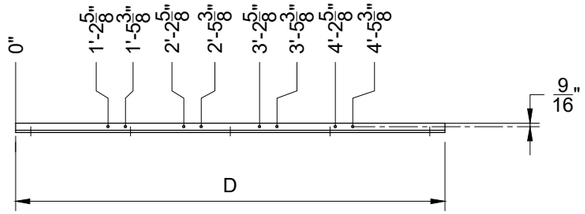
Scale: 1/2"=1'-0"

Dwg. No.: 002

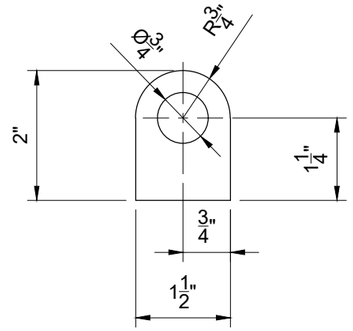
Rev.: 0

08/09/2022 11:10am - Admin - H:\654 - Entex\654-149 Typical Wavtex\Typical Wavtex 7-18-22 Submittal.dwg

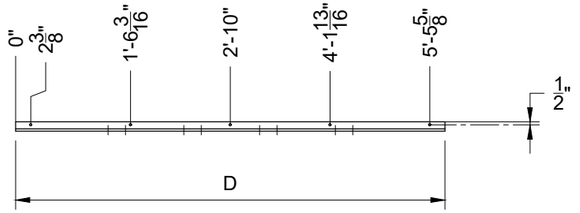
DIMENSION	ft	m
D	5.67	1.73
E	5.58	1.70
F	6.00	1.83



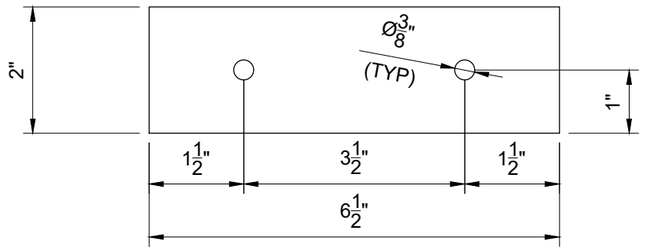
ITEM 1 TOP VIEW



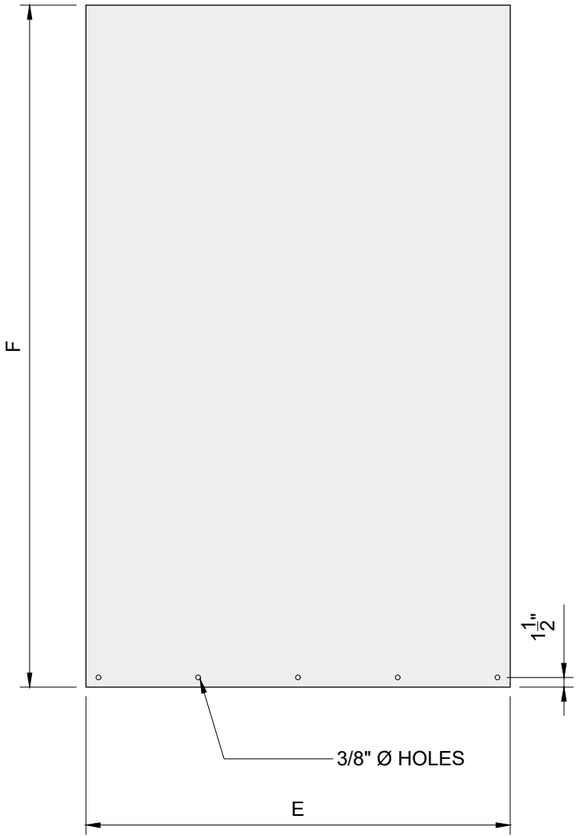
ITEM 6 DETAIL



ITEM 1 SIDE VIEW



ITEM 9 DETAIL



MEDIA SHEET

Notes
TYPICAL WAVTEX DRAWING SET.
DIMENSIONS MAY NOT TO BE SCALE.

This drawing contains confidential data and information that is the property of Entex Technologies Inc. It is not to be copied or disclosed to third parties without prior written permission from Entex Technologies Inc.

Rev	Date	Description	By	App'd

TOLERANCE UNLESS NOTED:
ALL DIMENSIONS IN INCHES
DIMENSIONS IN [ ] = METRIC
BREAK ALL SHARP EDGES
CONNECTION POINTS = ± 1/4"
ANGLES = ± 1°
NON-FUNCTIONAL DIM'S = ± 1"

DRAWN	ACS	DATE	07-20-22
CHECKED	LT	DATE	07-20-22
APPROVED	LT	DATE	07-20-22
NEXT ASS'Y		WEIGHT	

ENTEX Technologies
Engineering a Clean Water Environment

ENTEX TECHNOLOGIES INC
400 Silver Cedar Court
Suite 200
Chapel Hill, North Carolina 27514
(919) 933-2770
www.EntexInc.com

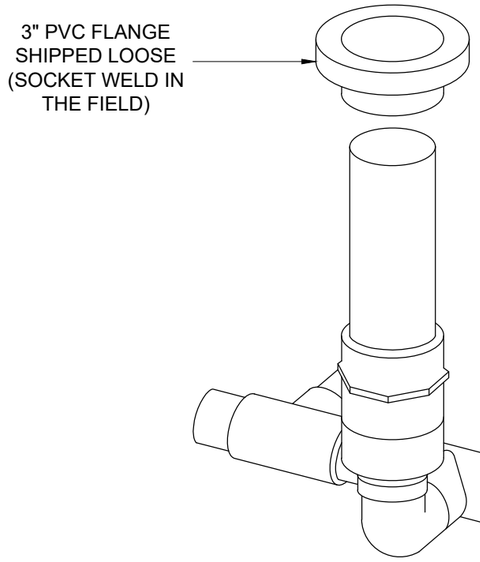
Title: WAVTEX FRAME

Scale: NONE

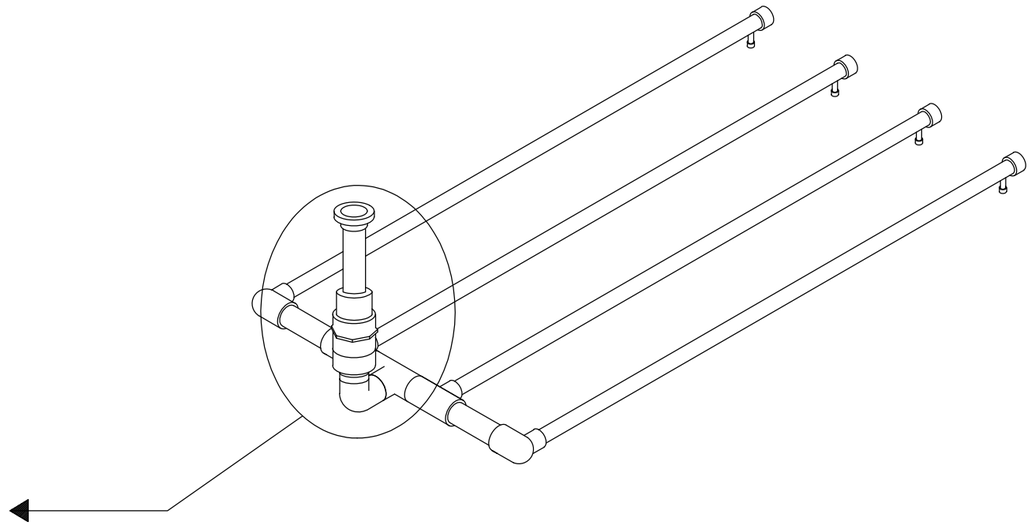
Dwg. No.: 003

Rev.: 0

08/09/2022 11:10am — Admin — H:\654 — Entex\654-149 Typical Wavtex\Typical Wavtex 7-18-22 Submittal.dwg



DETAIL



DIFFUSER ISOMETRIC PLAN

Notes
TYPICAL WAVTEX DRAWING SET.
DIMENSIONS MAY NOT TO BE SCALE.

This drawing contains confidential data and information that is the property of Entex Technologies Inc. It is not to be copied or disclosed to third parties without prior written permission from Entex Technologies Inc.

Rev	Date	Description	By	App'd

TOLERANCE UNLESS NOTED:
ALL DIMENSIONS IN INCHES
DIMENSIONS IN [ ] = METRIC
BREAK ALL SHARP EDGES
CONNECTION POINTS = ± 1/4"
ANGLES = ± 1°
NON-FUNCTIONAL DIM'S = ± 1"

DRAWN	ACS	DATE 07-20-22
CHECKED	LT	DATE 07-20-22
APPROVED	LT	DATE 07-20-22
NEXT ASS'Y		WEIGHT

ENTEX Technologies
Engineering Clean Water Solutions

Entex Technologies Inc.
1340 Environ Way
Chapel Hill, NC 27517
(919) 913-4798
www.EntexInc.com

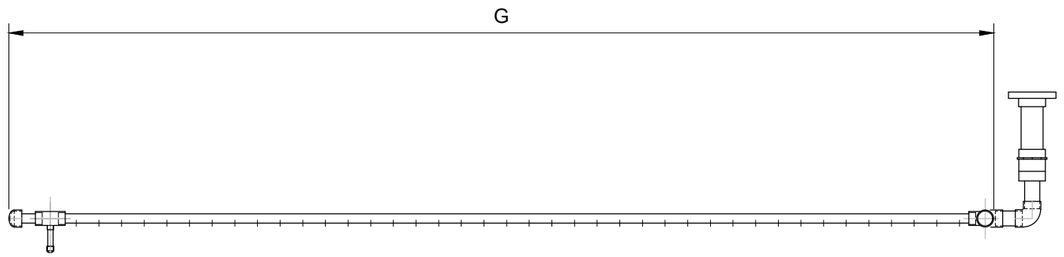
Title: WAVTEX FRAME

Scale: NONE

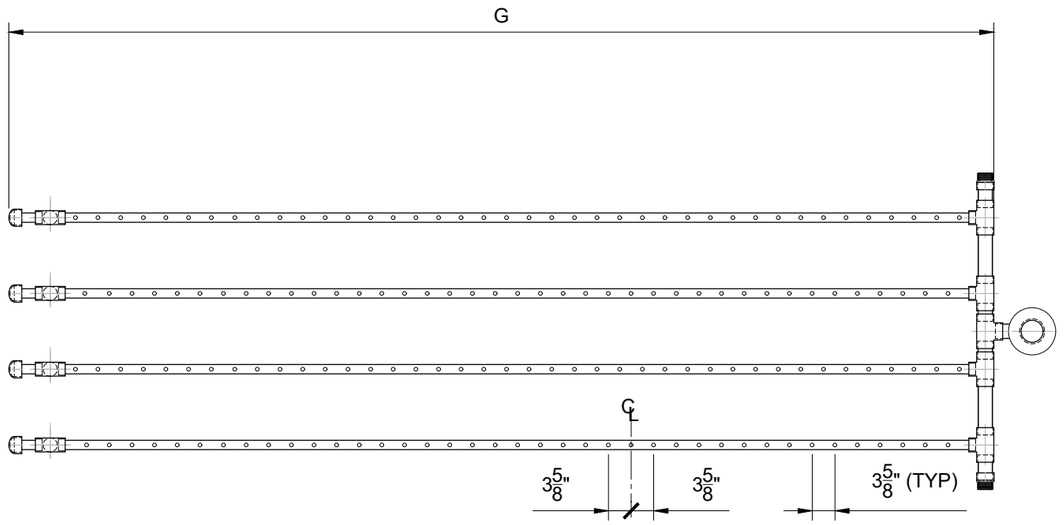
Dwg. No.: 004

Rev.: 0

07/17/2023 10:28am – Admin – H:\654 – Entex\654-149 Typical Wavtex\Typical Wavtex 7-11-23 Submittal.dwg



DIFFUSER ELEVATION



DIFFUSER PLAN

Notes
TYPICAL WAVTEX DRAWING SET.
DIMENSIONS MAY NOT TO BE SCALE.

This drawing contains confidential data and information that is the property of Entex Technologies Inc. It is not to be copied or disclosed to third parties without prior written permission from Entex Technologies Inc.

Rev	Date	Description	By	App'd

TOLERANCE UNLESS NOTED:
ALL DIMENSIONS IN INCHES
DIMENSIONS IN [ ] = METRIC
BREAK ALL SHARP EDGES
CONNECTION POINTS = ± 1/4"
ANGLES = ± 1°
NON-FUNCTIONAL DIM'S = ± 1"

DRAWN	ACS	DATE	07-20-22
CHECKED	LT	DATE	07-20-22
APPROVED	LT	DATE	07-20-22
NEXT ASS'Y		WEIGHT	

ENTEX Technologies
Engineering Clean Water Solutions

Entex Technologies Inc.
1340 Environ Way
Chapel Hill, NC 27517
(919) 913-4798
www.EntexInc.com

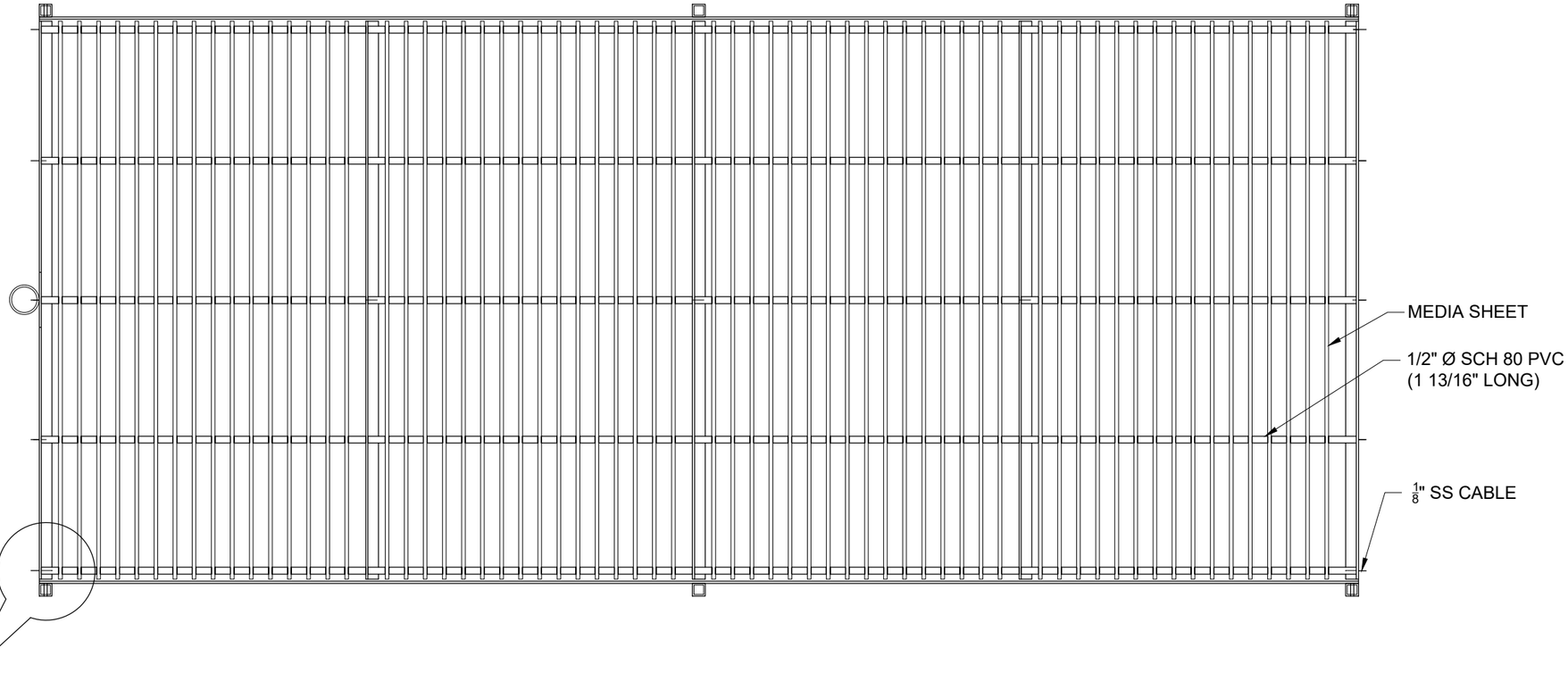
Title: WAVTEX FRAME

Scale: NONE

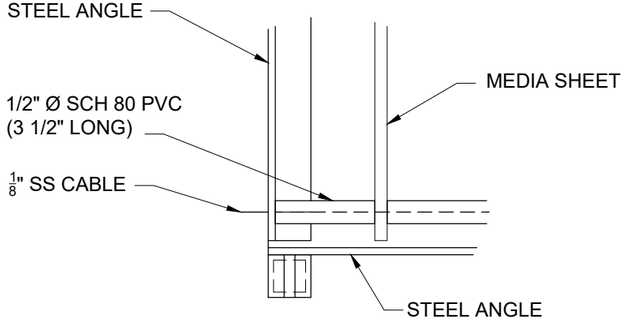
Dwg. No.: 005

Rev.: 0

07/17/2023 10:27am – Admin – H:\654 – Entex\654-149 Typical Wavtex\Typical Wavtex 7-11-23 Submittal.dwg



PLAN



ENLARGED DETAL

Notes
TYPICAL WAVTEX DRAWING SET.
DIMENSIONS MAY NOT TO BE SCALE.

This drawing contains confidential data and information that is the property of Entex Technologies Inc. It is not to be copied or disclosed to third parties without prior written permission from Entex Technologies Inc.

Rev	Date	Description	By	App'd

TOLERANCE UNLESS NOTED:
ALL DIMENSIONS IN INCHES
DIMENSIONS IN [ ] = METRIC
BREAK ALL SHARP EDGES
CONNECTION POINTS = ± 1/4"
ANGLES = ± 1°
NON-FUNCTIONAL DIM'S = ± 1"

DRAWN	ACS	DATE 07-20-22
CHECKED	LT	DATE 07-20-22
APPROVED	LT	DATE 07-20-22
NEXT ASS'Y		WEIGHT

ENTEX Technologies
Engineering a Clean Water Environment

ENTEX TECHNOLOGIES INC
400 Silver Cedar Court
Suite 200
Chapel Hill, North Carolina 27514
(919) 933-2770
www.EntexInc.com

Title: WAVTEX FRAME

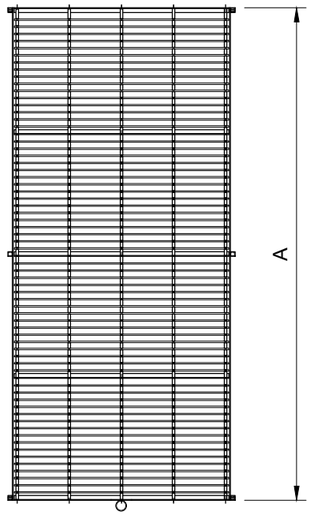
Scale: 3/4"=1'-0"

Dwg. No.: 006

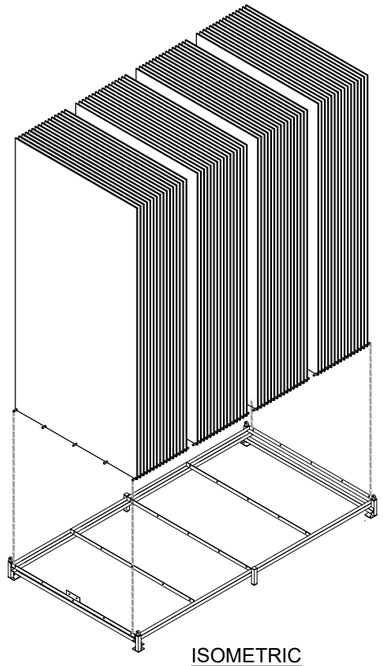
Rev.: 0

08/09/2022 11:11am – Admin – H:\654 – Entex\654-149 Typical Wavtex\Typical Wavtex 7-18-22 Submittal.dwg

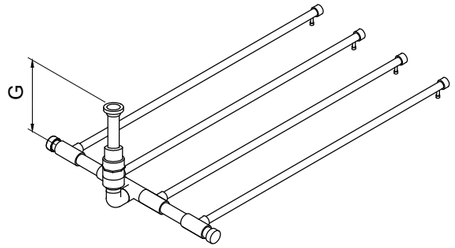
DIMENSION	ft	m
A	13.0	3.96
B	6.00	1.83
C	10.0	3.05
D	1.00	0.305
E	9.00	2.74
F	NUMBER OF SHEETS = 64	
G	---	---

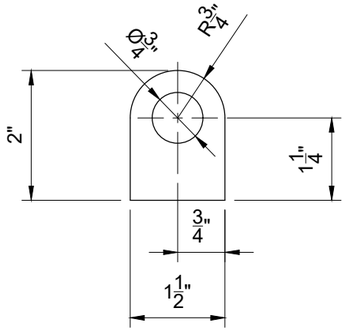


TOP

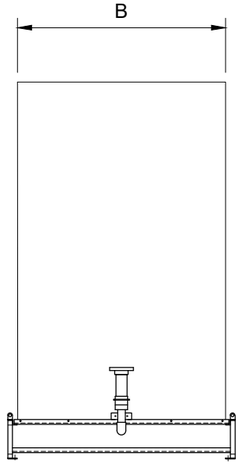


ISOMETRIC

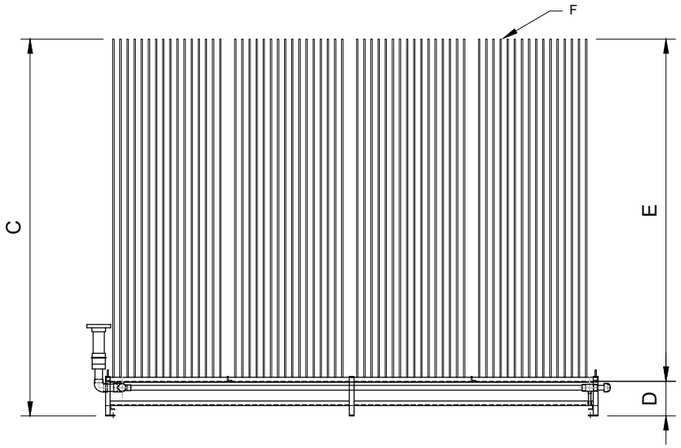




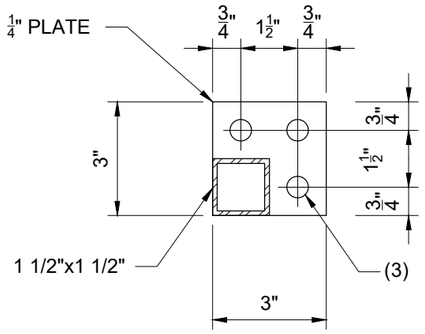
LIFTING LUG DETAIL



FRONT

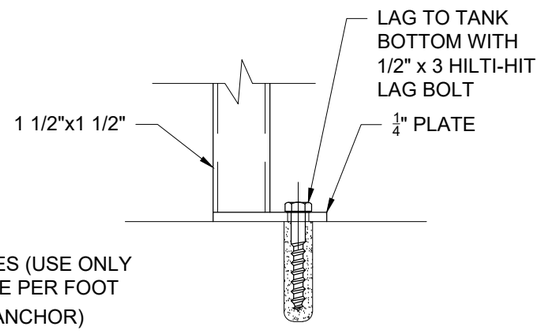


SIDE



PLAN

9/16"Ø HOLES (USE ONLY ONE HOLE PER FOOT FOR 1/2"Ø ANCHOR)



ELEVATION

BASE PLATE DETAIL

Notes
TYPICAL WAVTEX DRAWING SET.
DIMENSIONS MAY NOT TO BE SCALE.

This drawing contains confidential data and information that is the property of Entex Technologies Inc. It is not to be copied or disclosed to third parties without prior written permission from Entex Technologies Inc.

Rev	Date	Description	By	App'd

TOLERANCE UNLESS NOTED:
ALL DIMENSIONS IN INCHES
DIMENSIONS IN [ ] = METRIC
BREAK ALL SHARP EDGES
CONNECTION POINTS = ± 1/4"
ANGLES = ± 1°
NON-FUNCTIONAL DIM'S = ± 1"

DRAWN	ACS	DATE 07-20-22
CHECKED	LT	DATE 07-20-22
APPROVED	LT	DATE 07-20-22
NEXT ASS'Y		WEIGHT

ENTEX Technologies
Engineering Clean Water Solutions

Entex Technologies Inc.
1340 Environ Way
Chapel Hill, NC 27517
(919) 913-4798
www.EntexInc.com

Title: WAVTEX FRAME

Scale: NONE

Dwg. No.: 007

Rev.: 0

07/11/2023 3:44pm – Admin – H:\654 – Entex\654-149 Typical Wavtex\Typical Wavtex 7-11-23 Submittal.dwg

BEACON WATER TECHNOLOGIES

Pile Cloth Disk Filtration Systems

APPROVED CA TITLE 22 APPROVED

GDisk® Models

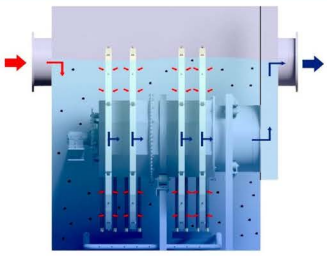
Available in five different models, all offered in concrete and package stainless steel (304SS or 316SS).

Model	Disk Diameter	Max Capacity /Unit*	Segments/ Disk	Max # Disks/Unit
GDisk®-Giant	9.8 ft (3.0 m)	25.4 MGD	8	24
GDisk®-Standard	7.2 ft (2.2 m)	12.7 MGD	6	24
GDisk®-Compact	5.9 ft (1.8 m)	8.22 MGD	6	24
GDisk®-Mini	3.9 ft (1.2 m)	2.06 MGD	4	14
GDisk®-XS	3.0 ft (0.9 m)	0.36 MGD	4	6

***at 6.5 gpm/ft2**

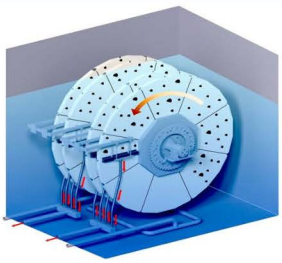
GDisk® Operation Mode

FILTRATION



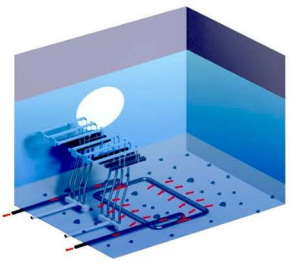
- Pass through media by gravity
- Removing Solids accumulated on the disk surface, forming a mat
- Filtered water flow through from the inside of center tube to the outlet

BACKWASH



- Operated by level switch or timer
- Low pressure suction on the front and back side of the pile cloth disk
- Non-stop filtration during backwash

SLUDGE DISCHARGE

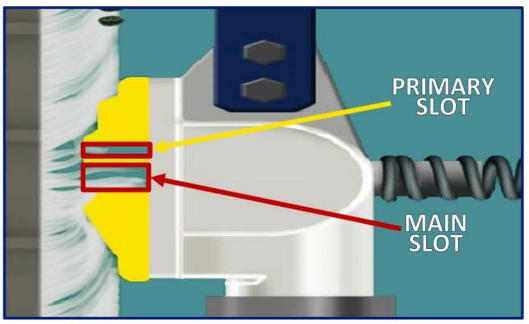


- Sludge sediments on the bottom
- Automatic discharge of bottom sludge
- Flexible response to incoming shock load

Floating scum is evacuated into a dedicated trough for primary and wet weather application models.

Dual-Slot Backwash Manifold

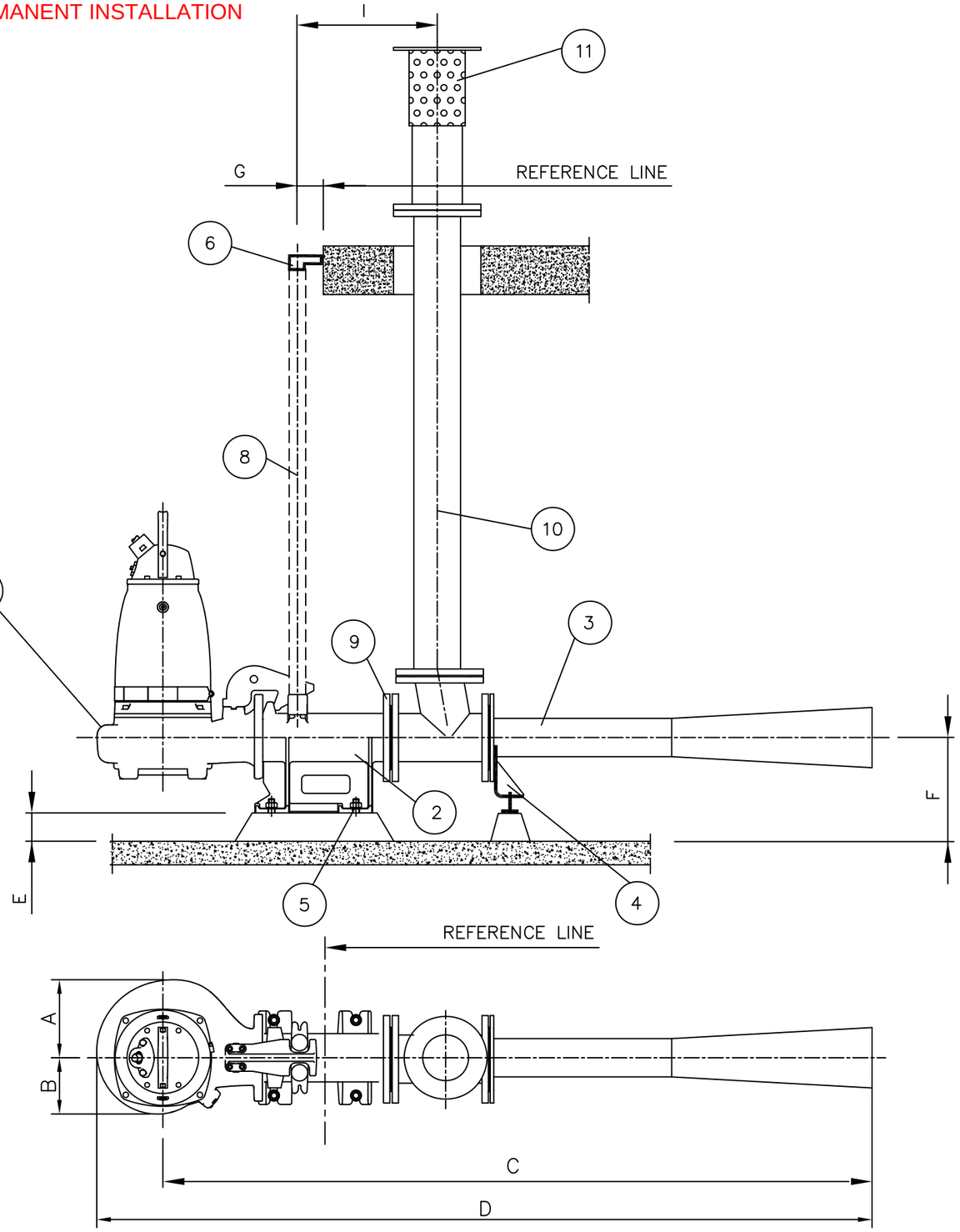
- A main slot and a primary slot are provided in parallel by a partition
- Pile threads undergo delayed straightening and fluctuation while going through the primary slot. The main slot then straightens pile threads rapidly
- This patented dual-slot backwash manifold increases backwash efficiency and minimize backwash water volume

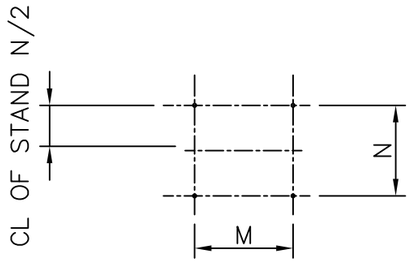


PO Box 22097
Charleston, SC 29413
843.481.4470
info@beaconh2o.com
www.beaconh2o.com
BEACON WATER TECHNOLOGIES

©2025 Beacon Water Technologies, Inc. All rights reserved.

CHAPTER 4 - JET-AERATOR
PERMANENT INSTALLATION





inch	10 1/5	7 2/5	91 3/10	100	2 2/5	12 3/5	3 3/10	18 1/2	11	7 9/10
mm	259	187	2320	2540	60	320	85	470	280	200
	A	B	C	D	E	F	G	I	M	N

* NOT INCLUDED IN UNIT
** ON REQUEST ONLY

	Pos	Denomination	Article	No	Dimension
**	11	Strainer complete	687 93 03	–	–
**	10	Extension pipe unit	688 82 02	–	DN 150
	9	Flange connection kit	679 74 00	1	DN 150
*	8	Guide bar	–	–	ø2"
	7				
	6	Guide bracket unit	613 68 00	1	–
	5	Mounting kit	84 14 88	1	M16 (4 pcs.)
	4	Support complete	688 37 00	1	–
	3	Ejector 4817	687 84 04	1	–
	2	Discharge connection	688 32 00	1	DN150
*	1	Pump NP 3153 MT	–	–	–

Rev. No/ ?nderung Nr	Revision/?nderung	Request by Geford.v.	Insert. by/ Eingef. von	Date/ Datum	Checked/ Kontroll.
3	~~687 91 06~~; 1-8	KW	MJo	050526	HOw
2	Weight added.	KW	MJo	050512	HOw
1	Pos.10 & 11; 6879106 included in unit; Table introduced	KW	MJo	050407	HOw

Measurements and tolerance/ Masse und Toler. | Deviation/ Abmass

D?r ej annat angives / Unless otherwise specified / Wenn nicht anderes angegeben: R=
Sl?ppning/Draft / Seitenschr¦gen: √
?mne/Blank/Rohling

Designed by / Konstr. von: Fl
Drawn by / Gez. von: MJo
Date / Datum: 041216
Checked by / Kontr. von: HOw

Denomination/Benennung: JA 117–P Assy
Material/Werkstoff:
Treatment/Behandlung:
Applicable to/Bestimmt fur ¨:

Dieses Dokument darf nicht ohne unsere Einwilligung an Konkurrenz–Firmen oder sonst unbefugte Personen gezeigt, kopiert oder ausgeliehen werden.

This document may not, without our permission, be copied, shown or handed out to competitors or any other unauthorized persons

FLYGT

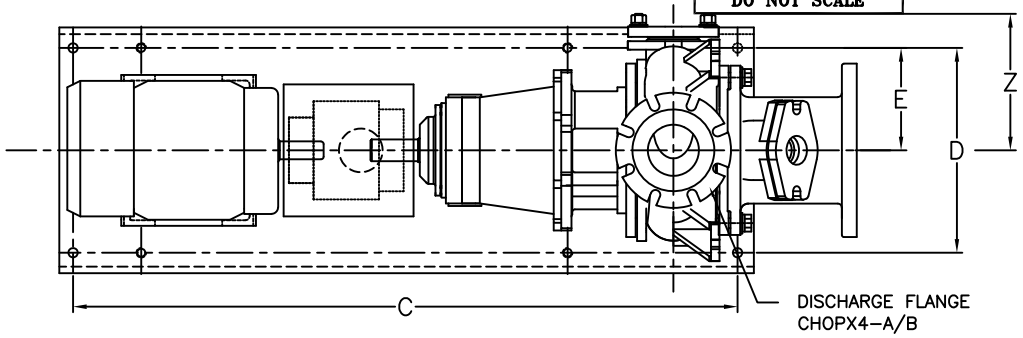
Certifikat/Zeugnis:
Scale/Masstab: not acc. to standard
Reg. No: 4279
Kg, netto: 154

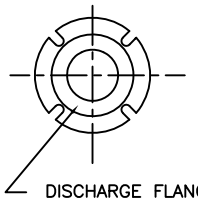
688 59 20 | 3

A3
AutoCAD

PUMP CUTSHEET - 215T MOTOR FRAME CHOSEN

DO NOT SCALE





1. SUCTION AND DISCHARGE FLANGES:
C.I. – 125 lbs R.F.
ALLOYS & D.I.– 150 lbs R.F. ⚠4
ALL FLANGES MATE WITH STD. ASA FLANGES.

2. PUMP ROTATION–C.W. VIEWED FROM SHAFT END.

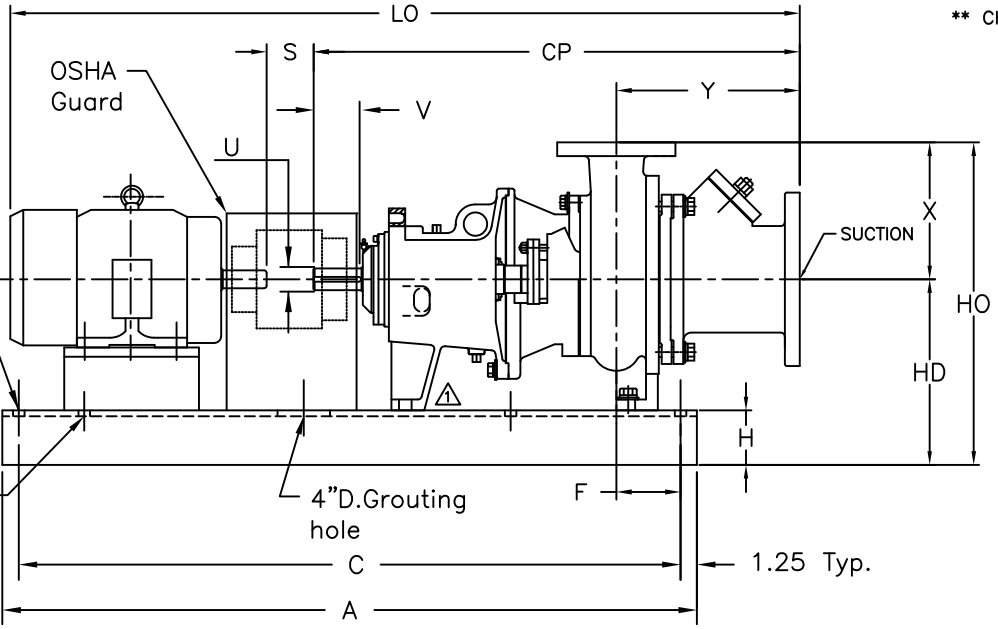
3. ALL DIMENSIONS ARE IN INCHES. USE FOR CONSTRUCTION ONLY IF CERTIFIED.

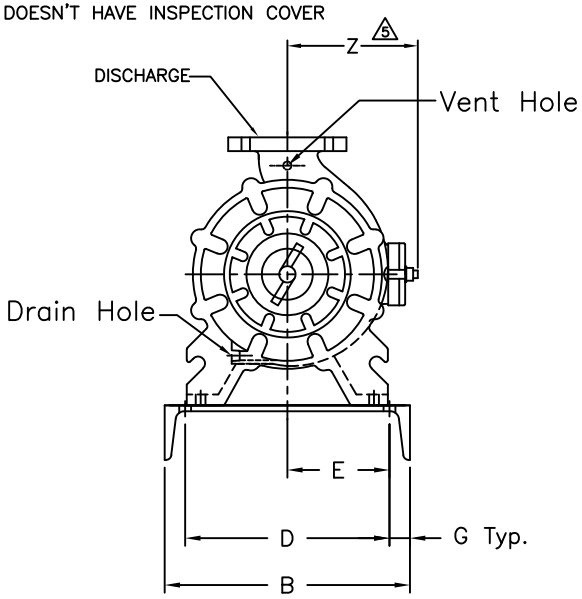
CERTIFIED FOR CONSTRUCTION

DATE SIGNED

HAYWARD GORDON ULC

NOTE: ⚠5
** CHOPX3 A/B DOESN'T HAVE INSPECTION COVER





Suction Pump model	Discharge Motor frame	A	B	C	D	E	F	G	H	K	S	Pump shaft U	Pump shaft K	V	X	Y	Z	CP	HD	HO	LO	BASE DWG.
⚠2 CHOPX3–A/B	184T																				50.7	02620130
	6 3 213T	51	15	48.5	12	6.0	5.81	1.5	3.38	5/8–11NC	3.63	1.38	.31 x .31	3.1	8.75	11.7	** 6.4 ⚠5	30.9	11.6	20.4	53.1	02620131
	215T																				54.6	02620131
⚠1 CHOPX4–A/B	184T																				51.1	02320381
	213T	52	18	49.5																	53.7	02320382
	6 4 215T				15	7.5	6.0	1.5	4.0	1/2–13NC	3.63	1.38	.31 x .31	3.1	9.75	12.3	10.0	31.9	12.3	22.0	55.2	02320382
	254T																				58.9	02320383
	256T	59	18	56.5																	60.6	02320383
	284T																				61.9	02620124
	286T																				62.9	02620124

NO.	DATE:	REVISION	BY	CHK.
5	JAN 29,25	NOTE ADDED, ECR 25007	RP	
4	JAN 19,23	D.I. ADDED, ECR 23003	RP	
3	JULY28,22	GENERAL UPDATE, 3RD VIEW ADDED, ECR22014	RP	
2	DEC17,03	CHOPX3–A ADDED * ECR 03047	LF	
1	AUG 8,03	CHOPX4 MOVED FROM 02620046; CHOPX4–C R/B 4–B;	LF	
		GENERAL REVISION FOR USING #1U PF * ECR 03047		

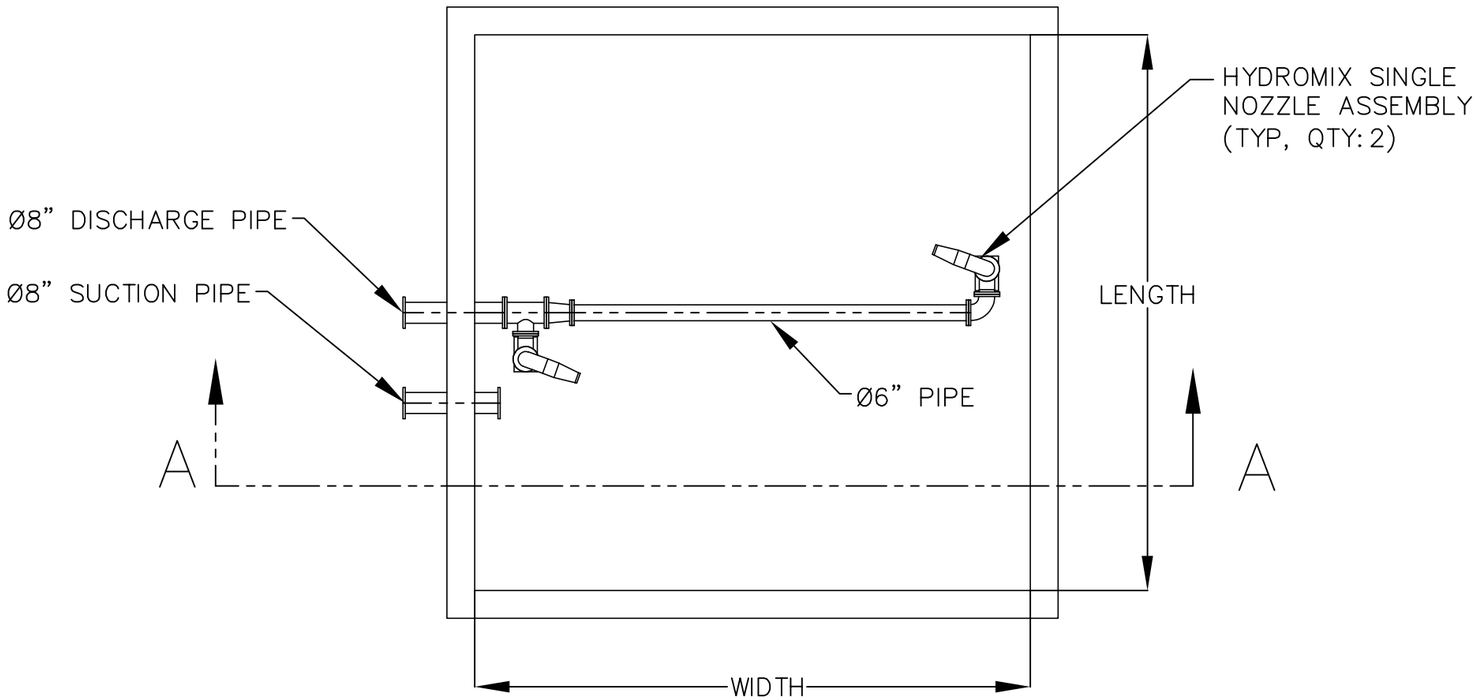
Hayward Gordon ULC

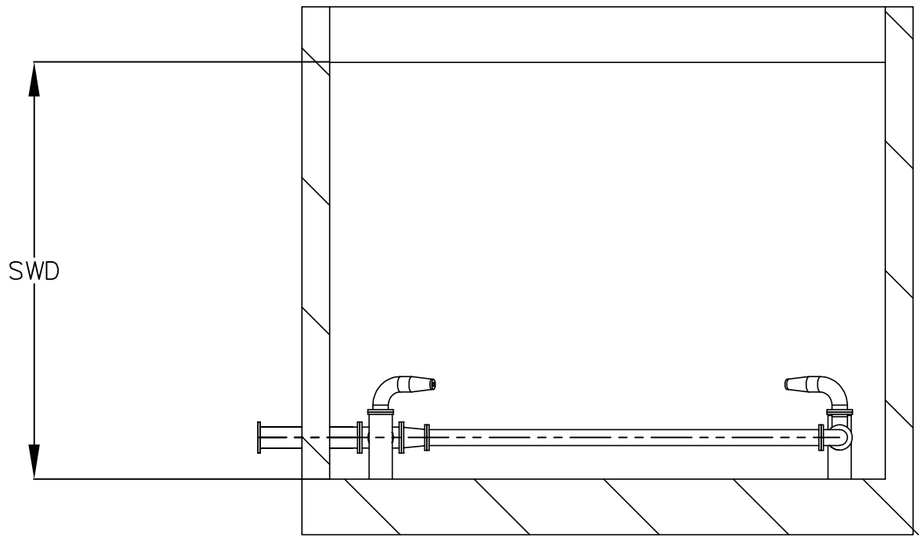
THIS DRAWING IS THE PROPERTY OF HAYWARD GORDON ULC AND MAY NOT BE USED OR COPIED EXCEPT AS EXPRESSLY AUTHORIZED BY IT. THIS DRAWING IS SUBJECT TO RECALL.

TITLE
STANDARD DIMENSIONAL DRAWING FOR DIRECT DRIVE CHOPX3–A/B AND CHOPX4–A/B ⚠1 ⚠2

DESIGN BY:	DRAWN BY:	CHECKED BY:	DATE:
	LF		NOVEMBER 22,2001
SCALE: N.T.S.	SIZE: B	DWG.# 02620132	SHEET 1 of 1

NOZZLE
ALIGNMENT





SECTION A–A

NOTES:

1. NOZZLE ANGLES TO BE CONFIRMED IN FIELD BY HAYWARD GORDON REPRESENTATIVE/ENGINEER.
2. HAYWARD GORDON TO SUPPLY PUMP(S) AND NOZZLE ASSEMBLIES w/SUPPORT BASE. ALL PIPING, PIPING SUPPORTS, VALVES, CONNECTION HARDWARE, GASKETS AND ANCHOR BOLTS TO BE SUPPLIED BY OTHERS.
3. RECOMMENDED PIPE VELOCITY FOR WASTEWATER APPLICATIONS SHALL BE IN THE RANGE OF 3–10 FT/S.

REFERENCE LAYOUT ONLY. NOT FOR CONSTRUCTION.

NO.	DATE:	REVISION	BY	CHK.

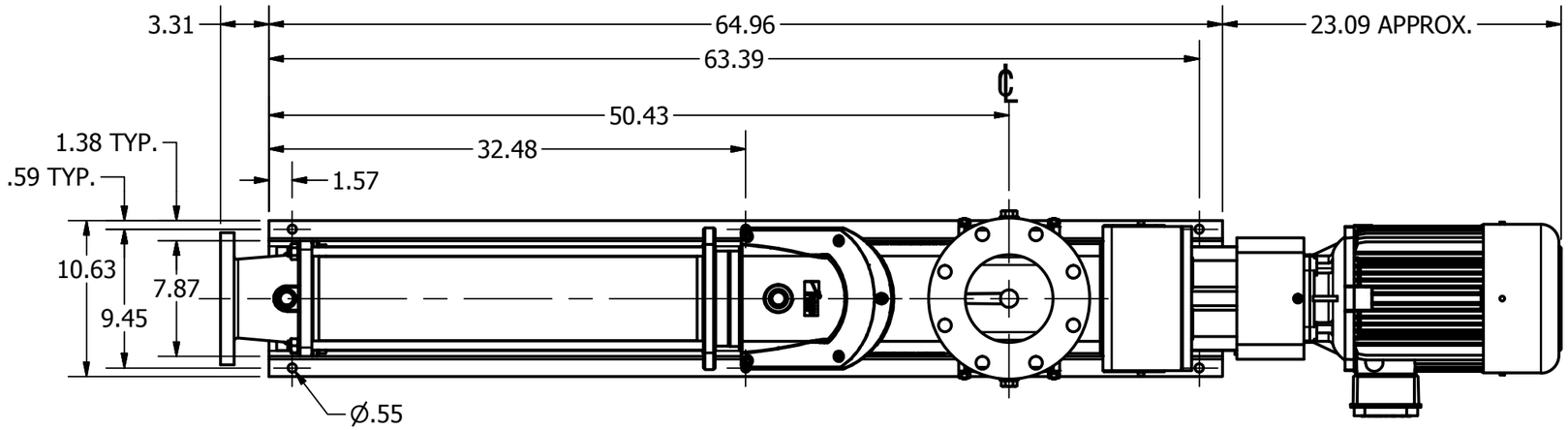
HAYWARD GORDON ULC.
TORONTO MONTREAL CALGARY VANCOUVER

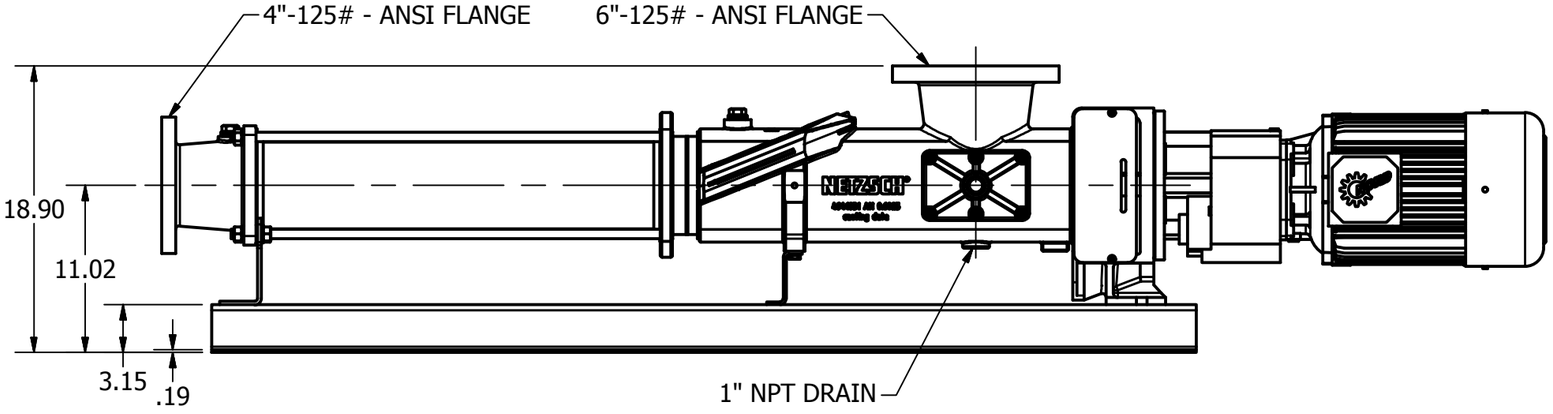
THIS DRAWING IS THE PROPERTY OF HAYWARD GORDON ULC. AND MAY NOT BE USED OR COPIED EXCEPT AS EXPRESSLY AUTHORIZED BY IT. THIS DRAWING IS SUBJECT TO RECALL.

TITLE
HYDROMIX LAYOUT
TWO (2) NOZZLE CONFIG

DESIGN BY:	DRAWN BY:	CHECKED BY:	DATE:
ZQ	ZQ		01/01/18

SCALE:	SIZE:	DWG.#	SHEET	REV.
CAD	C	02720037	1 of 1	0





NOTES:

A) DO NOT SCALE.
B) TOLERANCE ±0.25"
C) ALL DIMENSIONS ARE IN INCHES.
D) BASEPLATE FABRICATION-STRUCTURAL STEEL.
E) CLEAN OUT PORTS STANDARD ONLY ON CAST IRON.
F) APPROXIMATE WEIGHT OF PUMP ASSY, 698 lbs.

ASSEMBLIES REQUIRED		
0	063BY20-0	BASEPLATE ASSEMBLY
1	SEE BOM	GEARMOTOR, REDUCER
2	VERTICAL	SUCTION ORIENTATION

PROPRIETARY: DRAWING MAY NOT BE USED OR REPRODUCED WITHOUTWRITTEN AUTHORIZATION OF NETZSCH PUMPS NORTH AMERICA, LLC.

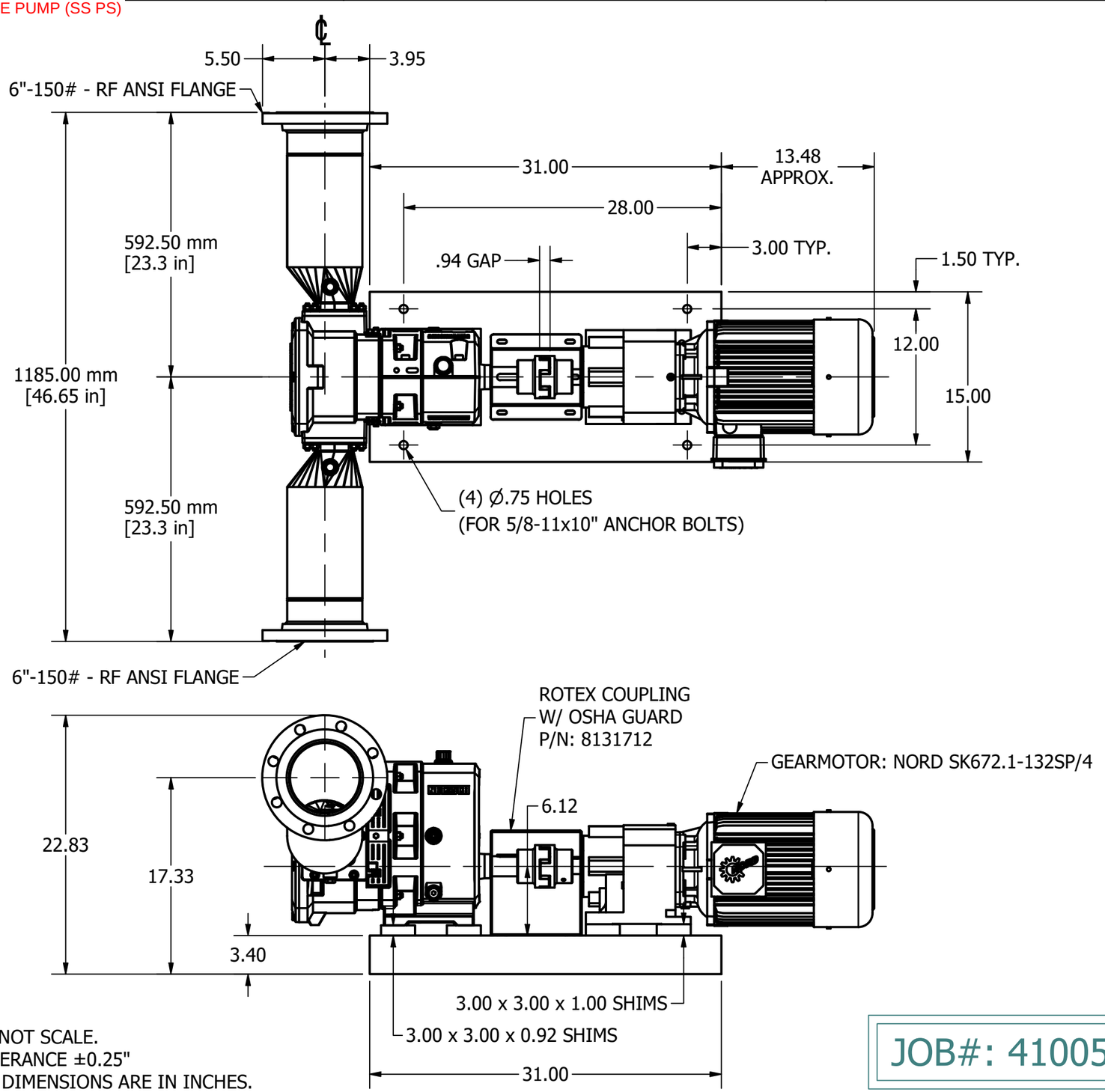
REV.	DESCRIPTION	BY	DATE	APP'D.
0	RELEASED TO SALES/MFG.	MT	2/3/2017	RL

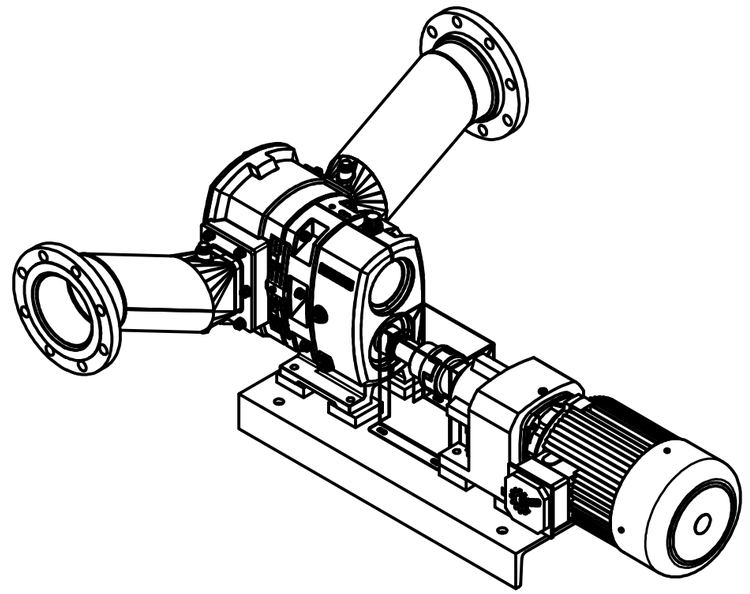
NETZSCH PUMPS NORTH AMERICA, LLC.
EXTON, PA 19341 - 1393

TITLE: NM063BY 01L07/02S14/01P05/02D09/.1/.2/.3

DRAWN: MT DATE: 11/8/2016 | CHK'D: DATE:
SCALE: 1:10 | APP'D: DATE:
SHEET NUMBER: 1 OF 1 | ORDER/PROJECT NUMBER

SIZE DRAWING NUMBER SHT REV
B-063BY20.3





ISOMETRIC VIEW
SCALE 1:12

NOTES:
A) DO NOT SCALE.
B) TOLERANCE ±0.25"
C) ALL DIMENSIONS ARE IN INCHES.

JOB#: 41005368

NETZSCH
Proven Excellence.

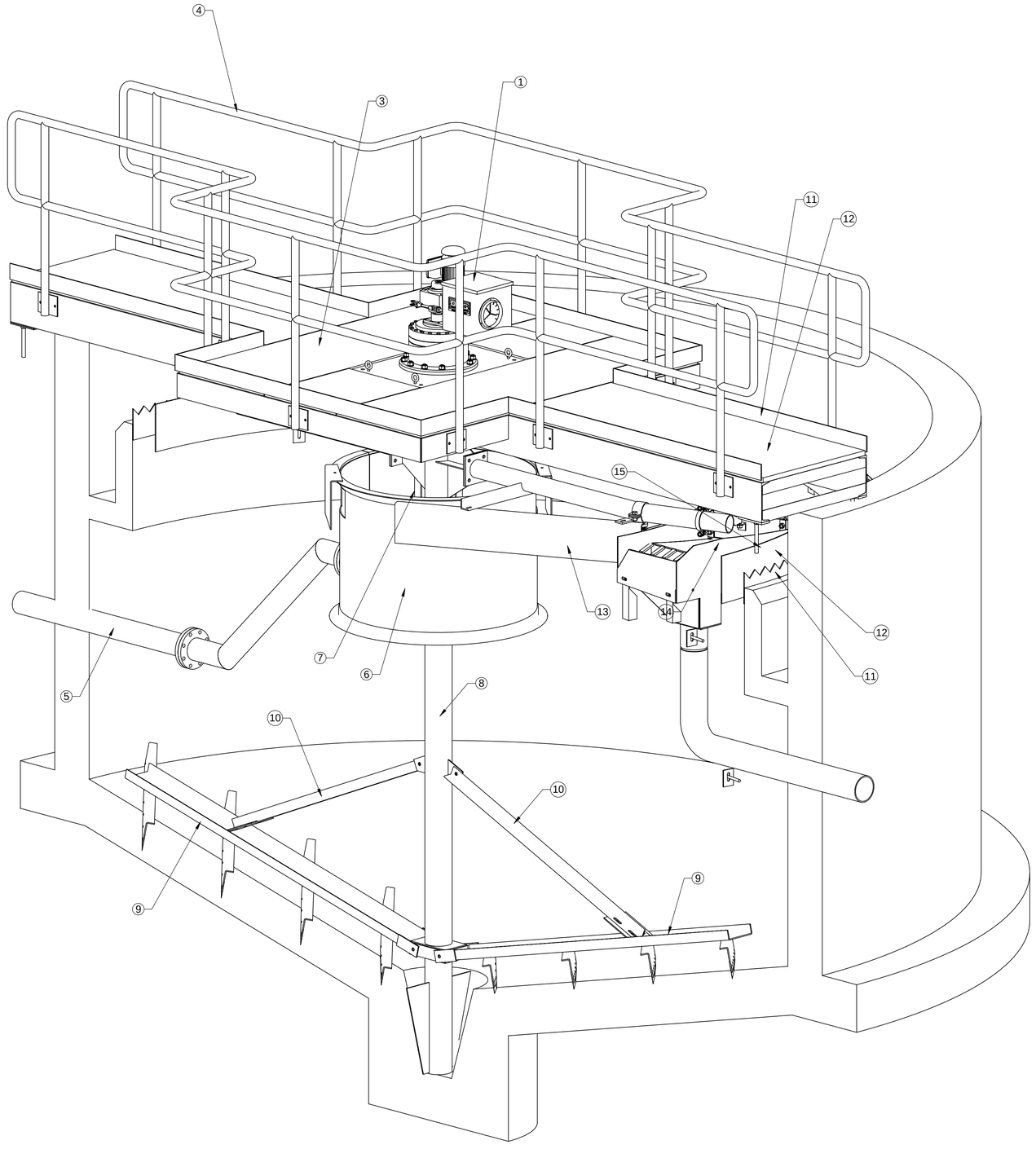
NETZSCH PUMPS USA
119 PICKERING WAY
EXTON, PA 19341

PROPRIETARY: DRAWING MAY NOT BE USED OR REPRODUCED WITHOUT WRITTEN AUTHORIZATION OF NETZSCH PUMPS USA

REV.	DESCRIPTION	BY	DATE	APP'D.
1	UPDATED TO FACELIFT MODEL	JP	13/11/2023	RL
0	RELEASED TO SALES/MFG.	CAH	19/10/2023	RL

TITLE: XB-2F - CHANNEL LAYOUT

DRAWN: CAH DATE: 19/10/2023
SCALE: 1:10
SHEET NUMBER: 1 OF 1
SIZE
DRAWING NUMBER: B-31801101



SEGMENTED BLADE
SHAFT DRIVE
CLEARSTREAM MODEL - CSG

CLARIFIER

DIAMETER: [ ]

SIDE WATER DEPTH: [ ]

SIDE WALL DEPTH: [ ]

EQUIPMENT LIST	
ITEM	DESCRIPTION
1	DRIVE UNIT W/ [ ] FT. LBS. CONTINUOUS TORQUE
2	ACCESS WALKWAY
3	PLATFORM
4	HANDRAIL 42" HIGH DOUBLE RAIL W/ 1/4" X 4" KICKPLATE
5	INFLUENT PIPE
6	FEEDWELL W/ BAFFLED SCUM PORTS
7	FEEDWELL SUPPORTS
8	DRIVE SHAFT
9	RAKE ARMS W/ BLADES AND ADJUSTABLE SQUEEGEES
10	ADJUSTABLE RAKE ARM SUPPORTS
11	WEIR PLATE W/ 90Á V-NOTCHES
12	BAFFLE W/ SUPPORTS
13	SKIMMER BLADES
14	SCUM SCRAPER [ ] WIDE
15	SCUM BOX W/FLEXIBLE COUPLING OUTLET [ ] WIDE

NOTES:
1. THE CONFIGURATION AND DATA SHOWN ON THESE DRAWINGS IS FOR INFORMATION PURPOSES ONLY AND SHOULD NOT BE USED WITHOUT FOLLOWING PROPER PROCESS DESIGN CRITERIA.

REV.	DESCRIPTION	DRAWN	APPROV.	DATE

ClearStream ENVIRONMENTAL
9547 SOUTH 500 WEST
SANDY, UT 84070
OFFICE: (801) 676-1890
FAX: (801) 676-1893

PROPRIETARY AND CONFIDENTIAL
THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF CLEARSTREAM ENVIRONMENTAL. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF CLEARSTREAM ENVIRONMENTAL IS PROHIBITED.

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
WEIGHTS ARE IN LBS
TOLERANCES (I.A.W. ANS D1.1, AISC CODE OF STD PRACTICE):
FRACTIONAL: ±1/8"
HOLE LOCATION: ±1/32"

	NAME	DATE
DRAWN	JJW	5/14
CHECKED	BGA	5/14
ENG APPR.	BKB	5/14
FAB INSP.		

MATERIAL: N/A
WEIGHT EACH: N/A
NUMBER OF MECHANISMS:
TOTAL WEIGHT: N/A
DO NOT SCALE DRAWING
MODEL NUMBER:
DESIGNATION:

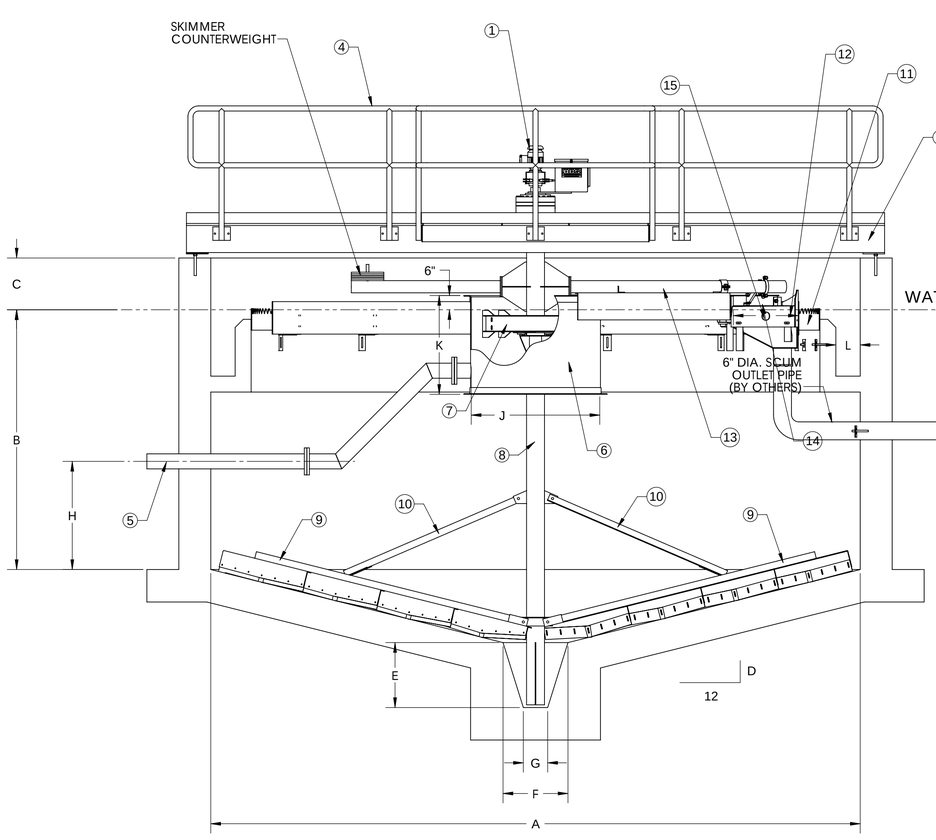
SHAFT DRIVE SCRAPER

TITLE: GENERAL ARRANGEMENT ROTATING WEIR DETAILS

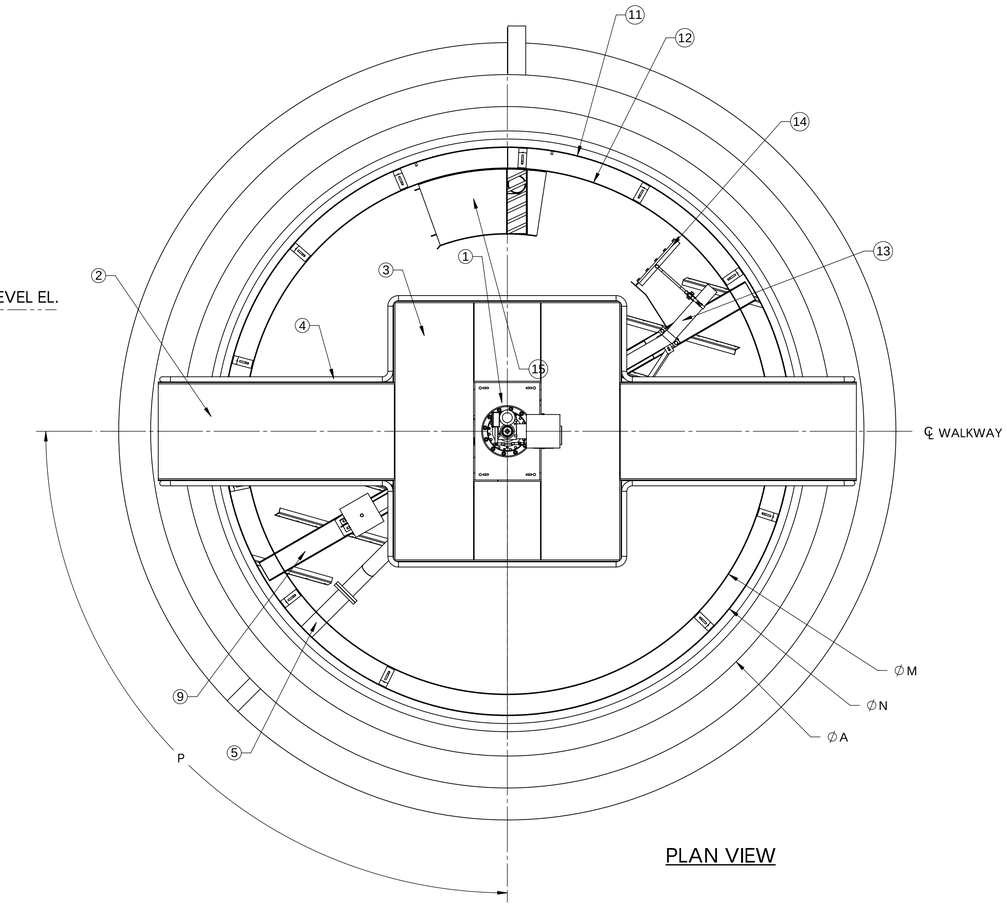
SIZE	DWG. / PART NO.	REV
D	101	

SCALE: 1:15 SHEET 1 OF 1

DATA		
ITEM	DESCRIPTION	DIMENSION
A	TANK INSIDE DIA.	
B	SIDE WATER DEPTH	
C	FREEBOARD	
D	TANK SLOPE	
E	SLUDGE PIT DEPTH	
F	SLUDGE PIT UPPER DIA.	
G	SLUDGE PIT LOWER DIA.	
H	INFLUENT PIPE HEIGHT	
J	FEEDWELL I.D.	
K	FEEDWELL DEPTH	
L	LAUNDER WIDTH	
M	BAFFLE INSIDE DIA.	
N	LAUNDER INSIDE DIA.	
O	SCUM BOX WIDTH	
P	SCUM BOX ANGLE	



ILLUSTRATIVE ELEVATION



PLAN VIEW

Clear Stream Environmental
9547 SOUTH 500 WEST
SANDY, UT 84070
OFFICE: (801) 676-1890
FAX: (801) 676-1893

PROPRIETARY AND CONFIDENTIAL
THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF CLEARSTREAM ENVIRONMENTAL. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF CLEARSTREAM ENVIRONMENTAL IS PROHIBITED.

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
WEIGHTS ARE IN LBS
TOLERANCES (I.A.W. ANS D1.1, AISC CODE OF STD PRACTICE):
FRACTIONAL: ±1/8"
HOLE LOCATION: ±1/32"

	NAME	DATE
DRAWN	JJW	5/14
CHECKED	BGA	5/14
ENG APPR.	BKB	5/14
FAB INSP.		

MATERIAL: N/A
WEIGHT EACH: N/A
NUMBER OF MECHANISMS:
TOTAL WEIGHT: N/A

DO NOT SCALE DRAWING
MODEL NUMBER:
DESIGNATION:

REV.	DESCRIPTION	DRAWN	APPROV.	DATE

SHAFT DRIVE SCRAPER

TITLE: GENERAL ARRANGEMENT ROTATING WEIR DETAILS

SIZE	DWG. / PART NO.	REV
D	101	

SCALE: 1:28 SHEET 1 OF 1

CHAPTER 4 - GRAVITY THICKENER COVER

PROTECTOLITE™
COMPOSITES INC.

Pro'Deck Covers Solution

Protectolite™ Pro'Deck Covers 3000

CHAPTER 4 - GRAVITY THICKENER COVER

Deck Panel for :

- ✓ Clarifier Tank Covers
- ✓ Membrane Cell Covers
- ✓ Screw Pump Covers
- ✓ Bio-filter Covers
- ✓ Troughs

Applications :

- ✓ Odor Control
- ✓ Prevent Freeze-up
- ✓ Reduce Contamination
- ✓ Algae Control

Materials of Construction

PRO'DECK Cover panels are a composite of fiberglass reinforcements and a thermoset resin system. All components are produced by the pultrusion process.

The standard resin system is a medium grey polyester resin and incorporates a corrosion resistant polyester surfacing veil on the outer surfaces. All PRO'DECK Cover panels are available in fire retardant and various resin grades and color combinations on special orders.

Benefits & Features

- High load ratings
- Excellent corrosion resistance
- Easy to install
- Modular panels
- Choice of top surface
- Light weight
- Long service life
- Low maintenance

Basis of Design Information

Tank Design Criteria

The WesTech digester cover was designed based on the following information.

Digester Tank Information*

Parameter	Unit	Value / Description
Tank Inner Diameter*	ft	24
Tank Wall Thickness*	in	10
Top of Wall Elevation	ft	29.5
High Water Elevation	ft	25
Low Water Elevation*	ft	24.5

*Any values that are assumed should be verified. Digester tank dimensions and liquid elevations that differ from the information provided above may result in a design change for the digester cover.

WesTech is not responsible for digester tank design, concrete design for new or existing concrete, nor for determining the suitability of the concrete to withstand any design loads.

Design Description

WesTech covers are shipped in sections that have been pre-assembled and welded in the fabrication shop. Each pre-assembled section consists of two (2) radial beams and one (1) shop-welded cover plate. For this project, the beams will be welded to the bottom of the cover plate. Shipped-loose filler plates are field welded between pre-assembled sections to provide a complete and fully sealed cover.

Basis of Design Information

Tank Design Criteria

The WesTech digester cover was designed based on the following information.

Digester Tank Information*

Parameter	Unit	Value / Description
Tank Inner Diameter*	ft	24
Tank Wall Thickness*	in	10
Top of Wall Elevation	ft	29.5
High Water Elevation	ft	25
Low Water Elevation*	ft	24.5

*Any values that are assumed should be verified. Digester tank dimensions and liquid elevations that differ from the information provided above may result in a design change for the digester cover.

WesTech is not responsible for digester tank design, concrete design for new or existing concrete, nor for determining the suitability of the concrete to withstand any design loads.

Design Description

WesTech covers are shipped in sections that have been pre-assembled and welded in the fabrication shop. Each pre-assembled section consists of two (2) radial beams and one (1) shop-welded cover plate. For this project, the beams will be welded to the bottom of the cover plate. Shipped-loose filler plates are field welded between pre-assembled sections to provide a complete and fully sealed cover.

Technical Proposal

Detailed Design Summary

Detailed Design Summary

Parameter	AES	SI
WesTech System Model	Radial Beam Digester Covers, Model DCB1	
Number of Covers	(2) total covers	
Configuration	Fixed	
Cover Diameter	24 ft	7.3 m
Roof Radius Factor	1.5x tank diameter	
Radial Beam Maximum Span	8 ft	2.4 m
Center Dome Diameter	48 in	1,219 mm
Side Sheet Length	76 in	1,930 mm
Minimum Side Sheet Submergence	7.5 in	191 mm
Pressures		
Normal Operating Pressure*	10 in WC	254 mm WC
Gas Relief Pressure Setting*	12 in WC	305 mm WC
Maximum Design Pressure*	16 in WC	406 mm WC
Vacuum Pressure*	2 in WC	51 mm WC
Point Loads		
Center Dome Point Load*	500 lb	227 kg
Shop-Assembled Sections Quantity	6	
Weights		
Bare Weight of Steel (without supports)	16,000 lb	7,257 kg
Shop-Assembled Section Weight	600 lb	272 kg
Heaviest Component Weight	800 lb	363 kg
Welds		
Estimated Overhead Weld**	162 ft	50 m
Estimated Total Linear Weld**	630 ft	192 m

*Values are assumed and should be verified.
**Total weld length includes overhead weld. Weld lengths are estimates and can vary at final design completion. Field welding, if required, is by others.

Scope of Supply

Scope of Supply – Per Cover*

Item	Quantity	Description	Item A-1 Material	Item A-2 Material
Shop Assembled Sections	6	1/4 in thick plate welded to the top of the support beams	304L SS	316L SS
Cover Plates	6	1/4 in thick plates, shipped-loose	304L SS	316L SS
Center Dome	1	48 in dia., 1/4 in thick; includes bolted cover, welded compression ring, and lifting handles	304L SS	316L SS
Side Sheets**	6	1/4 in thick sheets, stiffeners and tension ring welded in shop	304L SS	316L SS
Tube Supports and Hold Down Straps	12	Includes UHMW-PE bearing plates	304L SS	316L SS
Gaskets	1 lot	-	Neoprene	
Bolts & Fasteners	1 lot	-	304 SS	316 SS
Pressure Relief Port	1	3 in dia., shipped loose	304L SS	316L SS
Sample Tube Ports	3	8 in dia., shipped loose	304L SS	316L SS
Manhole Ports with Covers	2	36 in dia., with bolted cover and lifting handles	304L SS	316L SS
Emergency Relief Hatch Port	1	24 in dia., shipped loose	304L SS	316L SS

*Cover insulation, if required, is by others.
**Annular seal material, if required, is by others.

Scope of Supply – Accessories* (Per Cover)

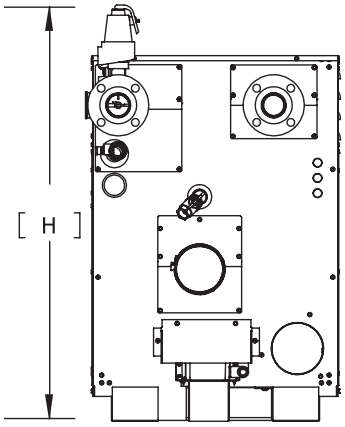
Item	Quantity	Description	Brand/Material
Emergency Relief Hatch	1	24 in dia., aluminum model 94210	Shand & Jurs, aluminum
Sample Tube Covers	3	8 in dia., quick-opening hatch with lockdown device	Shand & Jurs, aluminum
Pressure / Vacuum Relief Valve	2	3 in dia., includes flame arrestor	Shand & Jurs, aluminum
Plug Valve	1	3 in dia., 3-way valve with elbows	Milliken
Gas Piping	By Others	Including supports	By Others

*WesTech will design the cover with the appropriate ports for the above accessories.

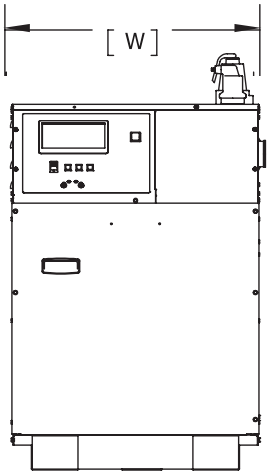
Surface Preparation and Painting

The digester cover will be shipped bare steel for field surface preparation by the contractor. WesTech will ensure shop welds are treated by spray pickling prior to shipment.

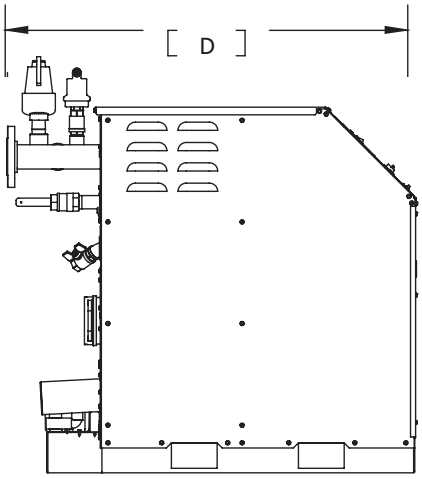
TORUS® WATERTUBE Product Dimensions WB/WW 300 - 1000



REAR VIEW



FRONT VIEW



LEFT SIDE VIEW

	300	350	400	500	650	800	1000
Dimensions							
Height (in)	40.94	40.94	40.94	40.94	40.94	40.94	41.69
Width (in)	25.09	25.09	25.09	25.09	25.09	25.09	25.36
Depth (in)	40.25	40.25	40.25	41.75	49.25	52.12	56.89
Operating Weight (lbs.)	407	407	407	426	486	524	607
Shipping Weight (lbs.)	519	519	519	537	598	635	746
Metric Dimensions							
Height (mm)	1040	1040	1040	1040	1040	1040	1059
Width (mm)	637	637	637	637	637	637	644
Depth (mm)	1022	1022	1022	1060	1251	1324	1445
Operating Weight (kg)	185	185	185	193	221	235	275
Shipping Weight (kg)	235	235	235	244	271	288	338

RBI®
RELIABLE. BOLD. INNOVATIVE.

TORUS® WATERTUBE

Product Specification
WB/WW 300 - 1000

	300	350	400	500	650	800	1000
Ratings and Capacities							
Input BTU/HR - (WB/WW)	300,000	349,000	399,000	500,000	650,000	800,000	999,000
Output BTU/HR - Boiler - (WB)	291,000	337,483	385,035	482,000	625,950	768,800	959,040
AHRI Thermal Efficiency - Boiler (%)	97	96.7	96.5	96.4	96.3	96.1	96
Water Heater Hourly Recovery Capacity (GPH @ 60 deg f)	588	677	782	960	1262	1553	1939
Water Heater Hourly Recovery Capacity (GPH @ 100 deg f)	353	406	469	576	757	932	1163
Water Heater Hourly Recovery Capacity (GPH @ 140 deg f)	252	290	335	412	541	665	831
Turn Down (NG)	8:1	9:1	10:1	10:1	10:1	10:1	10:1
Turn Down (LP)	8:1	8:1	8:1	8:1	8:1	8:1	8:1
HP - Boiler	8.69	10.08	11.50	14.40	18.70	22.97	28.65
Fuel Type	NG/LP/Dual Fuel	NG/LP/Dual Fuel	NG/LP/Dual Fuel	NG/LP/Dual Fuel	NG/LP/Dual Fuel	NG/LP/Dual Fuel	NG/LP/Dual Fuel
Category	CAT II/IV	CAT II/IV	CAT II/IV	CAT II/IV	CAT II/IV	CAT II/IV	CAT II/IV
Water Volume (gal)	3.8	3.8	3.8	4.2	5.6	6.6	8.1
Design Data - (Max working Press - psig)	160	160	160	160	160	160	160
Min water pressure (psi)	20	20	20	20	20	20	20
ASME Sect IV Fireside Htg Surface (sq-ft)	34.8	34.8	34.8	39.1	52.2	60.9	75.4
ASME Sect IV Waterside Htg Surface (sq-ft)	31.5	31.5	31.5	35.44	47.25	55.12	68.24
Electrical (Standard)	120V-1ph	120V-1ph	120V-1ph	120V-1ph	120V-1ph	120V - 1ph	120V - 1ph
FLA (amps)	12	12	12	12	12	12	12
Min. Gas Pressure (w.c.) N/G	4	4	4	4	4	4	4
Min. Gas Pressure (w.c.) LP	4	4	4	4	4	4	4
Max. Gas Pressure (w.c.)	14	14	14	14	14	14	14
Max Vent (Equiv. ft)	100	100	100	100	100	100	100
Max Combustion Air (Equiv. ft)	100	100	100	100	100	100	100
Trim							
Number of Relief Valves	1	1	1	1	1	1	1
Relief Valve Pressure Rating (PSI) (WB/WW)	50/125	50/125	50/125	50/125	50/125	50/125	50/125
Inlet Water Connection (in)	2.0	2.0	2.0	2.0	2.0	2.0	2.5
Outlet Water Connection (in)	2.0	2.0	2.0	2.0	2.0	2.0	2.5
Gas Connection - NG (in)	1"	1"	1"	1"	1-1/4"	1-1/4"	1-1/4"
Gas Connection - LP (in)	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"
Vent Outlet Connection (in)	4	4	4	4	6	6	6
Standard Vent Material	PVC/CPVC	PVC/CPVC	PVC/CPVC	PVC/CPVC	PVC/CPVC	PVC/CPVC	PVC/CPVC
Optional Non Metallic Vent Material	SS/PP	SS/PP	SS/PP	SS/PP	SS/PP	SS/PP	SS/PP
Combustion Air Connection	5	5	5	5	5	5	5
Dimensions							
Height (in)	40.94	40.94	40.94	40.94	40.94	40.94	41.69
Width (in)	25.09	25.09	25.09	25.09	25.09	25.09	25.36
Depth (in)	40.25	40.25	40.25	41.75	49.25	52.12	56.89
Operating Weight (lbs.)	407	407	407	426	486	524	607
Shipping Weight (lbs.)	519	519	519	537	598	635	746
Clearance Service/Combustible							
Front (in)	36/6	36/6	36/6	36/6	36/6	36/6	36/6
Rear (in)	24/6	24/6	24/6	24/6	24/6	24/6	24/6
Right Side (in)	1/1	1/1	1/1	1/1	1/1	1/1	1/1
Left Side (in)	1/1	1/1	1/1	1/1	1/1	1/1	1/1
Top (in)	30/6	30/6	30/6	30/6	30/6	30/6	30/6

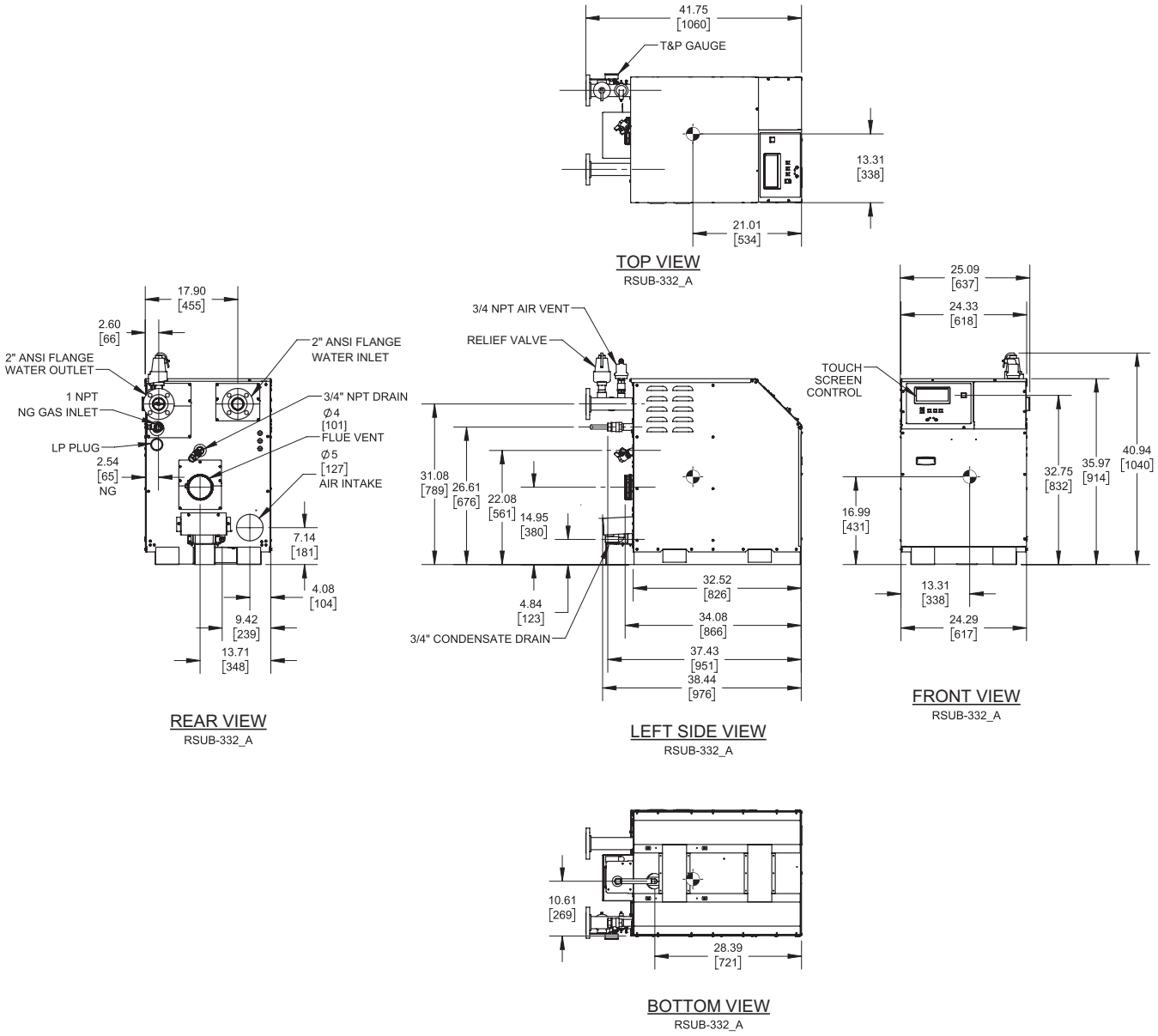
TORUS 500

Category II or Category IV Appliance
(see Installation and Operation Manual for venting information)

CODE OPTIONS

CSD-1	FIRMWARE W/REMOTE TEST MANUAL RESET LWCO High and Low Gas Pressure Switches

INDOOR UNIT



Notes:
1. Dimensions are approximate and should not be used to "rough-in" equipment.
2. Dimensions are subject to change without notice.
3. All dimensions are in inches (mm).
4. ◓ Symbol indicates center of gravity.

BOILER CERTIFIED RATINGS & CAPACITIES

Fuel Type	Natural/Propane Gas	**Boiler FLA**	12.0*
Input BTU/hr.	500,000 / 146.54 kW	**Boiler HP**	14.40
Output BTU/hr.	482,000 / 141.26 kW	**Min. Gas Pressure Required**	4"W.C.
Electrical Requirements	120 VAC/60 Hz/1PH	**Max. Gas Pressure Allowed**	14" W.C.
		Operating Weight	425.69 lbs / 193.09 kg

BOILER TRIM & CONTROLS

Main Gas Valve	Dungs MBC	**Air Switch**	Huba
Firing Valve	Apollo	**Flow Switch**	SIKA
Ignition Control	Fenwal	**Blocked Flue Switch**	Cleveland NS2
Operating Control	HeatNet®	**Blower Motor**	Ametek
High Limit	Jumo	**L.W.C.O.**	800
Main Ball Valve	Apollo	**Relief Valve (WB)**	3/4" x 3/4" set @ 50 psi
Pump contactor strongly recommended for water heater applications.		**Relief Valve (WW)**	1" x 1" set @ 125 psi

A.S.M.E.

ASME Sect IV Fire Side Htg Surface	39.1 Sq. Ft. / 3.63 Sq. M.	**Design Data**	Max. 160 psig & 210°F
		Water Volume	4.2 gal. / 15.90 Liters
ASME Sect IV Water Side Htg Surface	35.44 Sq. Ft. / 3.29 Sq. M.	**pH Level**	6.5-8.5

* Add circulator amps.

BOILER TEMPERATURE RISE / PRESSURE DROP (Based on Full Input)

20°F / 11.1°C				30°F / 16.7°C				40°F / 22.2°C			
Flow Rate		Pressure Drop		Flow Rate		Pressure Drop		Flow Rate		Pressure Drop	
GPM	L/s	Ft	kPa	GPM	L/s	Ft	kPa	GPM	L/s	Ft	kPa
48.2	3.0	12.2	36.4	32.1	2.0	5.4	16.2	24.1	1.5	3.1	9.1

Flow GPM (Boiler)		Temp. Rise (°F) (Boiler**)		Vent Length (Equiv. Ft.)		Air Inlet Length (Equiv. Ft.)	
Min	Max	Min	Max	Min	Max	Min	Max
24.1	48.2	20	40	6	100	0	100

** Min/Max delta t reflects boiler operation at full input. For applications requiring operation above/below these parameters please consult factory.

WATER HEATER HOURLY RECOVERY CAPACITY (GPH & LPH)

40°F	22°C	60°F	33°C	80°F	44°C	100°F	56°C	120°F	67°C	140°F	78°C
1441	5445	960	3630	720	2723	576	2178	480	1815	412	1556

Water Heater Min Flow Rates							
Normal (4 to 12) gpg				Hard (12 to 15) gpg			
Flow Rate		Pressure Drop		Flow Rate		Pressure Drop	
gpm	L/s	Ft	kPa	gpm	L/s	Ft	kPa
36.1	2.3	6.8	20.4	48.3	3.0	6.8	20.4

REP FIRM	Johnson Barrow Oregon/Boise
SUBMITTED BY	Jessica Mangrobang
JOB NAME	Digester Gas Boiler
ARCHITECT	-
ENGINEER	-
CONTRACTOR	Jacobs
DATE	10.17.2025

TORUS 500

Category II or Category IV Appliance
(see Installation and Operation Manual for venting information)

RBI®
RELIABLE. BOLD. INNOVATIVE.

A Division of Mestek, Inc.
Westfield, MA 01085
(833) 265-5371

An Ovivo Company

GAS CONTROL

VAREC BIOGAS 231 Series
GAS/ FOAM SEPARATOR

The 231 Series Gas/Foam Separator is designed for use in piping systems to remove foam typically caused by agitation from the digester discharge gas.

Introduction

The Varec Biogas 231 Series Gas/Foam Separator is designed for use in piping systems to remove foam typically caused by agitation from the digester discharge gas. The foam must be dispersed and collected in order to protect downstream equipment from corrosion or clogging. The Gas/ Foam Separator is typically installed in the gas piping as it exits the digester.

Construction

The main vessel is welded 316L stainless steel construction and is available in either 2 foot or 3 foot diameter vessels.

The inlet and outlet gas connections are ANSI 150 FF flanges. The size is determined by the actual pipe size of the digester gas line. The water inlet connection is a 3/4" NPT connection. Drain connections are 4", ANSI 150lb flat face flanges.

The unit is equipped with a NEMA 7 level switch for high and low water level alarms. High level alarm is connected to a NEMA 7 solenoid valve located on the water supply line.

The water spray manifold is stainless steel pipe and fittings, welded at all joints. Maximum working pressure is 1 psig (27.7" WC). Consult factory for special dimensional requirements.

Operation

Entrained foam and solids are removed from the gas as it flows through the device. This is accomplished by subjecting the gas/foam mixture to a direct spray of water inside the chamber. The gas must then rise vertically past an internal baffle in order to flow from the tank.

Foam and solids are heavier than gas, and the combination of the large vertical rise the gas has to travel, and the continuous spray of water will knock the foam out of the gas and direct it to the bottom of the chamber. The foam is removed via a drain connection.

Liquid level switches allow for high and low-level alarms to be connected to the plant system. At low water condition, source power is routed through the low-level switch to terminals for plant connection of a low water alarm. If for any reason the water level in the tank rises above the high water float switch, source power is routed to terminals for plant connection of a high water alarm and the spray water solenoid valve is de-energized which stops the water flow into the unit.

Design Features

- All stainless steel construction
- Continuous spray wash system
- Removes foam and particulates
- Alarms for high and low water levels
- Large reservoir with baffle

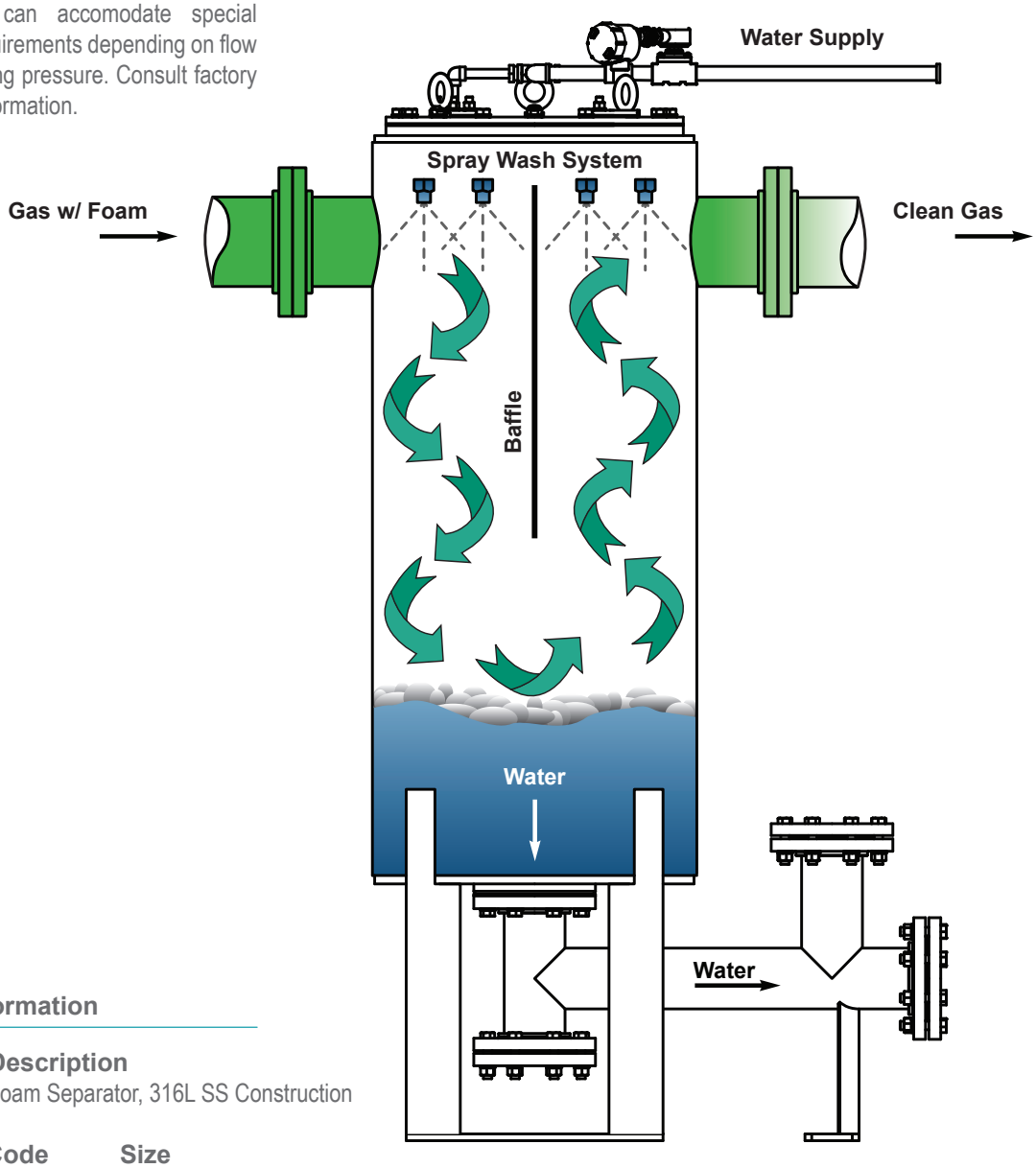
Varec Biogas Inc. reserves the right to change product design and specifications without notice.
Copyright © 2021 by Varec Biogas Inc. An Ovivo Company.

Schematic Drawing

Approximate Shipping Weights

24" Diameter Vessel - 1800 lbs. (816 kg) SELECTED SIZE
36" Diameter Vessel - 2200 lbs. (998 kg)

Consult factory for general dimension drawings. We can accomodate special dimensional requirements depending on flow rate and operating pressure. Consult factory for additional information.



Ordering Information

Model	Description
231	Foam Separator, 316L SS Construction

Code	Size
24	24-in Diameter Vessel
36	36-in Diameter Vessel
PU	Special Configuration

P/N: SPC 231 36 06

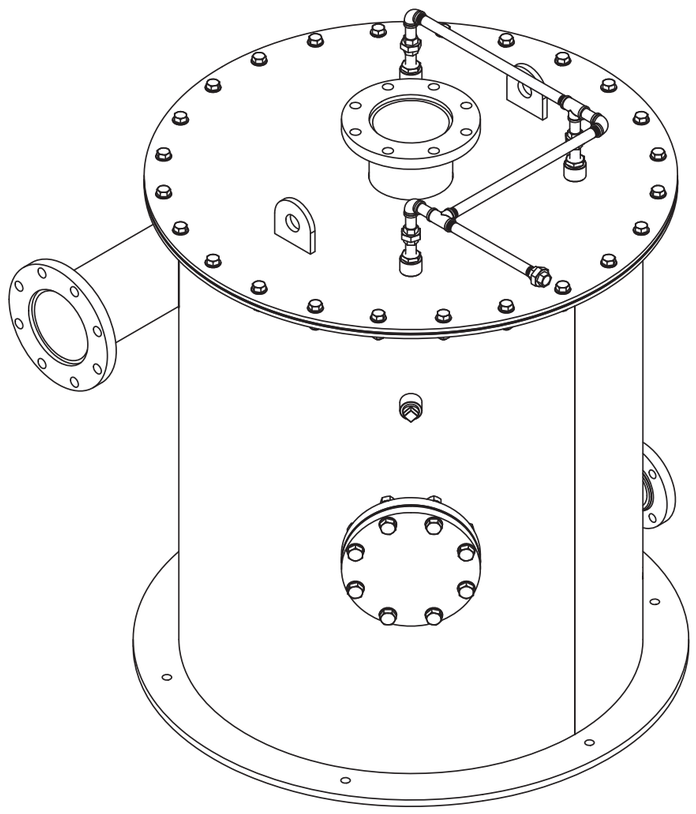
Code	Inlet & Outlet Flanges
04	4" (100mm)
06	6" (150mm)
08	8" (200mm)
10	10" (250mm)
12	12" (300mm)

Varec Biogas Inc. reserves the right to change product design and specifications without notice.
Copyright © 2021 by Varec Biogas Inc. An Ovivo Company.

ITEM NO.	QTY	DESCRIPTION	MATERIAL	PART NO	REVISION
1	1	BODY WELDMENT	316SS	SOCVW51-231-01-W10003	A
2	1	COVER WELDMENT	316SS	SOCVW51-231-02-W10003	A
3	1	COVER GASKET	NEOPRENE	SOCVW51-231-04-P0001	A
4	2	BLIND FLANGE GASKET: 6" RF	NEOPRENE	B3049-446	
5	1	SIGHT GLASS: 31"	STAINLESS/ POLYCARBONATE	2181	
6	3	SPRAY NOZZLE: 3/8", 1.8 GPM @ 40 PSI	316SS	MOF-SS06-096	
7	1	PLUG: 1" NPT, SQUARE, 150#	316SS	MPL-SS16-100	

CHAPTER 4 - DIGESTER
BIOGAS FOAM SEPARATOR

NOTES:
1. APPROXIMATE WEIGHT OF ASSEMBLY: 1458.70 LBS



FOAM SEPERATOR: 36" VESSEL

SIZE	DWG. NO.	REV
B	CVW51-231-SPC	A

SCALE: 1:12 | WEIGHT: | SHEET 1 OF 4

9803 Mula Road
Stafford, TX 77477
(281) 564-0300
(281) 564-9578 FAX

Varec Biogas

DWN	N. MELI	11/18/2021
CHK	B. HOSFORD	11/18/2021
APPR		

UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONS ARE IN INCHES
TOLERANCES:
X.XX ±0.03
X.XXX ±0.008

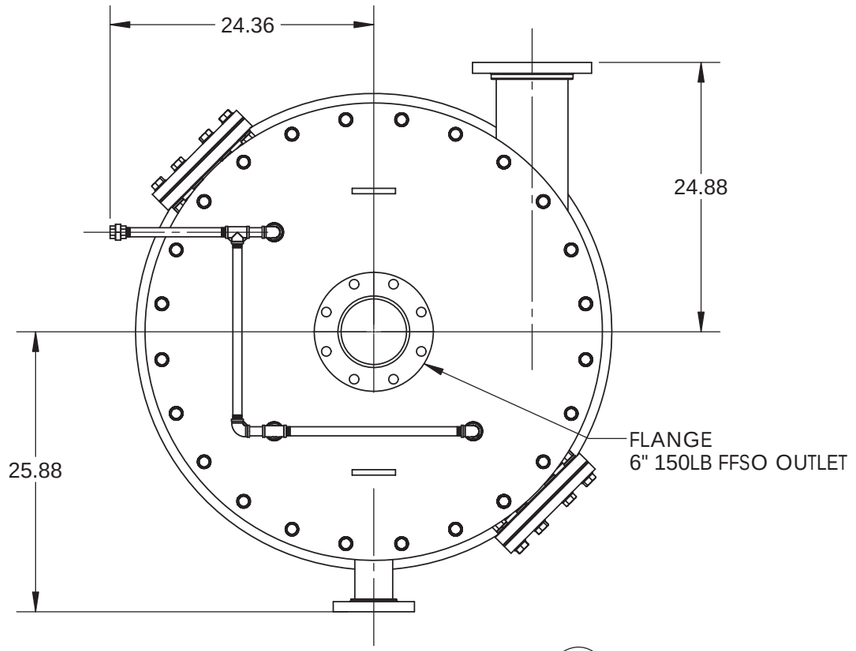
250 MICROINCH SURFACE ROUGHNESS
ALL MACHINED SURFACES

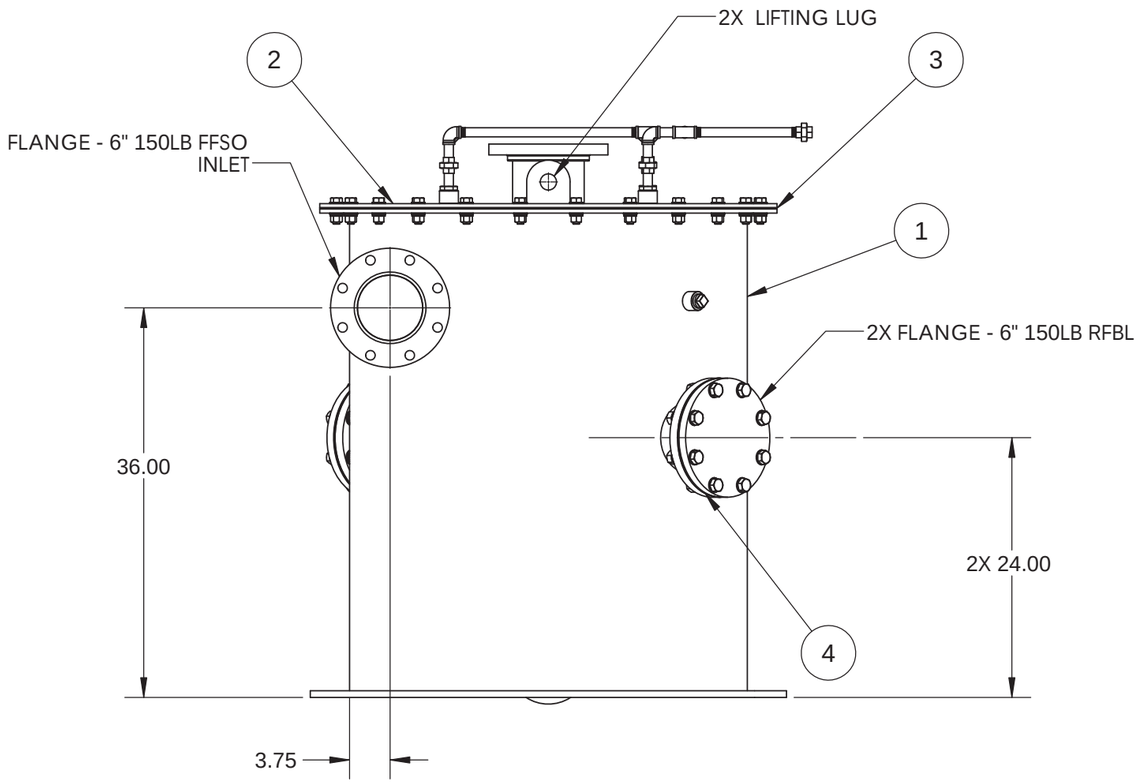
ALL VAREC BIOGAS PRODUCTION STANDARDS APPLY

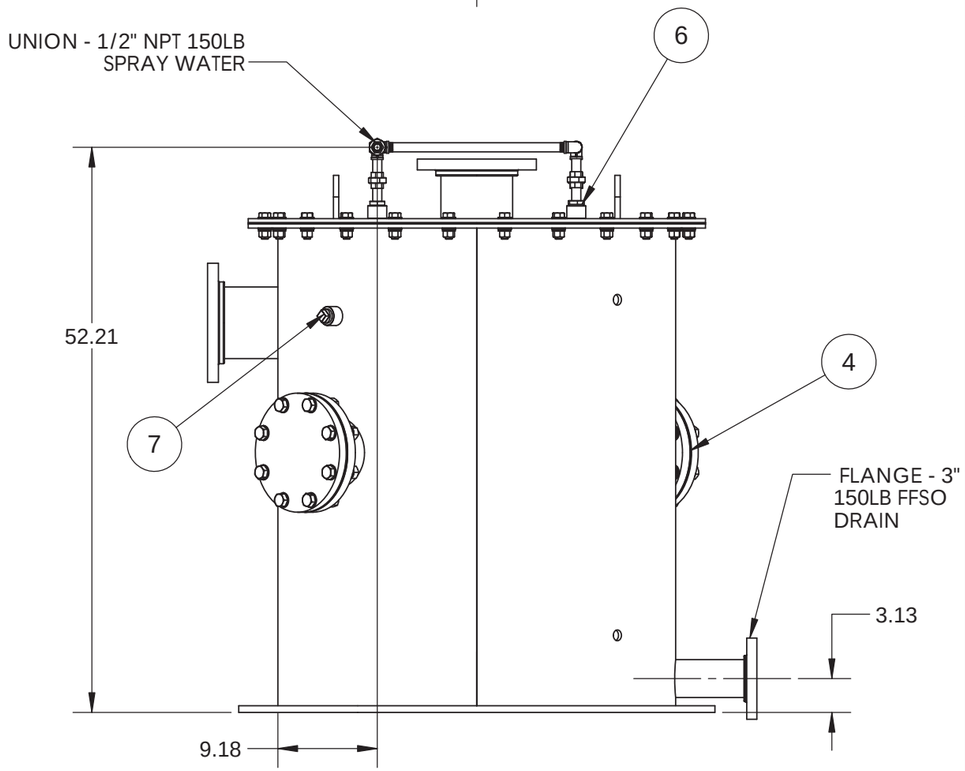
DO NOT SCALE DRAWING

IMPORTANT NOTICE, READ FIRST

This drawing is part of information made available to recipient under obligations of confidentiality on a proprietary basis owned by VAREC BIOGAS and all ownership, patent, design, manufacturing, reproduction use and sale rights regarding the same are expressly retained by VAREC BIOGAS. This drawing contains VAREC BIOGAS confidential information and is submitted by VAREC BIOGAS under a confidential relationship for an agreed purpose, and by accepting or reviewing this drawing, the recipient agrees to maintain: this drawing in strict confidence; not to supply or disclose this drawing to any employee or consultant who is not authorized by VAREC BIOGAS; and not otherwise use, disclose or reproduce this drawing without VAREC BIOGAS written authorization. This drawing and all copies shall be returned to VAREC BIOGAS on request.







FOAM SEPERATOR: 36" VESSEL

SIZE	DWG. NO.	REV
B	CVW51-231-SPC	A

SCALE: 1:14 | WEIGHT: | SHEET 2 OF 4

Varec Biogas
9803 Mula Road
Stafford, TX 77477
(281) 564-0300
(281) 564-9578 FAX

	DWN	CHK	APPR
	N. MELI	B. HOSFORD	
	11/18/2021	11/18/2021	
APPR			APPR
APPR			APPR

UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONS ARE IN INCHES

TOLERANCES:
X.XX ±0.03
X.XXX ±0.008

250 MICROINCH SURFACE ROUGHNESS
ALL MACHINED SURFACES

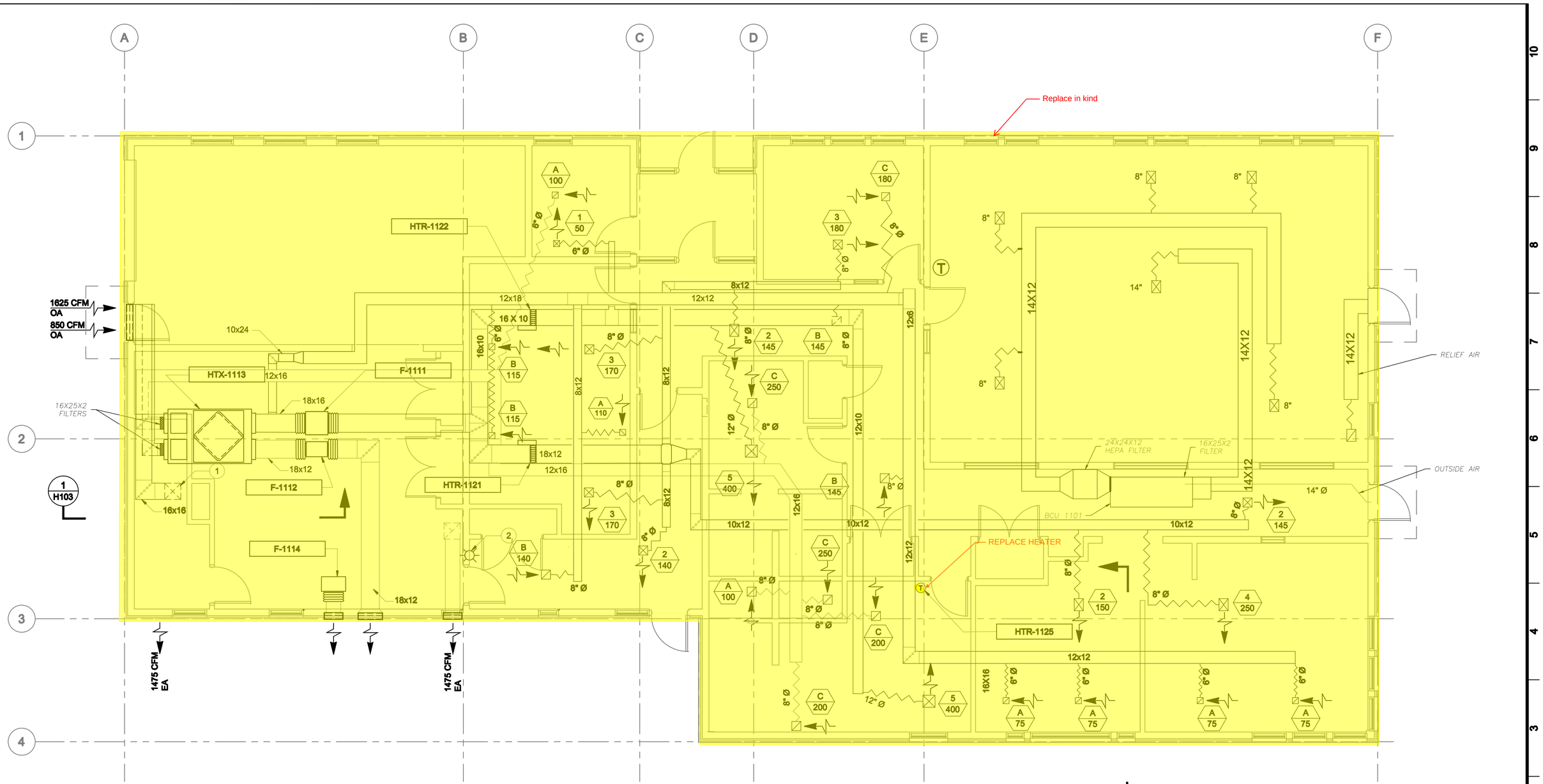
ALL VAREC BIOGAS PRODUCTION STANDARDS APPLY

DO NOT SCALE DRAWING

IMPORTANT NOTICE, READ FIRST

This drawing is part of information made available to recipient under obligations of confidentiality and is considered property owned by VAREC BIOGAS and all ownership, patent, design, manufacturing, reproduction use and sale rights regarding the same are expressly retained by VAREC BIOGAS. This drawing contains VAREC BIOGAS confidential information and is issued in strict confidence and is to be used only for the purpose for which it was intended, within the confidential relationship for an agreed purpose, and by accepting or reviewing this drawing, the recipient agrees to maintain this drawing in strict confidence, not to supply or disclose this drawing to any employee or consultant not authorized by VAREC BIOGAS and not otherwise use, disclose or reproduce this drawing without VAREC BIOGAS written authorization. This drawing and all copies shall be returned to VAREC BIOGAS on request.

Appendix F
Heating, Ventilation, and Air Conditioning Replacement Markups



GENERAL NOTES:

1. DUCT RUNS IN ATTIC SPACE.
2. COORDINATE DUCT LOCATION WITH CLEAR TRUSS CORDS AND WEBS.
3. WHERE DUCT PENETRATES SHEAR WALL CUT OPENING 1/2" LARGER THEN DUCT AND PROVIDE 2x6 BLOCKING ALL AROUND TO NEAREST STUDS. COORDINATE WITH STRUCTURAL DRAWINGS.

KEY NOTES:

(1) DUCT RUNS ALONG BOTTOM OF CEILING.
(2) VENTILATION SYSTEM ALARM.
(3) SET AT 6'-0" ABOVE FINISHED FLOOR.

PLAN
SCALE: 1/4" = 1'-0"

PORTLAND, OREGON

SUBMITTED: _____ DATE: _____ PROJECT MANAGER

APPROVED: _____ DATE: _____ BROWN AND CALDWELL

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED: TAM
DRAWN: REJ
CHECKED: KJH
CHECKED: WKF
APPROVED: JB

EXTERNAL REFERENCE FILES
- 25204-000-G-1000-01.dwg
- 25204-XRF-OPSBLDG-GRID.dwg
- 25204-XRF-OPSBLDG-S-H.dwg
- 25204-XRF-OPSBLDG-S-GRID.dwg
- 25204-XRF-OPSBLDG-HVAC.dwg

REGISTERED PROFESSIONAL ENGINEER WILLIAM KARL PATSETT No. 29146 Exp. 03-31-07 CIVIL STATE OF CALIFORNIA

RECORD DRAWING

THIS DOCUMENT HAS BEEN PREPARED ON THE BASIS OF INFORMATION COMPILED FROM CONSTRUCTION RECORDS. THE ENGINEER IS NOT RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH HAVE BEEN INCORPORATED INTO THIS DOCUMENT. FIELD VERIFICATION OF CRITICAL FACTS AND DATA SHOULD BE MADE.

CRESCENT CITY, CA

CITY OF CRESCENT CITY 1854 CALIFORNIA

WATER POLLUTION CONTROL FACILITIES
MBR / BUILDINGS

HVAC

OPERATIONS BUILDING PLAN

FILENAME 25204-H-0102.DWG
BC PROJECT NUMBER 25204
CLIENT PROJECT NUMBER
DRAWING NUMBER H102

gformsen
Mar 29, 2011 - 11:09am
S:\3353.2 - CCWPCF - ASBUILT RECORD DRAWINGS\dwg\MBR\25204-H-0102-1.dwg
7/05/05

KEY NOTES:

1. 10"X16" BRANCH DOWN. SET REGISTERS AT 3' & 6' ABOVE FINISHED FLOOR.
2. BOTTOM OF HORIZONTAL DUCT 12'-2" ABOVE FINISHED FLOOR.
3. CHEMICAL ROOM INTAKE LOUVER IN WALL SPACE ABOVE GENERATOR ROOM.
4. SET AT 8'-0" ABOVE FINISHED FLOOR.
5. CONNECT EXHAUST FAN OUTLET DUCT TO GENERATOR OUTLET PLENUM.
6. PROVIDE BROAN MODEL 171H & 165FT WALL HEATER AT 500W, 120V OR EQUAL. INSTALL PER MANUFACTURERS INSTALLATION GUIDE.
7. SOUND LINED SHEET METAL PLENUM. SEAL AIR TIGHT WITH SOUND TRAPS.
8. 24"X24" ACCESS.
9. SET DUCT 1'-0" BELOW RAFTERS.

ST-4113A
ST-4113B
NEW, DO NOT REPLACE
PILASTER BELOW SEE S401
CONCRETAWALL & PILASTER BELOW
20X12
20X12
F 875
F 875
F 875
F 875
F-4123
EXHAUST FAN ON ROOF
12X12
UH-4121 4
F-4114
F-4124
(2) 4 500
CONST. JOINT IN SLAB
CONST. JOINT IN SLAB
Replace with 316 stainless steel ductwork
4 UH-4122
(2) 4 500
CMU COLD JOINT
HEAT PUMP
DOWN
EXIT
24X16
24X16
16X16
16X14
9
4 9 350
1 H405
6 UH-4132
F-4132
- 200
CMU COLD JOINT 1
10X16
2
10X6
F-4131
10X10
- 400
UH-4131 6
9
16X14
4 G 350
2 H405
3 H404
CHEMICAL ROOM

PLAN
SCALE: 3/16"=1'-0"

BROWN AND CALDWELL
PORTLAND, OREGON

SUBMITTED: _____ DATE: _____ PROJECT MANAGER
APPROVED: _____ DATE: _____ BROWN AND CALDWELL

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)	
DESIGNED:	TAM
DRAWN:	ABS
CHECKED:	KJH
CHECKED:	WKF
APPROVED:	JB

EXTERNAL REFERENCE FILES
25204-000-G-1000-01.dwg
25204-XRF-MBR-BLDG-coordinates.dwg
25204-XRF-MBR-BLDG-1FLR-M-HVAC.dwg
25204-XRF-MBR-BLDG-1FLR-A-N.dwg
25204-XRF-MBR-BLDG-1FLR-E-N.dwg
25204-XRF-MBR-BLDG-GRID-N.dwg

REGISTERED PROFESSIONAL ENGINEER WILLIAM KARL FASSET No. 29146 Exp. 03-31-07 CIVIL STATE OF CALIFORNIA

RECORD DRAWING

THIS DOCUMENT HAS BEEN PREPARED ON THE BASIS OF INFORMATION COMPILED FROM CONSTRUCTION RECORDS. THE ENGINEER IS NOT RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH HAVE BEEN INCORPORATED INTO THIS DOCUMENT. FIELD VERIFICATION OF CRITICAL FACTS AND DATA SHOULD BE MADE.

CRESCENT CITY, CA

CITY OF CRESCENT CITY CALIFORNIA 1854

WATER POLLUTION CONTROL FACILITIES
MBR / BUILDINGS

HVAC

MBR BUILDING
GROUND LEVEL PLAN

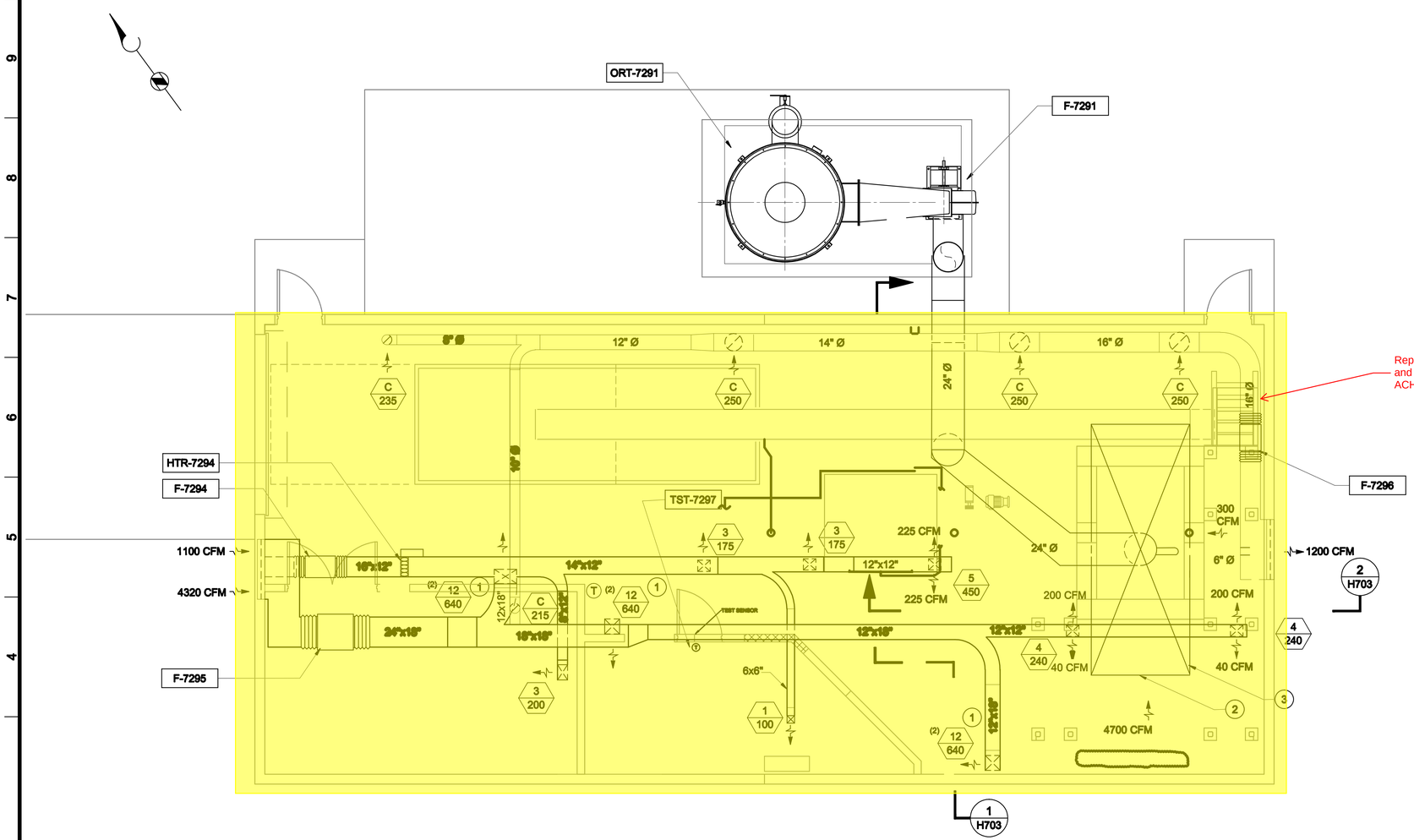
FILENAME 25204-H-0403.DWG
BC PROJECT NUMBER 25204
CLIENT PROJECT NUMBER
DRAWING NUMBER H403

JULY 2005

gthomson
Feb 17, 2011 - 10:15am
S:\25204.2 - CCWPCF - ASBUILT RECORD DRAWINGS\dwg\MBR\25204-H-0403.dwg

KEY NOTES:

1. SET ONE REGISTER 3'-0" ABOVE FINISH FLOOR (AFF) AND ONE 8'-0" AFF.
2. EXHAUST HOOD. SEE DETAIL A/H704.
3. SEE DETAIL B/H704 FOR DRAIN PIPE PARTIAL PLAN.



PLAN
SCALE: 1/4" = 1'-0"

BROWN AND CALDWELL
PORTLAND, OREGON

SUBMITTED: _____ DATE: _____ PROJECT MANAGER
APPROVED: _____ DATE: _____ BROWN AND CALDWELL

JULY 2006

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)	
DESIGNED:	ECJO
DRAWN:	REJ
CHECKED:	KJH
CHECKED:	WKF
APPROVED:	JB

EXTERNAL REFERENCE FILES
25204-XRF-DWTRGBLDG-S-N.dwg
25204-XRF-DWTRGBLDG-M-N.dwg
25204-000-G-1000-01.dwg
25204-XRF-DWTRGBLDG-HVAC.dwg
25204-S-0752_truss.dwg

REGISTERED PROFESSIONAL ENGINEER WILLIAM KARL FAISST No. 29146 Exp. 03-31-07 CIVIL STATE OF CALIFORNIA

RECORD DRAWING

THIS DOCUMENT HAS BEEN PREPARED ON THE BASIS OF INFORMATION COMPILED FROM CONSTRUCTION RECORDS. THE ENGINEER IS NOT RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH HAVE BEEN INCORPORATED INTO THIS DOCUMENT. FIELD VERIFICATION OF CRITICAL FACTS AND DATA SHOULD BE MADE.

CRESCENT CITY, CA

CITY OF CRESCENT CITY 1854 CALIFORNIA

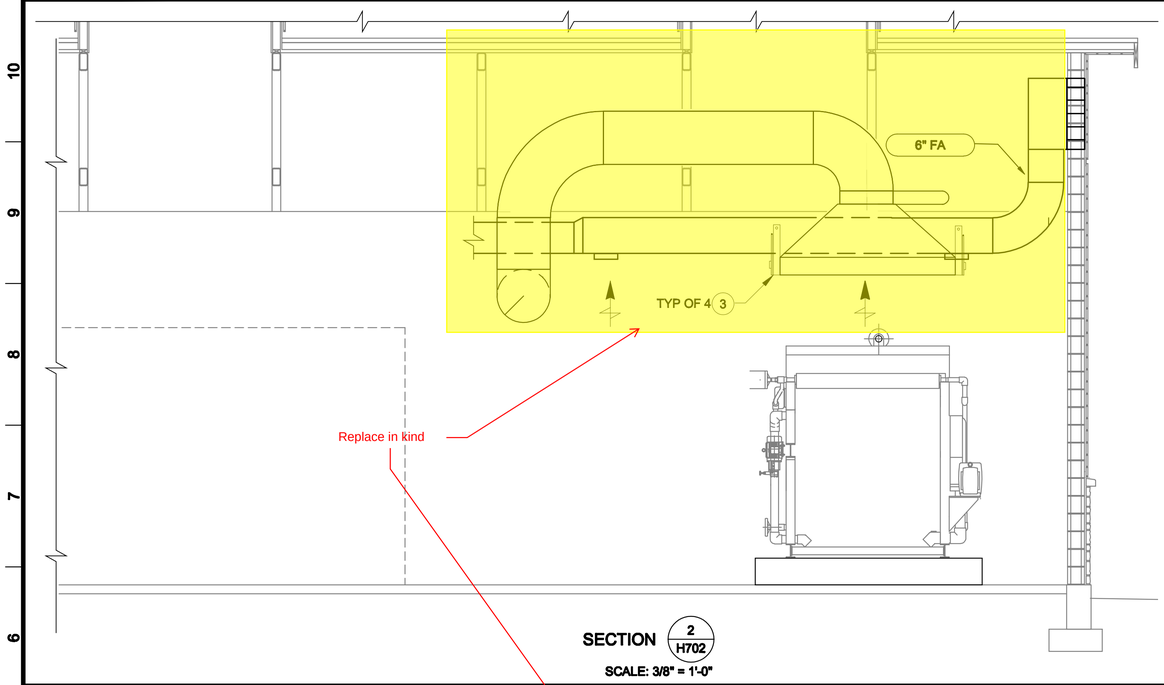
WATER POLLUTION CONTROL FACILITIES
MBR / BUILDINGS

HVAC

DEWATERING BUILDING PLAN

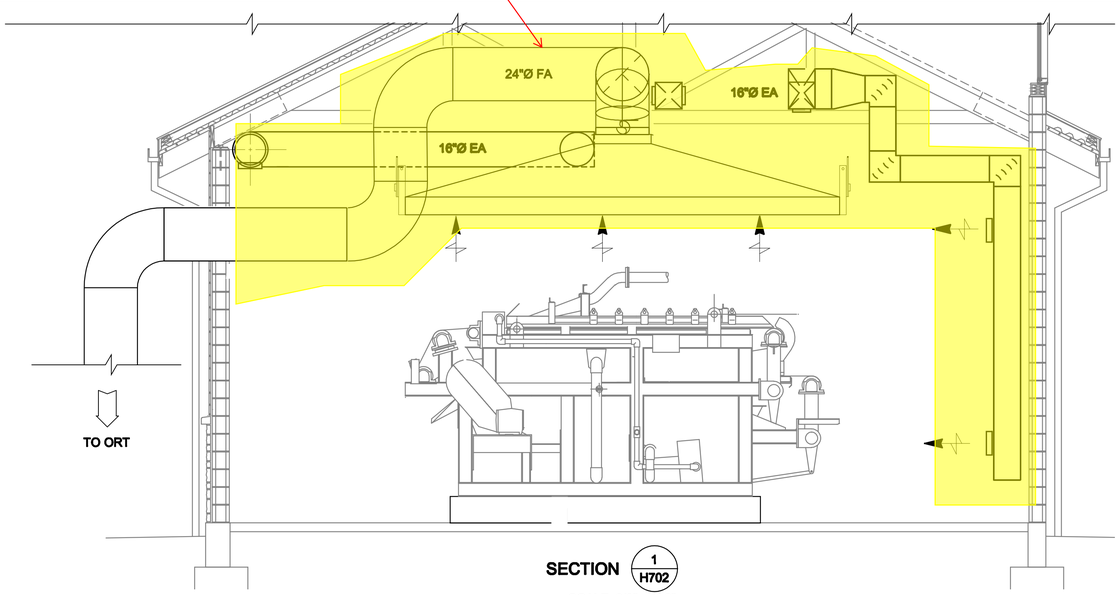
FILENAME	25204-H-0702.DWG
BC PROJECT NUMBER	25204
CLIENT PROJECT NUMBER	
DRAWING NUMBER	H702

gthomson
Feb 17, 2011 - 10:23am
S:\3804.2 - CCWPCF - ASBUILT RECORD DRAWINGS\dwg\ARCH\25204-H-0702.dwg



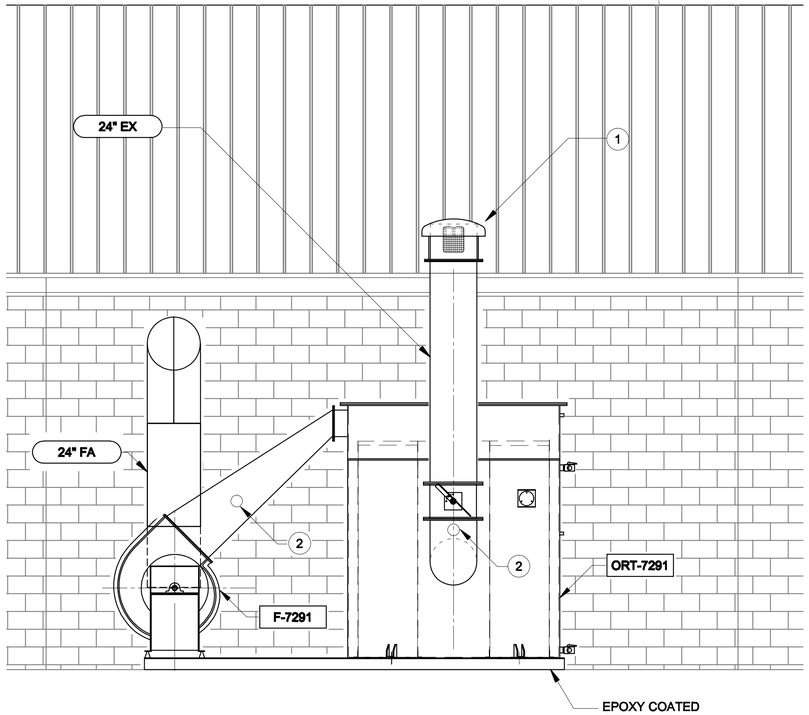
SECTION 2 / H702

SCALE: 3/8" = 1'-0"



SECTION 1 / H702

SCALE: 3/8" = 1'-0"



ODOR CONTROL

ELEVATION

SCALE: 3/8" = 1'-0"

KEY NOTES

1. SET STACK DISCHARGE MIN 2 FEET ABOVE BUILDING EAVE.
2. AIR SAMPLE PORTS.
3. HANG HOOD AT EACH CORNER FROM STRUCTURE WITH 1/4" STAINLESS STEEL CABLE AND TURNBUCKLES.
4. SEE DETAIL B/H704 FOR CONTINUATION.

PORTLAND, OREGON

SUBMITTED: _____ DATE: _____ PROJECT MANAGER

APPROVED: _____ DATE: _____ BROWN AND CALDWELL

JULY 2005

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED: TAM
DRAWN: REJ
CHECKED: KJH
CHECKED: WKF
APPROVED: JB

EXTERNAL REFERENCE FILES

25204-000-G-1000-01.dwg
25204-XRF-DWTRGBLDG-BSCT-S-N.dwg
25204-XRF-DWTRGBLDG-M-N.dwg
25204-XRF-DWTRGBLDG-S-N.dwg
25204-XRF-DWTRGBLDG-BSCT-A-N.dwg
25204-XRF-DWTRGBLDG-ELEV-M-N.dwg

REGISTERED PROFESSIONAL ENGINEER
WILLIAM KARL FASSET
No. 29146
Exp. 03-31-07
CIVIL
STATE OF CALIFORNIA

RECORD DRAWING

THIS DOCUMENT HAS BEEN PREPARED ON THE BASIS OF INFORMATION COMPILED FROM CONSTRUCTION RECORDS. THE ENGINEER IS NOT RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH HAVE BEEN INCORPORATED INTO THIS DOCUMENT. FIELD VERIFICATION OF CRITICAL FACTS AND DATA SHOULD BE MADE.

CRESCENT CITY, CA

CITY OF CRESCENT CITY CALIFORNIA 1854

WATER POLLUTION CONTROL FACILITIES
MBR / BUILDINGS

HVAC

DEWATERING BUILDING SECTIONS AND ELEVATION

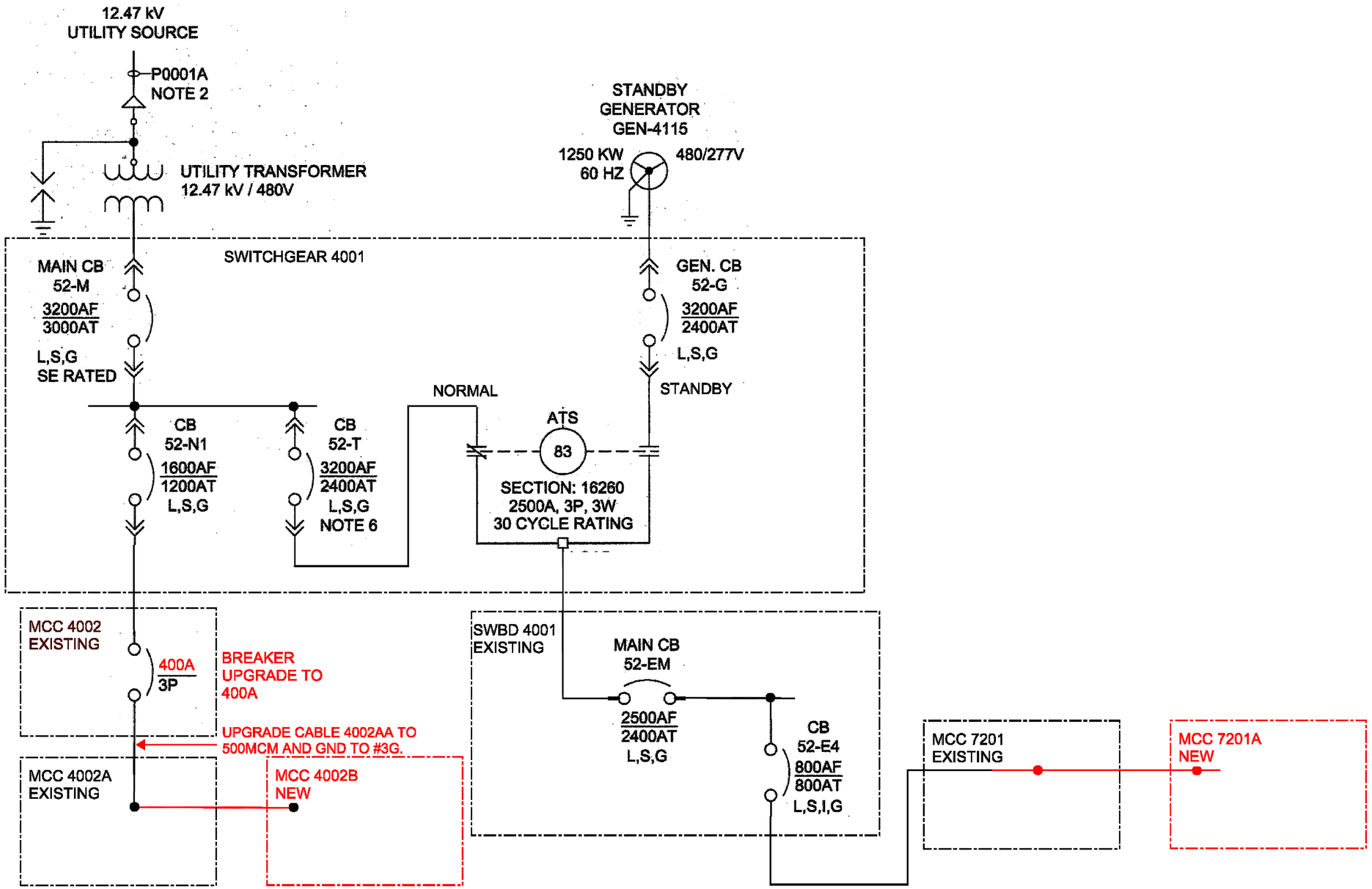
FILENAME: 25204-H-0703.DWG
BC PROJECT NUMBER: 25204
CLIENT PROJECT NUMBER:
DRAWING NUMBER: H703

Feb 17, 2011 - 10:28am gthomson
S:\3838\2 - CONPCF - ASBUILT RECORD DRAWINGS\dwg\MBR\25204-H-0703.dwg

Appendix G
Half Size One-Line Diagrams and Motor Control Center Plan and Elevations

GENERAL SHEET NOTES

1. PARTIAL ONE SHOWS MAIN EXISTING FEEDS AND NEW ADDITIONS ONLY.
2. NEW COORDINATION AND ARC FLASH STUDIES WILL BE REQUIRED.

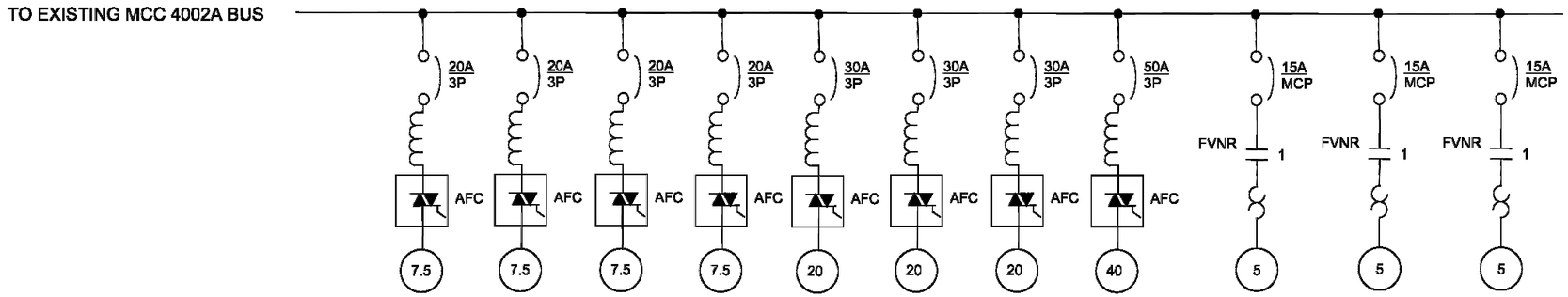


1 OVERALL ONELINE
NTS

W8Y18700

GENERAL SHEET NOTES

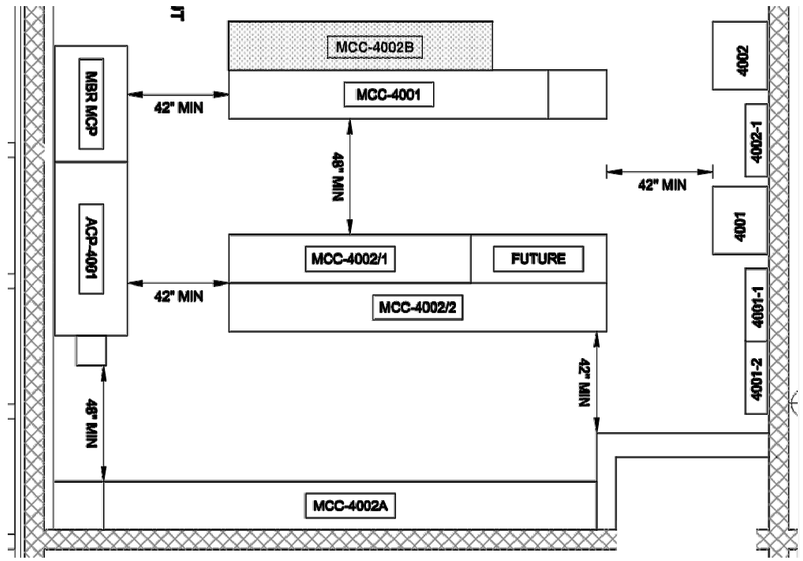
1. MCC 4002B AC POWER AND SCADA SHALL BE CONNECTED TO MCC 4002A BUS AND SCADA TRUNKNET TERMINATION.
2. FEEDER BREAKER FROM MCC4002 WILL NEED TO BE UPGRADED TO 400A AND CONDUIT 4002AA UPGRADED TO 500MCM AND #3 GND CABLE.
3. COORDINATION SETTINGS AND ARC FLASH WILL NEED TO BE REVIEWED. ARC FLASH CALCULATIONS FOR MCC4002 FEEDER, MCC4002A, AND MCC4002B WILL NEED TO BE SUPPLIED.
4. MAXIMUM HEAT LOSS FROM AFC DRIVES IS: 1.65 TON = 19855 BTU/HR



2 MCC 4002B ONELINE

7.5HP AS FILTRATE PUMP	7.5HP AS FILTRATE PUMP	7.5HP AS FILTRATE PUMP	7.5HP AS RECYCLE PUMP	5HP CS AERATION TANK DRAIN PUMP 5HP CS BAND SCREEN 5HP CS ANOXIC MIXER
20HP AS MIXED LIQUOR PUMP	20HP AS MIXED LIQUOR PUMP	20HP AS MIXED LIQUOR PUMP	40HP AS AIR SCOUR BLOWER	SPARE

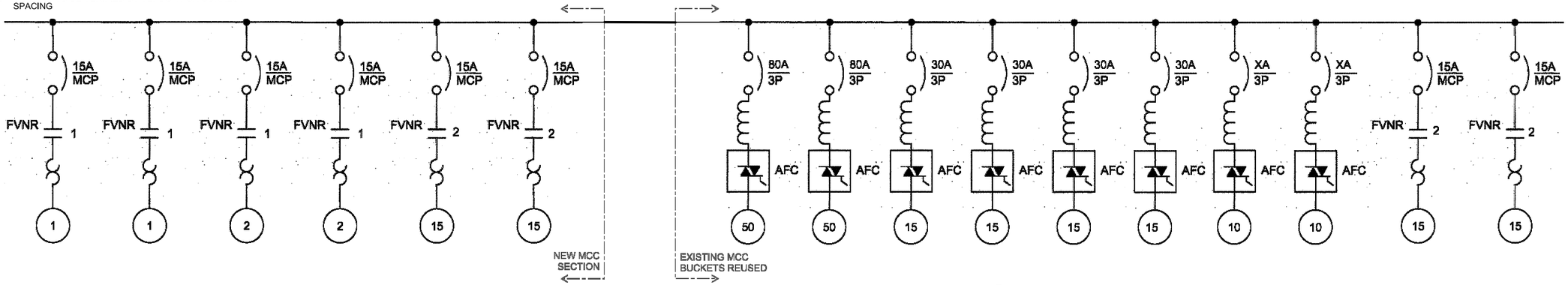
1 ELEVATION MCC 4002B
NTS



3 PLAN MBR ELECTRICAL ROOM GND FLOOR
NTS

GENERAL SHEET NOTES

1. MCC7201A AC POWER AND SCADA SHALL BE CONNECTED TO MCC7201 BUS AND SCADA TRUNKNET TERMINATION.
2. FEEDER BREAKER FROM MCC7201 WILL NEED COORDINATION SETTINGS REVIEWED. ARC FLASH CALCULATIONS FOR MCC7201 FEEDER AND MCC7201A WILL NEED TO BE SUPPLIED.
3. MAXIMUM HEAT LOSS FROM AFC DRIVES IS: 2.3 TON = 27500 BTU/HR
4. MCC7201 TO BE VERIFIED BY VENDOR FOR CORRECT SPACING



2 MCC 7201A ONELINE
NEW SECTION

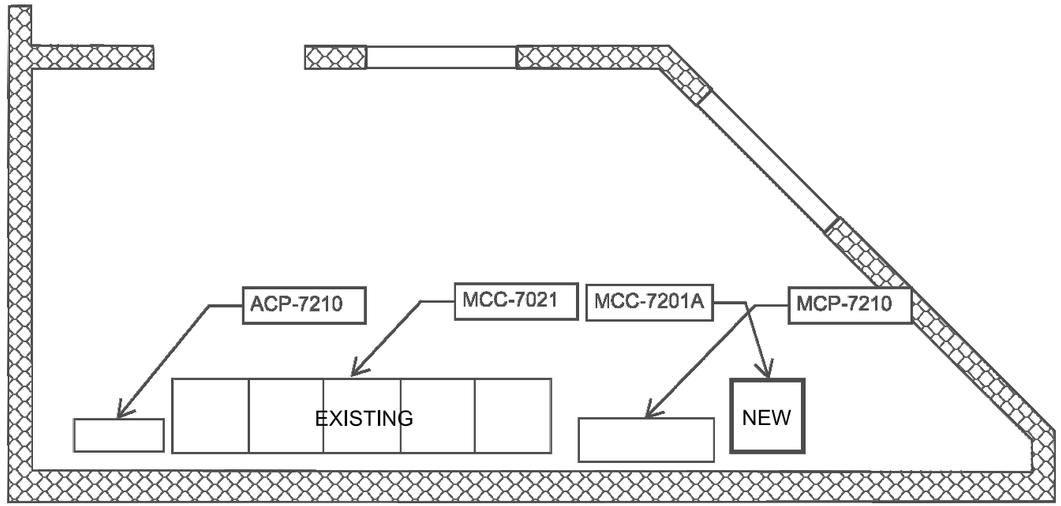
3 MCC 7201 ONELINE
ADDITIONS TO EXISTING

CS FVNR 1HP DISK FILTER TRAIN 1
CS FVNR 1HP DISK FILTER TRAIN 2
CS FVNR 2HP Filter Backwash Pump 1
CS FVNR 2HP Filter Backwash Pump 2
CS FVNR 15HP JET AERATOR 1
CS FVNR 15HP JET AERATOR 2
SPARE

10HP AS MIXER 1	10HP AS MIXER 2	SPARE		
15HP AS Cloth Disk Influent Pump Station 1	15HP AS Cloth Disk Influent Pump Station 2	50HP AS AERATION BLOWER 1	SPACE ALREADY USED	SPACE ALREADY USED
15HP AS Pump Station 3	15HP AS Pump Station 4	50HP AS AERATION BLOWER 2		CS FVNR 10HP DS PUMP 1
				CS FVNR 10HP DS PUMP 2
				SPARE

4 ELEVATION MCC 7201A
NTS NEW MCC SECTION

1 ELEVATION MCC 7201
NTS MODIFICATIONS TO EXISTING



5 PLAN DEWATERING BDLG
NTS CONTROL ROOM

Appendix H
National Fire Protection Association
820 Area Classification

GENERAL NOTES:

1. ALL COORDINATE VALUES SHOWN ARE BASED ON NAD 83. COORDINATES SHOWN ARE LOCATED AT THE CENTER OR CORNER POINT ON STRUCTURES. VERTICAL DATUM IS BASED ON NAVD 88.

GENERAL NOTES CONT'D:

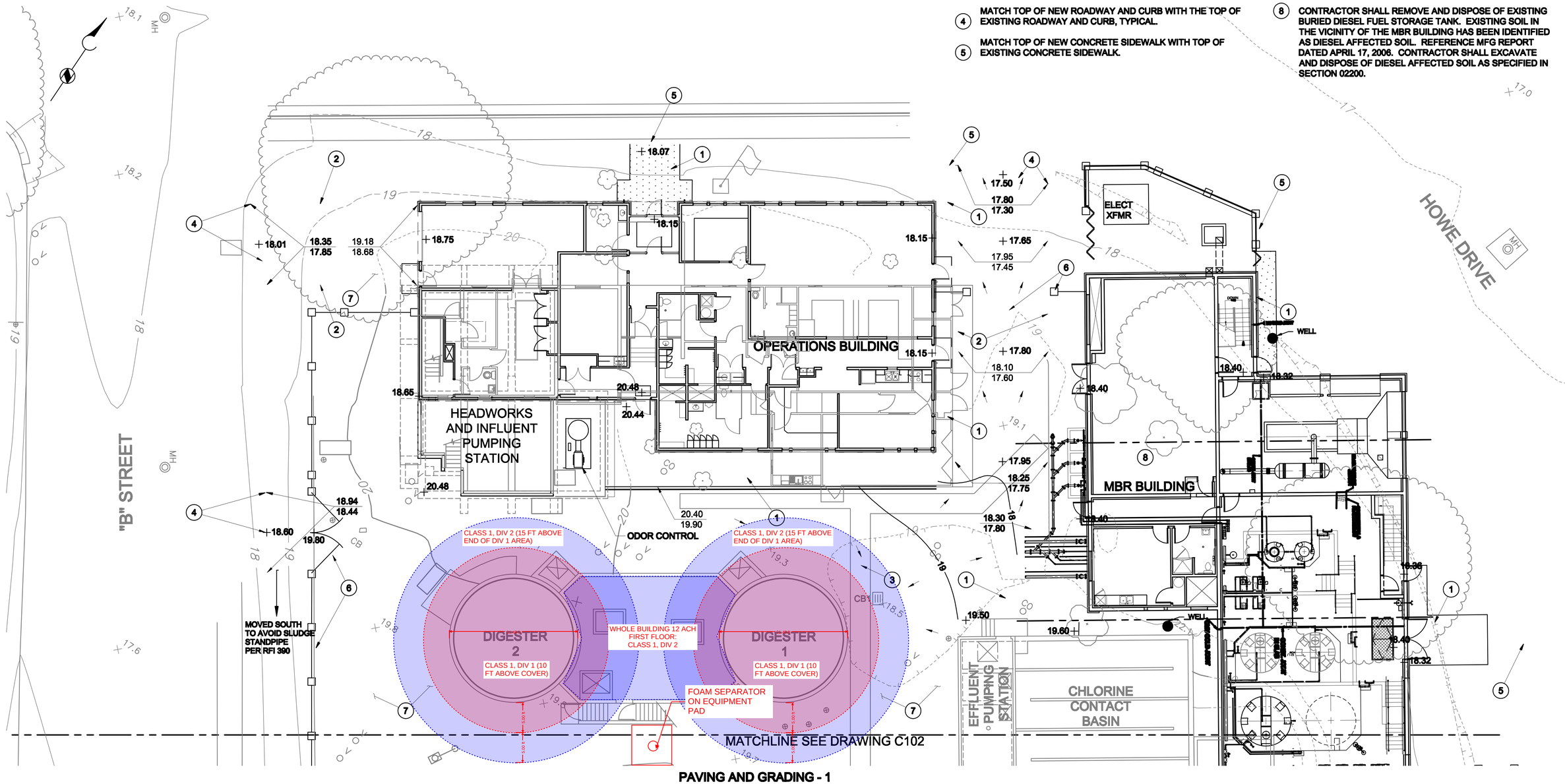
2. ELEVATIONS SHOWN ON ROADWAY ARE TOP OF PAVEMENT. TOP OF CURB WILL BE 6-INCHES HIGHER.
3. FOR LANDSCAPING, SEE LANDSCAPING DRAWINGS.

KEY NOTES:

1. PROVIDE CONCRETE SIDEWALK PER DETAIL C/C3.
2. PROVIDE CONCRETE CURB PER DETAIL B/C3.
3. EXISTING ELECTRICAL DUCTBANK.
4. MATCH TOP OF NEW ROADWAY AND CURB WITH THE TOP OF EXISTING ROADWAY AND CURB, TYPICAL.
5. MATCH TOP OF NEW CONCRETE SIDEWALK WITH TOP OF EXISTING CONCRETE SIDEWALK.

KEY NOTES CONT'D:

6. SITE PERIMETER FENCE AND GATE, TYP. SEE DRAWING C5 FOR DETAILS.
7. PROVIDE TYPE B ROADWAY OVER ALL SHADED AREAS PER DETAIL A/C3.
8. CONTRACTOR SHALL REMOVE AND DISPOSE OF EXISTING BURIED DIESEL FUEL STORAGE TANK. EXISTING SOIL IN THE VICINITY OF THE MBR BUILDING HAS BEEN IDENTIFIED AS DIESEL AFFECTED SOIL. REFERENCE MFG REPORT DATED APRIL 17, 2006. CONTRACTOR SHALL EXCAVATE AND DISPOSE OF DIESEL AFFECTED SOIL AS SPECIFIED IN SECTION 02200.



PAVING AND GRADING - 1

PLAN

SCALE: 1"=10'-0"

PORTLAND, OREGON

SUBMITTED: _____ DATE: _____
PROJECT MANAGER

APPROVED: _____ DATE: _____
BROWN AND CALDWELL

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)	
DESIGNED:	WMH
DRAWN:	GAS
CHECKED:	JLB
CHECKED:	WKF
APPROVED:	BKP

EXTERNAL REFERENCE FILES
25204-000-G-1000-01.dwg
SE_25204-XRF-SITE-C-E_SE.dwg
SE_25204-XRF-SITE-STRC-C-N_SE.dwg
25204-XRF-MBR-BLDG-1FLR-S-N.dwg
25204-XRF-DWTRGBLDG-S-N.dwg
25204-XRF-OPSBLDG-S-N.dwg
25204-XRF-DWTRGBLDG-M-N.dwg
25204-XRF-SCNDRY-CLHRN-S-N.dwg
25204-XRF-SCNDRY-CLHRN-M-N.dwg
25204-XRF-MBR-BLDG-1FLR-A-N.dwg
25204-XRF-OPSBLDG-GRID.dwg
25204-XRF-LABBLDG-1FLR.dwg

REGISTERED PROFESSIONAL ENGINEER WILLIAM KARL FAISST No. 29146 Exp. 03-31-07 CIVIL STATE OF CALIFORNIA

RECORD DRAWING

THIS DOCUMENT HAS BEEN PREPARED ON THE BASIS OF INFORMATION COMPILED FROM CONSTRUCTION RECORDS. THE ENGINEER IS NOT RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH HAVE BEEN INCORPORATED INTO THIS DOCUMENT. FIELD VERIFICATION OF CRITICAL FACTS AND DATA SHOULD BE MADE.

CRESCENT CITY, CA

CITY OF CRESCENT CITY 1854 CALIFORNIA

WATER POLLUTION CONTROL FACILITIES
MBR / BUILDINGS

CIVIL

PAVING AND GRADING PLAN - 1

FILENAME	25204-C-0101.MBR.DWG
BC PROJECT NUMBER	25204
CLIENT PROJECT NUMBER	
DRAWING NUMBER	C101

07-21-05

Apr 19, 2011 - 10:57am gthomson
S:\25000\25-COM\PCF - ASBUILT RECORD DRAWINGS\dwg\MBR\25204-C-0101.MBR.dwg

GENERAL NOTES:

1. REFER TO GENERAL NOTES ON DRAWING C101.

KEY NOTES:

1. PROVIDE CONCRETE CURB PER DETAIL B/C3.
2. MATCH TOP OF ROADWAY AND CURB WITH TOP OF EXISTING ROADWAY AND CURB.

KEY NOTES CONT'D:

3. EXISTING ELECTRICAL DUCTBANK.
4. SITE PERIMETER FENCE AND GATE, TYPICAL. SEE DRAWING C5 FOR DETAILS.

KEY NOTES CONT'D:

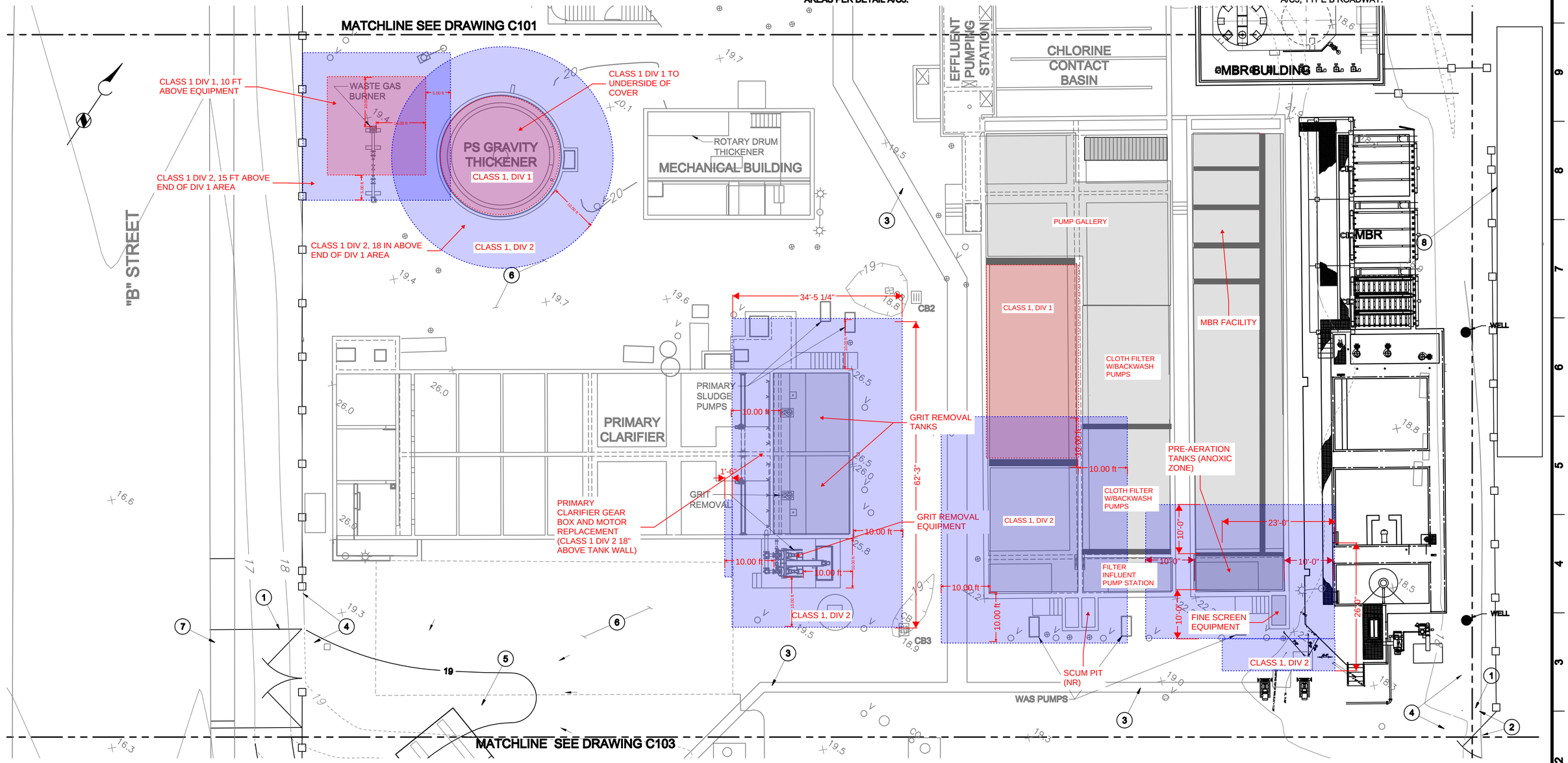
5. CONCRETE PAVEMENT, SEE DEWATERING BUILDING STRUCTURAL DRAWINGS.
6. PROVIDE TYPE B ROADWAY OVER ALL SHADED AREAS PER DETAIL A/C3.

KEY NOTES CONT'D:

7. PROVIDE 2-FOOT WIDE CONCRETE VALLEY GUTTER SIMILAR TO DETAIL D/C3. MATCH TOP OF VALLEY GUTTER WITH TOP OF EXISTING ROADWAY.

KEY NOTES CONT'D:

8. REPLACE CURB, GUTTER AND SIDEWALK TO EXTENT NEEDED FOR PLACEMENT OF 12-INCH RWR. SEE DRAWING C105. CURB, GUTTER AND SIDEWALK PER DETAIL C/C3. PAVING TO BE REPLACED TO MATCH EXISTING GRADE AND PER DETAIL A/C3, TYPE B ROADWAY.



PAVING AND GRADING - 2

PLAN

SCALE: 1"=10'-0"

PORTLAND, OREGON

SUBMITTED: _____ DATE: _____ PROJECT MANAGER

APPROVED: _____ DATE: _____ BROWN AND CALDWELL

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)	
DESIGNED:	WMH
DRAWN:	GAB
CHECKED:	JLB
CHECKED:	WKF
APPROVED:	BKP

EXTERNAL REFERENCE FILES

25204-000-G-1000-01.dwg
SE_25204-XRF-SITE-C-S_SE.dwg
SE_25204-XRF-SITE-STRC-C-H_SE.dwg
25204-XRF-MBR-BLDG-1FLR-S-N.dwg
25204-XRF-DWTRGBLDG-S-N.dwg
25204-XRF-OPSBLDG-S-N.dwg
25204-XRF-DWTRGBLDG-M-N.dwg
25204-XRF-SCNDRY-CLHRN-M-N.dwg
25204-XRF-SCNDRY-CLHRN-S-N.dwg
25204-XRF-MBR-BLDG-1FLR-M-N.dwg
25204-XRF-MBR-BLDG-1FLR-A-N.dwg
25204-XRF-OPSBLDG-GRID.dwg
25204-XRF-LABBLDG-1FLR.dwg

REGISTERED PROFESSIONAL ENGINEER — WILLIAM KARL FAYBISH — No. 29146 — Exp. 03-31-07 — CIVIL — STATE OF CALIFORNIA

RECORD DRAWING

THIS DOCUMENT HAS BEEN PREPARED ON THE BASIS OF INFORMATION COMPILED FROM CONSTRUCTION RECORDS. THE ENGINEER IS NOT RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH HAVE BEEN INCORPORATED INTO THIS DOCUMENT. FIELD VERIFICATION OF CRITICAL FACTS AND DATA SHOULD BE MADE.

CRESCENT CITY, CA

CITY OF CRESCENT CITY CALIFORNIA 1854

WATER POLLUTION CONTROL FACILITIES MBR / BUILDINGS

CIVIL

PAVING AND GRADING PLAN - 2

FILENAME	25204-C-0102.MBR.DWG
BC PROJECT NUMBER	25204
CLIENT PROJECT NUMBER	
DRAWING NUMBER	C102

08-21-06

Apr 19, 2011 - 11:06am
@thomson
S:\25204.2 - CCWPCF - ASBUILT RECORD DRAWINGS\dwg\MBR\25204-C-0102.MBR.dwg

GENERAL NOTES:

1. REFER TO GENERAL NOTES ON DRAWING C101.

KEY NOTES:

(1) EXISTING ELECTRICAL DUCTBANK.

(2) CONCRETE PAVEMENT, SEE DEWATERING BUILDING STRUCTURAL DRAWINGS.

KEY NOTES CONT'D:

(3) PROVIDE TYPE B ROADWAY OVER ALL SHADED AREAS PER DETAIL A/C3.

(4) PROVIDE CONCRETE SIDEWALK PER DETAIL C/C3.

KEY NOTES CONT'D:

(5) EXISTING PAVED BIKE PATH. CONTRACTOR SHALL PROTECT PATH FROM DAMAGE DURING CONSTRUCTION. ANY DAMAGE SHALL BE REPAIRED TO ORIGINAL CONDITIONS.

(6) SITE PERIMETER FENCE, SEE DRAWING C5 FOR DETAILS.

KEY NOTES CONT'D:

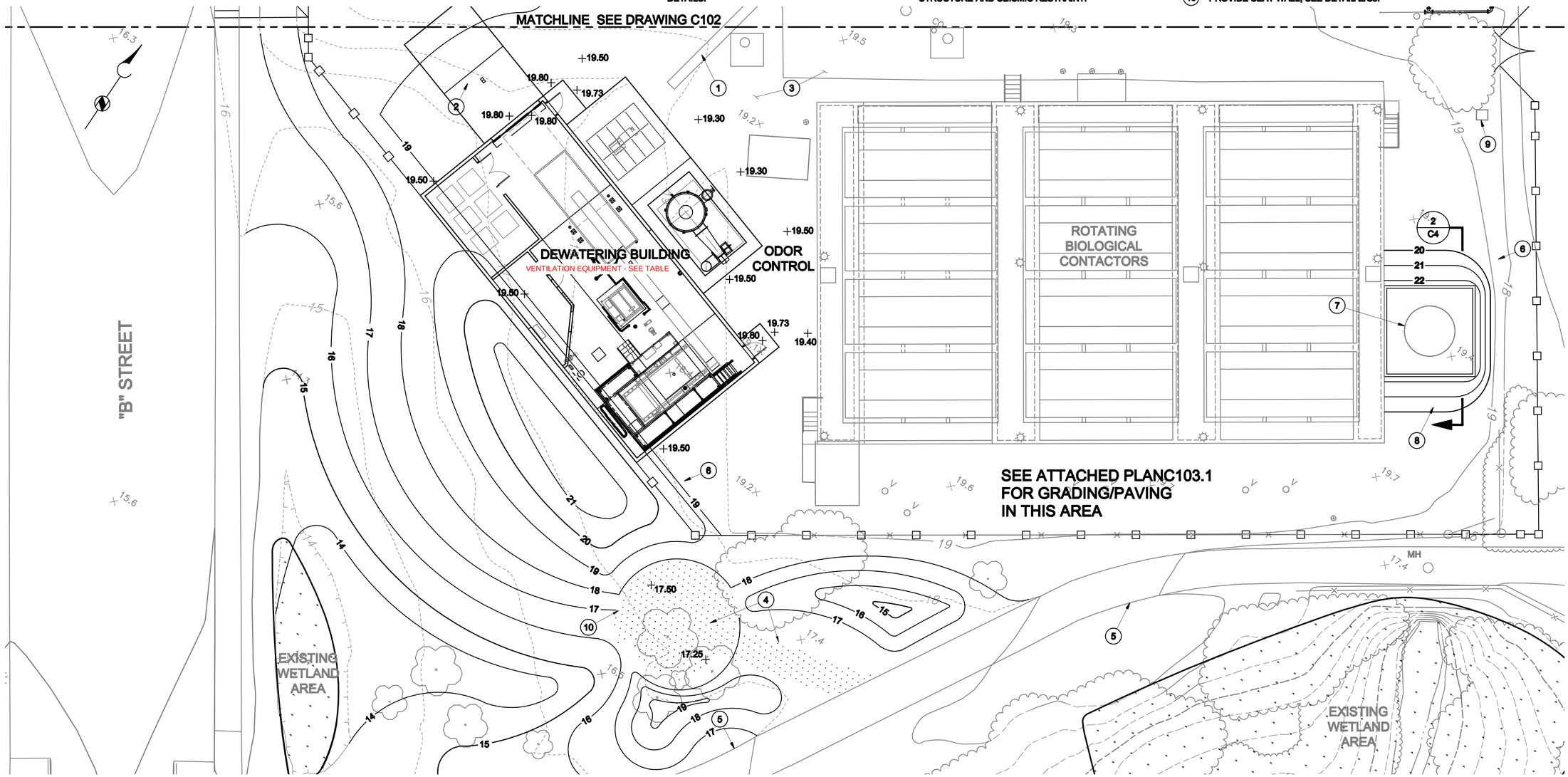
(7) RELOCATE CHEMICAL STORAGE TANK FROM NORTH OF SECONDARY CLARIFIER TO THIS LOCATION. PROVIDE SECONDARY CONTAINMENT STRUCTURE AND INTERCONNECTING PIPING FOR A COMPLETE INSTALLATION. SEE SECTION 2/C4 FOR TEMPORARY CHEMICAL STORAGE TANK FOUNDATION, CONTAINMENT STRUCTURE AND SEISMIC RESTRAINT.

KEY NOTES CONT'D:

(8) PROVIDE STRUCTURAL FILL TO BRING GRADE UP TO ELEVATION 22.00 AT TANK BASE.

(9) RELOCATE EXISTING FIBERGLASS TRUCK UNLOADING STATION FROM NORTH OF SECONDARY CLARIFIERS TO THIS LOCATION. PROVIDE 4-INCH CONCRETE SLAB ON GRADE ON 4-INCH CLASS A1 FILL.

(10) PROVIDE SEAT WALL, SEE DETAIL E/C5.



PAVING AND GRADING - 3

PLAN

SCALE: 1"=10'-0"

PORTLAND, OREGON

SUBMITTED: _____ DATE: _____ PROJECT MANAGER

APPROVED: _____ DATE: _____ BROWN AND CALDWELL

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)	
DESIGNED:	WMH
DRAWN:	GAS
CHECKED:	JLB
CHECKED:	WKF
APPROVED:	BKP

EXTERNAL REFERENCE FILES

26204-000-G-1000-01.dwg
SE_26204-XRF-SITE-C-E_SE.dwg
SE_26204-XRF-SITE-STRC-C-N_SE.dwg
26204-XRF-MBR-BLDG-1FLR-S-N.dwg
26204-XRF-DWTRGBLDG-S-N.dwg
26204-XRF-OPSBLDG-S-N.dwg
26204-XRF-DWTRGBLDG-M-N.dwg
26204-XRF-SCNDRY-CLHRN-M-N.dwg
26204-XRF-SCNDRY-CLHRN-S-N.dwg
26204-XRF-MBR-BLDG-1FLR-M-N.dwg
26204-XRF-MBR-BLDG-1FLR-A-N.dwg
26204-XRF-OPSBLDG-GRID.dwg
26204-XRF-LABBLDG-1FLR.dwg
26204-XRF-ADMBLDG-GRID.dwg
SURVEY RECORD LOCATIONS.dwg
CHECK - M PIPE 20PE DBL1 N STAGE 1B.dwg

REGISTERED PROFESSIONAL ENGINEER — WILLIAM KARL FAYBET — No. 29146 — Exp. 03-31-07 — CIVIL — STATE OF CALIFORNIA

RECORD DRAWING

THIS DOCUMENT HAS BEEN PREPARED ON THE BASIS OF INFORMATION COMPILED FROM CONSTRUCTION RECORDS. THE ENGINEER IS NOT RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH HAVE BEEN INCORPORATED INTO THIS DOCUMENT. FIELD VERIFICATION OF CRITICAL FACTS AND DATA SHOULD BE MADE.

CRESCENT CITY, CA

CITY OF CRESCENT CITY — 1854 — CALIFORNIA

WATER POLLUTION CONTROL FACILITIES
MBR / BUILDINGS

CIVIL

PAVING AND GRADING PLAN - 3

FILENAME	26204-C-0103.MBR.DWG
BC PROJECT NUMBER	26204
CLIENT PROJECT NUMBER	
DRAWING NUMBER	C103

gthomson
Feb 11, 2011 - 10:55am
S:\26XX\26204 - CH\PCF - ASBUILT RECORD DRAWINGS\MBR\26204-C-0103.MBR.dwg

09-08-05